

Let them shine: insights from an outdoor education initiative for primary school students about an olive tree collection.

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Abstract. Nowadays, experiential learning and outdoor education are increasingly relevant due to phenomena of ‘extinction of experience’ (Pyle, 1993), ‘plant blindness’ (Wandersee & Schussler, 2001) and ‘nature deficit childhoods’ (Louv, 2005). This paper revisits experiential learning and outdoor education concepts and some of their history development for European and North American contexts. It describes an experiential learning initiative held in Portugal, during 2019, at an olive tree collection (*Olea europaea* L.) aimed to (re)connect primary school students with nature, to support teachers in hands-on experiences and to demonstrate the potential of an olive tree collection as a resource for outdoor education. It was structured with outdoor visits to complement classroom learning and engaged five teachers and 117 students, aged 8-9 years. It highlights olive tree biodiversity as an important issue due to biodiversity erosion within agriculture (Linos Nikoloudakis, Katsiotis, & Hagidimitriou, 2014; Mousavi Mariotti, Regni, Nasini, Bufacchi, Pandolfi, Baldoni, & Proietti, 2017). Survey results showed that students and teachers found the outdoor visits enriching for the learning process. Implications for practice are discussed in terms of outdoor education project design for childhood, a human developmental phase during which the role of provision of stimulating environmental conditions is crucial to strengthen individual competencies to make decisions able to accelerate transition for more sustainable societies (UN, 2019).

Keywords: experiential learning; *Olea europaea*; outdoor education; plant blindness

Introduction

Experiential learning

“Nothing will protect Nature more effectively, our Earth, than the individual's opportunity to enjoy nature in childhood, crawl, walk and run surrounded by growing plants, trees and the variety of animals we still have around us.” (Jakobsson, 1998, p. 26).

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e-publisher: National Documentation Centre, National Hellenic Research Foundation
URL: <http://ejournals.epublishing.ekt.gr/index.php/education>

The drive to discover or explore, understand and use natural resources is considered to be a basic human trait. However, in western societies, at the end of the twentieth century it was verified that the young generation was increasingly disconnected from nature due to phenomena of 'extinction of experience' (Pyle, 1993), 'plant blindness' (Wandersee & Schussler, 2001) or 'nature deficit childhoods' (Louv, 2005). Since then, experiential learning in nature received a renewed attention and began to be perceived as an excellent opportunity to engage young people, both cognitively and physically, with nature and the countryside (O'Brien & Weldon, 2007).

Later on, in the United Kingdom, the 'learning outside the classroom manifesto' (DfES, 2006) arose, which "championed a move beyond the classroom towards more diverse learning sites, including the outdoors" (Harris 2018, p. 223). This variety of settings in which an individual engages in learning highlights that youth development occurs across multiple contexts, which span from "formal education systems (e.g., schools), to informal learning settings (e.g., museums) and organized or semi-formal activities such as afterschool programmes" (Akiva 2012 as cited in Russell, Knutson & Crowley 2013, p. 261). Therefore, the huge potential that informal-formal collaboration has in expanding learning opportunities for children and youth, as well as its current developments and future challenges constitute a research field that goes beyond the scope of this paper, being discussed by other authors (e.g. see Bevan, Dillon, Hein, Macdonald, Michalchik, Miller, Root, Rudder, Xanthoudaki, & Yoon, 2010).

In this paper, concepts of 'Learning through experience' or 'Experiential Learning' follow Stonehouse, Allison & Carr, (2011) perspective which framed it as a theory of education that "broadly encompasses many contexts". Within various contexts, the one which uses natural environment as the locus for learning experientially is considered to be 'outdoor education'.

Outdoor education

Although it is not possible to precisely define when outdoor learning emerged, literature generally describes excursions and field trips as enriching complements to student education. Among the many definitions of outdoor education, the following classical definition - "outdoor education is in, about, and for the outdoors" (Donaldson & Donaldson, 1958, p. 17) - was considered to be a comprehensive one, as it included where the learning process took place, the topic to be taught, and the activity's purpose.

This classical definition was also cited by Rickinson et al. (2004) for whom the related concept of 'outdoor learning' was considered as a broad and complex one, which touched on a wide range of educational activities within different natural environment settings. These authors highlighted that within outdoor education literature there was a plethora of terms, which while differing in meaning, were used instead of outdoor education. They included, among others, 'environmental education', 'conservation education', 'experiential education' and 'environmental interpretation', being recognized by Andrews (2003 as cited in Borland, 2011) that 'environmental education' began to be used interchangeably with the term 'outdoor education'.

According to Rickinson et al. (2004), outdoor learning could be seen as a concept and practice with a range of different *foci*, outcomes and locations. The *foci* of outdoor learning, for example, could include, among other things, 'learning about nature, as in outdoor ecological field study' or 'learning about society, as in community-based gardening initiatives'. These authors considered that locations of outdoor learning could encompass, for instance: (i) school grounds or gardens; (ii) wilderness areas; (iii) rural or city farms; (iv) field study/nature centres; among others. Acknowledging this variety, these authors framed the literature (not

for definitional purposes) using: 1) a three-fold categorisation of outdoor learning activities; and 2) a four-fold breakdown of their possible learning outcomes.

Therefore, categories of learning activities included: (i) fieldwork and outdoor visits, (ii) outdoor adventure education; (iii) school grounds and community-based projects. According to Rickinson et al. (2004), the four-fold breakdown of their possible learning outcomes included: (i) cognitive impacts (e.g., knowledge and other academic outcomes); (ii) affective impacts (e.g., attitudes, values, beliefs and self-perceptions); (iii) interpersonal/ social impacts (e.g., communication skills, teamwork); (iv) physical/ behavioural impacts (e.g., physical fitness, personal behaviours). For the purposes of this paper, outdoor learning is explored in terms of the 'fieldwork and outdoor visits' category and learning outcomes are examined in terms of some of the abovementioned impacts (i.e. cognitive; affective; social and behavioural).

Throughout the world, environmental and outdoor education initiatives have been developed within different frameworks which are briefly revisited for certain North American and European countries in the following paragraphs. For the North American context, chosen countries include USA and Canada, both known to have valued outdoor learning since the dawn of twentieth century. For the European northern zone context, the United Kingdom and Scandinavian countries were chosen due to their long tradition of outdoor recreation/education and mutual influences in this scope. For the European southern zone, chosen countries include Portugal and Greece, known to share similar Mediterranean climate type and habitats, amenable to outdoor learning activities.

Brief notes about outdoor and environmental education in certain North American countries

Within outdoor education literature, John Dewey's foundational contribution to the movement of experiential learning (Dewey, 1938) has been studied by several researchers (e.g., Luff, 2018; Moss & Normore, 2006). For decades, researchers of outdoor learning have shown that in the USA, field trips and excursions were a great contribution to students educational development (NASSP, 1941) with multiple benefits, and it was even stated that "good learning and the outdoors are inseparable" (NASSP, 1957, p. 141). The early twentieth century was therefore, for both USA and Canada, marked by a "burgeoning interest in nature study and by official support for conservation" (Marsden, 1998, p. 350).

For the USA context, the value of outdoor education was long recognized and "frequent field trips were part of the syllabus of progressive schools in the early 1900s" (Knapp, 1994 as cited in Rubens, 1997, p. 5). For the Canadian context, research in Ontario done by Borland (2011) evidenced that it was also by the early 1900s that "Agricultural Science had become a course for many secondary school students, while elementary teachers focused on nature study and school gardening". By the 1970s, an increasing number of Canadian teachers were discovering the value of outdoor education as "a method of learning through first-hand experience and discovery, and as a method of teaching which uses the real world as a resource" (Passmore, 1972, p. 23).

Brief notes about outdoor and environmental education in certain European countries

Within northern European regions, for Scandinavian countries (which include Denmark, Norway and Sweden) outdoor recreation/education has been referred to as '*friluftsliv*', literally meaning free/open-air life (e.g. Andkjær 2005; Henderson & Vikander 2007 as cited in Bentsen, Mygind & Randrup, 2009). Based upon studies from several authors, Bentsen et al. (2009) considered that the Danish development of outdoor recreation/education

could be perceived “as a parallel-history to the European and is especially influenced by Norwegian, Swedish, British and German thoughts and ideas within sport, recreation and education”. These kinds of mutual influences and/or historic developments or parallelisms of outdoor recreation/education among some European countries can be found in literature. For instance, according to O’Brien & Murray (2006 as cited in Bentsen et al., 2009, p. 39) traditionally outdoor learning in Britain, included “nature oriented and adventure activities mainly carried out outside school hours, and the development of Forest Schools in Britain began in the 1990’s through inspiration from Scandinavia”. Nowadays, Forest school is a popular form of outdoor learning increasingly practised in primary schools in the United Kingdom which, according to Kraftl (2013 as cited in Harris, 2018, p. 224), “may be taught within the framework of mainstream school or as part of more informal or alternative learning provision”.

For the United Kingdom context, it is known that outdoor education had a long and rich history and a revision of English literature about it, its impacts and provisions was done by Rickinson et al. (2004). They stated that, within ‘The nature study movement’, the study of botany, in particular, was by then considered to be one of the few scientific and outdoor educational activities appropriate for women, with a pioneer role provided by Lilian Clarke (Sanders, 2008). According to literature, from 1896 to 1926, she developed innovative teaching practices in the design and use of school gardens in London, and within her legacy for contemporary outdoor education/field studies is the promulgation of the use of ‘outdoor classrooms’. These authors highlighted that besides the ‘Nature Study Movement’ other initiatives have influenced outdoor education, namely ‘School journeys’ and ‘Field studies’.

Concerning the southern European region, some data are below describe the Greek and Portuguese contexts. For the Greek context, it is worth mentioning the influence of early Greek thought and of the philosophers Socrates, Plato and Aristotle concerning experiential learning, extensively analysed by Stonehouse et al. (2011).

In an overall review of the organization and operation of environmental education within Greek Schools, Michaelides (2005) analysed and discussed information about the two main national existing schemes - the formal and the informal (optional)-, for students of primary and secondary schools. Environmental Education (EE) in Greece was also analysed by Valavanidis & Vlachogianni (2011, p. 13) who noted that in 1990, a new law “mandated the integration of environmental education into the educational curricula, and promoted the cooperation between governmental teacher organizations and nongovernmental agencies (NGOs) for the expansion of environmental education”. According to these authors, about 56 centres of environmental education were developed in Greece, to promote outdoor activities and studies about local environmental issues. They highlighted also the contribution of various NGOs and MEDIES network of educators and schools, to the implementation of integrated educational programmes. In Greece, the national framework of EE was affected by the localized effects of the Eurozone debt crisis and the resilience of EE frameworks during this period has been studied by Yanniris & Garis (2018).

In Portugal, the Environmental Education (EE)/ Education for Sustainable Development (ESD) initiatives were reviewed by Schmidt, Gil Nave, O’Riordan, & Guerra (2011). According to these authors, it was by the mid-1980s that EE initiatives grew more formal with changes in school curricula occurring in 1986. They found that EE/ESD projects were “predominantly aimed at students in the first stage of basic education (48.4%) and pre-primary (32.9%) schools, emphasizing a child-oriented trend that persists in EE/ESD in Portugal” (Schmidt et al., 2011, p. 166). These authors identified a disconnection between EE/ESD projects and the community, as projects held in schools were kept confined within school walls, rarely involving the community. More recently, since 2017, a National Strategy for Environmental Education (ENEA, 2017) constitutes a roadmap with several EE planned actions for the 2017-2020 period.

Outdoor and environmental education about plant biodiversity

Biological diversity or biodiversity is the diversity of life found on earth at all hierarchical levels from genes, species, and communities to entire ecosystems, encompassing therefore the complex functions and processes of these systems. The source of the term 'Biodiversity' dates back into the National Forum on Bio Diversity, held in Washington, D.C., in 1986, under the auspices of the National Academy of Sciences and Smithsonian Institution (National Academy of Sciences, 1988).

The growing recognition that biological diversity is tremendously valuable to present and future generations, although it keeps being threatened by human activities, led the United Nations Environment Programme (UNEP) to convene the 'Ad Hoc Working Group of Experts on Biological Diversity' in November 1988 to explore the need for an international convention on biological diversity. Currently, the Convention on Biological Diversity (CBD) keeps providing a global legal framework for action on biodiversity, bringing together all stakeholders every two years to the Conference of the Parties (COP). Global and national efforts to conserve biodiversity are known to be still far from sufficient, and biodiversity loss is a threat to our environment and societies.

Within the Portuguese National Biodiversity Strategy Action Plan (NBSAP), one of the 10 fundamental strategies listed is precisely aimed to ensure public education, awareness and sensitization (CBD, 2018). This is particularly relevant for plant biodiversity due to the so-called 'plant blindness' phenomena (Wandersee & Schussler 2001), i.e. people tendency to neither properly notice nor value plants in their daily lives, the environment and societies.

According to Balding and Williams (2016) the lower preference for, inferior recall of, and worse visual detection of plants compared with animals ('zoocentric societies') is attributable not only to perceptual factors, but also to cultural factors such as a greater focus on animals in formal biological education. In their perspective, although plant blindness is common, it is not inevitable and therefore they consider all measures to communicate about plant biodiversity and their role in biosphere as a valuable input to counteract this phenomenon.

Case-study - an olive tree collection: a treasure to maintain and communicate

The olive tree (*Olea europaea* L.) of the *Oleaceae* Family has been widely cultivated over time in traditional or intensive olive groves. Its fruit - olive - and the oil obtained from it - olive oil - are used for food and gastronomic purposes, being an important part of the so-called 'Mediterranean Diet'. Worldwide, the favourable ecological zone for olive tree cultivation lies between latitudes 30 and 45 degrees, both in northern and southern hemispheres, within Mediterranean climate areas. The Mediterranean olive region stood out with 95% of world olive oil production (FAO, 2001). Nowadays, it is a region where hundreds of olive varieties are described and referenced for the production of olive oil and/or table olives.

Many varieties have emerged over millennia as a result of several spontaneous crossings, various genetic mutations, fruit and seed natural dispersal, as well as the domestication of many of them, particularly in Mediterranean region. Thus, since ancient Greek times, olive cultivars arose from vegetative propagation (by cuttings or grafting), allowing the reproduction of the best genotypes, leading to the current varietal diversity.

Nowadays, olive tree cultivation is experiencing a shift from traditional to modern groves, planted with only a few varieties, which is a factor leading to genetic erosion of olive species (Linos, et al., 2014; Mousavi et al., 2017). Given this tendency, olive tree collections are an essential tool not only for the preservation and certification of their germplasm, but also for outreach educational initiatives aimed to raise awareness about olive tree biodiversity. The

olive tree collection held at Oeiras (Portugal) was planted for agronomic research purposes during the 1980-1990s (Leitão, et al., 1986; Leitão, 2001). It has several olive tree specimens from Portuguese national varieties and from the following other five different Mediterranean countries: France, Greece, Italy, Morocco and Spain. In this tree collection some of the varieties include, by country of origin, the following ones: A) Arbequina (Spain); (B) Branquita (Portugal); (C) Carolea (Greece); (L) Leccino (Italy); (M) Manzanilla (Spain); (PM) Picholine Marocaine (Morocco) and (P) Picholine (France).

The aim of the study

Nowadays, the young generation's reduced engagement in the outdoors and disconnection from nature has resulted in a decrease of their knowledge and conservation ethic with future negative impacts for whole societies. Therefore, nature interpretation initiatives aimed to enhance nature exploration by young people which highlight biodiversity richness are becoming increasingly relevant. The olive tree collection outdoor visits initiatives had these specific objectives:

- 1) to increase young people's interest, curiosity and knowledge about olive tree biodiversity;
- 2) to support teachers and educators seeking to create novel hands-on experiences that simultaneously promote students' engagement in olive tree plant science and in biodiversity issue;
- 3) to demonstrate the potential of an olive tree collection as a useful resource to design outdoor education projects; providing practical data upon which future initiatives can be developed.

Methodology

This study was held during the 2019 academic year. It engaged five teachers and a total of 117 students, aged 8-9 years, from two school communities located near a Research Institute at Oeiras (Portugal) which has the olive tree collection in its Campus. Schools teachers accepted an invitation to participate in the olive tree outdoor visit planned activities that correspond with their school formal learning.

Before outdoor visits, in order to assess students' knowledge about olive tree species, a brief questionnaire was sent to enrolled teachers. It included two questions, one to assess their knowledge about the common name given to the tree which produces olives, and a second one to assess their knowledge about this tree's geographic distribution beyond their own country territory. Teachers asked their students to complete the questionnaires before the outdoor visit to the olive tree collection which was scheduled to occur in May, to last about 2 hours and was planned to be centred on a playful, multi-sensory approach (Figure 1).

During the outdoor visit students could explore the olive tree collection and read a two-page worksheet with information about the countries of origin of olive tree varieties and their corresponding variety names. This worksheet contained also an illustration of *Olea europaea* L. from the Iberian Flora book (Tavera, 2012) with drawings of several olive tree structural organs, able to reveal aspects of its morphology (Figure 1).



Figure 1 Students at the olive tree collection outdoor visit during the blooming and early olive fruit formation phases. The worksheet distributed had an illustration of various olive tree structural organs.

Students observed different olive tree varieties and became aware of data about their phytogeography (e.g. countries that hold olive trees around the world both in North and South hemispheres); propagation methods (e.g. sexually or asexually); among other biological and agronomic facts (e.g. current challenges concerning olive tree disease resistance or biodiversity conservation issues). Students were also provided with magnifying glasses so that they could observe with greater detail organs and morphological structures such as flowers, leaf veins, among other aspects. Students labelled olive trees with a code number which matched to a specific variety name / country of origin (Figure 2).



Figure 2 Labelling of olive trees by students.

Results

Pre-visit survey results. Assessment of students' prior knowledge about olive trees.

In order to assess students' prior knowledge about olive trees, they completed a pre-visit survey. Questions and answers obtained are shown in Table 1. For the enrolled 5 student groups, a total of 117 surveys were answered.

To the first question (Q1) of 'what is the common name of the tree that produces olives', 79% of the students correctly answered 'olive tree', and 21% of the answers had wrong designations.

Table 1 Students pre-survey results obtained for Questions 1 and 2

Question	Answer	
Q1- Do you know the common name given to the tree which produces olives?	Correct name 92/117 (79%)	Incorrect name 25 /117 (21%)
Q2- Do you know if the tree with olives grows outside your own country territory?	Yes 33/117 (28%)	No 84/117 (72%)

(total number of students = 117)

Concerning the possibility of olive trees growing in other countries besides Portugal, less than one third of the students (28%) knew that olive tree geographical distribution goes beyond Portuguese national territory. Among those who knew other geographic locations for olive tree species distribution, some of the countries referred by students included, among others: Spain, France, Turkey and Argentina.

Post-visit survey results. Students' evaluation of outdoor visit

After the outdoor visits, a post-visit survey was completed in classroom by 107 enrolled students. It had two questions, the first one to classify the outdoor visit and a second one aimed to assess what they had most enjoyed during the outdoor visit. From the 103 complete surveys received, 87 out of 103 answers classified the visit as 'Very Good' (84.5%) and 16 out of 103 considered it to be 'Good' (15.5%).

To the question about what they had most enjoyed during the outdoor visit, answers transcribed in the next paragraph, obtained from student groups 1 to 5 (Sg 1 to Sg 5), depict various aspects, such as a motivation for contact with nature, to learn new things and explore nature:

- 'To see nature' (Sg 1);
 - 'To see different trees' (Sg 1);
 - 'It was that whole nature and the tree species' (Sg1);
 - 'It was the learning activities we did, but I already knew a little about this, anyhow what really matters is that I have increased my knowledge about olive trees' (Sg 2);
 - 'To know the olive trees which were very beautiful' (Sg 2);
 - 'To live with nature' (Sg 2);
 - 'To know much more about olive trees and the differences between olive trees from other countries' (Sg 2);
 - 'To know that without the olive trees we couldn't eat olives at all.' (Sg 5);
 - 'To see and know that there are so many different olive trees in various different countries' (Sg 5).
 - 'It was to walk in the countryside which is a new experience for me, and to know various types of olive trees' (Sg 3);
 - 'To know the olive trees, and their names. To see the leaves, flowers and olive fruits in formation' (Sg 3);
 - 'To see the olive small fruits at their initial growing phase and see them with the magnifying glass' (Sg 4);
 - 'To discover the olive tree names and see with the magnifying glass their branches' (Sg 2).
- These two last affirmations refer the use of magnifying glass illustrated in Figure 3.



Figure 3 a, b - Students observing with magnifying glass various olive tree structural organs.

Results of teacher outdoor visit assessment.

After the outdoor visits, the engaged 5 teachers completed a brief survey. It had one question aimed to assess how they evaluated the contribution of outdoor visit to students' learning process. All of them considered the outdoor visits to be 'very good'. Teacher assessment of outdoor visits in terms of benefits for their students' learning process was summarized in their perspectives and/or suggestions presented in the following transcribed paragraphs (T1 to T5):

T1 - 'I considered the field activity very interesting, as if it was an outdoor laboratory. The activity was very well structured, matching the curiosity and interest of enrolled students. It fostered a perspective of nature conservation and its importance, for this and future generations. Students' learning was very positive and meaningful.'

T2 - 'Students' direct contact with curricula issues.'

T3 - 'I enjoyed the outdoor visit, I consider the way it was organised and its contents as very appropriate to the students' age group. It was very important to associate the theoretical explanation with the practice '*in loco*', i.e. the students were able to apply, explore and visualize in practice, in the environment, all the contents explored. A suggestion: for the next visit it would be interesting to address other plant species that exist on Campus as well as the animals, since they are contents studied in the 1st, 2nd and 3rd school grades curricula'.

T4 - 'Contact with different varieties of olive trees.'

T5 - 'The following were the most important: - knowledge about fauna and flora; - contact with nature; - the natural resources valuation; - environmental awareness; - economic activities. For future visits a suggestion is to publish a field guide for the outdoor activity, with description of various topics.'

Discussion

The pre-visit survey results for the first question, which aimed to assess students' knowledge about the common name given to the olive producing tree, revealed that about four fifths (4/5) knew it to be an 'olive tree' versus one fifth (1/5) who wrongly named it. Notwithstanding the fact that our sample is a small one (N=117), if we consider the fact that olive trees are very common trees in the Portuguese landscape, this percentage of wrong answers may be a sign of students' estrangement from botany and/or nature issues.

The pre-visit survey results for the second question aimed to assess students' knowledge about the existence of olive trees beyond Portuguese territory, less than one third (1/3) of students (28%) knew that olive tree geographical distribution goes beyond Portugal, versus the vast majority (72%) who did not know this. Among those who knew other geographic locations for olive tree species distribution, some of them cited Eurasia region (e.g. Spain, France, Turkey) and South America (e.g. Argentina). Although other world regions with a Mediterranean climate type (e.g., South Africa, California or Australia) were not referred by students in this pre-visit survey, it was possible to get them know these facts during the outdoor visits.

The post-visit survey results for the first question revealed that students considered outdoor visits as 'Very Good' (84.5%) and 'Good' (15.5%). To the second question, aimed to assess what they had most enjoyed during the outdoor visit, a brief qualitative analysis reveals that among these five student groups (Sg1 to Sg5) there was:

- 1) pleasure to learn about and to be in contact with nature, - e.g.:
 - 1.1. Sg 3: 'It was to walk in the countryside which is a new experience for me, and to know various types of olive trees;
 - 1.2. Sg 2: 'To live with nature';
 - 1.3. Sg 1: 'It was that whole nature and the tree species';
- 2) a real motivation and curiosity to learn new things and explore nature, e.g.:
 - 2.1. Sg 4: 'To see the olive small fruits at their initial growing phase and see them with the magnifying glass';
 - 2.2. Sg 5: 'To see and know that there are so many different olive trees in various distinct countries'
 - 2.3. Sg 2: 'It was the learning activities we did, but I already knew a little about this, anyhow what really matters is that I have increased my knowledge about olive trees'.

All these students' statements are vivid testimonies of what, for decades, has been argued by outdoor learning researchers. In fact, outdoor visits for decades have been considered "a great contribution to students' educational development" (NASSP, 1941, p. 67), bringing multiple benefits, and it was even stated that "good learning and the outdoors are inseparable" (NASSP, 1957, p. 141). Therefore, the outdoor visits to the olive tree collection proved useful to foster among students a greater curiosity about trees and flora in general, and a better knowledge in particular about the olive tree species, their varieties and corresponding geographic origin.

Most students were interested during the visit and found it very good and enriching. Students observed the olive trees and became aware of various aspects concerning this species that were previously unknown to them. They also became aware that the worldwide diffusion of plants; which occurred throughout millennia, maintains a high relevance nowadays within the current climate change scenarios.

Teachers classified the outdoor visits as very good and interesting, emphasizing their importance as an enriching complement to classroom teaching.

- T3: 'I enjoyed the outdoor visit and I consider the way it was organised and its contents as very appropriate to students' age group. It was very important to associate the theoretical explanation with the practice *'in loco'*, i.e. the students were able to apply, explore and visualize in practice, in the environment, all the contents explored.'

Teachers survey results also showed that they also positively valued students' direct contact with nature and school curricula study issues:

- T1: 'I considered the field activity very interesting, as if it was an 'outdoor laboratory'. The activity was very well structured, matching the curiosity and interest of enrolled students. (...)'

- T2: 'Students' direct contact with curricula issues.'

These brief teacher statements are in agreement with the long recognition of the value of outdoor education for learning through “first-hand experience and as a method of teaching which uses the real world as a resource” (Passmore, 1972, p. 23). Outdoor visit teacher assessments also revealed them as able to enrich school curricula, bringing positive impacts for enrolled students, at several levels, beyond the cognitive ones, in agreement with Rickinson et al. (2004). Suggestions received from teachers will be assessed in order to improve planned future visits and make them more effective.

Conclusion

This paper adds to the growing literature on the way outdoor learning spaces can be used and valued as part of the learning processes. Previous studies have repeatedly argued that young generations in western societies are increasingly estranged from hands-on experiences in nature (Pyle, 1993) and disconnected from nature (Louv, 2005; O'Brien & Weldon, 2007). In addition to this, the phenomenon of ‘plant blindness’ identified almost two decades ago (Wandersee & Schussler, 2001) calls societies to counteract it, because, as Balding & Williams (2016) stated, although plant blindness is common, it is not inevitable.

This research exemplifies a collaborative learning initiative of outdoor education about an olive tree collection, addressing three current pressing phenomena- plant blindness, extinction of experience and nature disconnection. Although this research was limited to one country (Portugal), its results are potentially useful to school communities in other countries which have olive tree groves in their landscape, with the aim of promoting direct experience of nature during childhood, in accordance with other authors (Louv, 2005; Pyle, 1993). The educational initiative implemented at the olive tree collection had very positive outputs and is therefore recommended to be continued in the future, taking in account the following threefold beneficial impacts.

Firstly, this research assessment of students’ prior knowledge about olive trees revealed the existence of knowledge gaps (e.g. in terms of olive tree nomenclature and geographical distribution) which were tackled during the outdoor visits, enabling students to improve their knowledge. Secondly, the majority of enrolled students classified the olive tree outdoor visits as ‘very good’ (84,5%) and ‘good’ (15,5%), and expressed a true appreciation at being in direct contact with nature and a deeply motivation and curiosity for learning new things. Thirdly, all enrolled teachers not only positively valued students’ direct contact with nature, but also perceived the olive tree collection outdoor visit as an interesting and enriching complement to classroom teaching, considering it as a truly ‘outdoor laboratory’.

For these reasons, in revealing an olive tree collection at a Portuguese Research Institute located in their schools surroundings to young students through outdoor visits, , it was possible not only to provide a complement to their school curricula, but also to provide an opportunity for them to (re)connect with plants and natural resources, and learn more about them. Tree collections are therefore useful not only for agricultural research, but also for experiential learning initiatives. Although a part of young generation, in some western societies seem to be at risk of becoming unaware of the process of growing plants, and lack knowledge about the landscape or farming systems where their food comes from, this scenario can indeed be changed. It is hoped that the results of this paper can be useful to inform future effective outdoor programme design with olive tree collections (or any other tree collection or arboreta), as it is time to expose “students to the beauty, wonder, and excitement of plants” (Uno, 2018, p. 277). In short, it is time to let them shine.

Acknowledgements

The author would like to thank all the teachers from enrolled School Communities (Portugal) for their collaboration and participation in outdoor visits. The author also wishes to thank the information provided by the researcher F. Leitão concerning the olive tree collection and the two anonymous reviewers for their feedback that helped improve this manuscript.

References

- Balding, M., & Williams, K.J.H. (2016). Plant blindness and the implications for plant conservation. *Conservation Biology*, 30, 1192–1199. doi: 10.1111/cobi.12738
- Bevan, B., Dillon, J., Hein, G.E., Macdonald, M., Michalchik, V., Miller, D., Root, D., Rudder, , p. L., Xanthoudaki, M., & Yoon, S. (2010). *Making science matter: Collaborations between informal science education organizations and schools. A CAISE inquiry group report*. Washington, D.C.: Center for Advancement of Informal Science Education (CAISE). Retrieved from: <https://www.informalscience.org/sites/default/files/MakingScienceMatter.pdf>
- Bentsen, P., Mygind, E., & Randrup, T.B. (2009). Towards an understanding of udeskole: education outside the classroom in a Danish context. *Education 3-13*, 37, 29-44. doi: 10.1080/03004270802291780
- Borland, J. (2011). Provoking dialogue: A short history of outdoor education in Ontario. *Pathways: The Ontario Journal of Outdoor Education*, 23, 32-33. Retrieved from: <https://files.eric.ed.gov/fulltext/EJ962053.pdf>
- CBD (2018). *The convention on biological diversity. Portuguese National Biodiversity Strategy and Action Plan (NBSAP)*. Retrieved from: <https://www.cbd.int/countries/?country=pt>
- Dewey, J. (1938). *Experience and education*. New York, USA: Collier Books.
- DfES (2006). *Learning outside the classroom manifesto*. Nottingham, UK: Department for Education and Skills.
- Donaldson, G.W., & Donaldson, L.E. (1958). Outdoor education a definition. *Journal of Health, Physical Education, Recreation*, 29, 17-63. doi: 10.1080/00221473.1958.10630353
- ENEA (2017). *Estratégia Nacional de Educação Ambiental (in Portuguese)*. Retrieved from: <https://enea.apambiente.pt/content/enea-2020>
- FAO (2001). *Olive, crop description and climate*. Retrieved from: <http://www.fao.org/land-water/databases-and-software/crop-information/olive/en/>
- Harris, F. (2018). Outdoor learning spaces: The case of forest school. *Area*, 50, 222–231. doi: 10.1111/area.12360
- Jakobsson, T. (1998). Rio, Iceland and the child environmental issues and education in Iceland. In I.P. Samuelsson (Ed.), *Our World?* (pp. 17-26). Goteborg, Sweden. Retrieved from: <https://eric.ed.gov/?id=ED435436>
- Leitão, F. (2001). *Relatório Final do Projeto Valorização do material vegetativo e conservação dos recursos genéticos da oliveira (Olea europaea L.) em Trás os Montes e Alto Douro*. DRAPTM & U. Évora. Oeiras: INIA-EAN.
- Leitão, F. et al. (1986). *Descrição de 22 variedades de oliveira cultivadas em Portugal*. Lisboa: M.A.P.A. Retrieved from: <http://www.dgadr.gov.pt/mediateca/send/10-diversos/26-descricao-de-22-variedades-de-oliveira-cultivadas-em-portugal>

- Linou, A., Nikoloudakis, N., Katsiotis, A., & Hagidimitriou, M. (2014). Genetic structure of the Greek olive germplasm revealed by RAPD, ISSR and SSR markers. *Scientia Horticulturae*, 175, 33–43. doi: <https://doi.org/10.1016/j.scienta.2014.05.034>
- Louv, R. (2005). *Last child in the woods: Saving our children from nature-deficit disorder*. Chapel Hill, NC, USA: Algonquin Books of Chapel Hill.
- Luff, P. (2018). Early childhood education for sustainability: origins and inspirations in the work of John Dewey. *Education 3-13*, 46, 447–455. doi: 10.1080/03004279.2018.1445484
- Marsden, W.E. (1998). 'Conservation education' and the foundations of national prosperity: comparative perspectives from early twentieth-century North America and Britain. *History of Education*, 27, 345–362. <https://doi.org/10.1080/0046760980270311>
- Michaelides, P.G. (2005). Environmental education in the Greek schools. In M. Kassotakis & G. Flouris (Eds.), *Topics and issues in education*, (pp. 485–608). Athens, Greece: Atrapos.
- Moss, L.J., & Normore, A.H. (2006). An exploratory analysis of John Dewey's writings: Implications for school leaders. In M.S. Plakhotnik & S.M. Nielsen (Eds.), *Proceedings of the Fifth Annual College of Education Research Conference: Urban and International Education Section* (pp. 82–87). Miami, USA: Florida International University. Retrieved from: http://coweb.fiu.edu/research_conference/.
- Mousavi, S., Mariotti, R., Regni, L., Nasini, L., Bufacchi, M., Pandolfi, S., Baldoni, L., & Proietti, P. (2017). The first molecular identification of an olive collection applying standard simple sequence repeats and novel expressed sequence tag markers. *Frontiers in Plant Science*. 8, 1283. doi: 10.3389/fpls.2017.01283
- NASSP (1941). Educational trips. *The Bulletin of the National Association of Secondary School Principals*, 25, 67–90. Retrieved from: <https://doi.org/10.1177/019263654102510208>
- NASSP (1957). A Look into the future. *The Bulletin of the National Association of Secondary School Principals*, 41, 141–144. Retrieved from: <https://doi.org/10.1177/019263655704122907>
- National Academy of Sciences (1988). *Biodiversity*. Washington, DC, USA: The National Academies Press. Retrieved from: <https://doi.org/10.17226/989>.
- O'Brien, E., & Weldon, S. (2007). A place where the needs of every child matter: factors affecting the use of greenspace and woodlands for children and young people. *Countryside Recreation Journal*, 15, 6–9.
- Passmore, J. (1972). *Outdoor education in Canada - 1972*. Retrieved from: <https://eric.ed.gov/?id=ED067256>
- Pyle, R.M. (1993). *The thunder tree: lessons from an urban wildland*. Boston, USA: Houghton Mifflin
- Rickinson, M., Dillon, J., Teamey, K., Morris, M., Choi, M. Y., Sanders, D., & Benefield, P. (2004). *A review of research on outdoor learning*. London: National Foundation for Educational Research, Shrewsbury and King's College London.
- Rubens, D. (1997). *Outdoor education, adventure and learning: A fusion*. MSc Thesis: University of Edinburgh.
- Russell, J. L., Knutson, K., & Crowley, K. (2013). Informal learning organizations as part of an educational ecology: Lessons from collaboration across the formal-informal divide. *Journal of Educational Change*, 14, 259–281.
- Sanders, D.L. (2008). Balancing the interplay between botanical gardens and schools: the work of William Hales and Lilian Clarke. *Studies in the History of Gardens & Designed Landscapes*, 28, 439–445. doi: 10.1080/14601176.2008.10404730

- Schmidt, L., Gil Nave, J., O'Riordan T., & Guerra, J. (2011). Trends and dilemmas facing environmental education in Portugal: From environmental problem assessment to citizenship involvement. *Journal of Environmental Policy & Planning*, 13, 159-177. doi: 10.1080/1523908X.2011.576167
- Stonehouse, P., Allison, P., & Carr, D. (2011). Aristotle, Plato, and Socrates: Ancient Greek perspectives on experiential learning. In T.E Smith & C.E. Knapp (Eds.) *Sourcebook of experiential education: Key thinkers and their contributions* (pp. 18-25). London, UK: Routledge / Taylor & Francis Group.
- Tavera, R. (2012). Illustration of the genus *Olea*. In Castroviejo, S. (Org.) *Flora Iberica*. Vol. 11. *Gentianaceae-Boraginaceae* (p. 138). Madrid, Spain: Real Jardín Botánico, CSIC. Retrieved from: http://www.floraiberica.es/floraiberica/texto/pdfs/11_133_01_Olea.pdf
- Yanniris, C., & Garis, M.K. (2018). Crisis and recovery in environmental education: The Case of Greece. In G. Reis & J. Scott (Eds.), *International perspectives on the theory and practice of environmental education: A reader. Environmental Discourses in Science Education*, vol 3, 117-129. Springer International Publishing AG. <https://doi.org/10.1007/978-3-319-67732-3>
- U.N. (2019). *Independent Group of Scientists appointed by the Secretary-General, Global Sustainable Development Report 2019: The Future is Now – Science for Achieving Sustainable Development*. New York, USA: United Nations. Retrieved from: https://sustainabledevelopment.un.org/content/documents/24797GSDR_report_2019.pdf
- Uno, G.E. (2018). Plant blindness, science illiteracy, and the future of botany. *South African Journal of Botany*, 115, 277. doi: 10.1016/j.sajb.2018.02.011
- Valavanidis, A., & Vlachogianni, T. (2011). *The most important and urgent environmental problems in Greece in the last decade (2000-2010)*. Retrieved from: <http://195.134.76.37/scinews/Reports/PDF/Env01.pdf>
- Wandersee, J.H., & Schussler, E.E. (2001). Toward a theory of plant blindness. *Plant Science Bulletin*, 47, 2-9.

Received: 9.12.2019, Revised: 29.1.2020, Approved: 30.1.2020