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# Children–plant interaction using therapeutic horticulture intervention in a Romanian school

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**Abstract.** Nature, childhood, and ecopsychology can to be connected in the landscape of a schoolyard. The landscape architecture of the natural environments serves as a wide-open green space for outdoor activities, creating imaginative and inventive urban environmental layouts and connecting natural elements. School-based green experience, either indoor or outdoor, can be a physical and mental activity for children. In the case of individuals, it makes` easy to access a natural, green environment and to be actively involved in a natural setting, developing either social and/or cognitive functions and improving concentration and creativity. Therapeutic horticulture activity, such as planting indoor plants, can be a good experience for developing team work, the proprioceptive (kinase) receptors, affectivity, socialization, permanent care, and responsibility. The potential benefits of ornamental plants for children involved in public education include spending time in outdoor spaces, fresh air and sunshine, experiencing a sense of control, and being exposed to sensory stimulations. Physical and psychological education based on therapeutic horticulture activities in Romanian schools, such as planting and green care, can provide important opportunities for children to develop their attachment to nature, offering sustainable education solutions to an active part of the natural environment.

**Keywords:** landscape, indoor plants, nature-based intervention

## 1. Introduction

Therapeutic horticulture activities have been mentioned since the ancient Egypt, and the main concept is to use nature (especially ornamental plants) as a tool to enhance human health and well-being [1]. Based on the results obtained upon people–plant interactions while attending horticultural therapy sessions, green spaces are a real field in which humans can contribute to their healing, rehabilitation, education, and training. Nature, childhood, and ecopsychology can be interconnected in the landscape of a schoolyard.

Current Romanian legislation requires a specific percentage of land use to provide enough green area inside school perimeters (for example: 22 square meters/children). As stipulated in the legislation in force, urban planning rules must be in accordance with HG 525/1996- 2.2; 2.2.2; however, these conditions are not fully met.

In order to achieve the nature-based education, ornamental indoor plants can be a solution in the education-integrated therapeutic horticulture activities to provide opportunities for children to connect with nature. According to this, the purpose of the present research study was to analyse the interaction between children and indoor ornamental plants, combined in the national educational system as alternative guidelines for the children's long-term development. According to Piaget and Inhelder (1971), playing is necessary for the development of intelligence [2].

*School-based green experience – Physical and mental activity with children*

In accordance with the environmental design in schools, the playtime site and placement influence the academic activities. Green spaces and natural surroundings serve as a large open area where various creative activities and games can be played in an urban environment. People surrounded by natural landscapes and with free access to green infrastructure are more active [3], and they also demonstrate well-developed social, cognitive, and increased concentration capacity. For children, learning environments in the educational institutions can contribute to achieving a permanent contact with nature. Outdoor activities, such as learning and playing, which involve green areas are closely connected with children's state of health, mental and physical well-being [4]. Although, to play outside, children use frequently only playground infrastructures [5], which is the cause that they have insufficient connection with green areas inside schools [6].

Compared to the past decades, young people are less involved in nature-related interactive activities nowadays [7] – analysing the constant connection with natural environments, only 10% of the children are involved as compared to

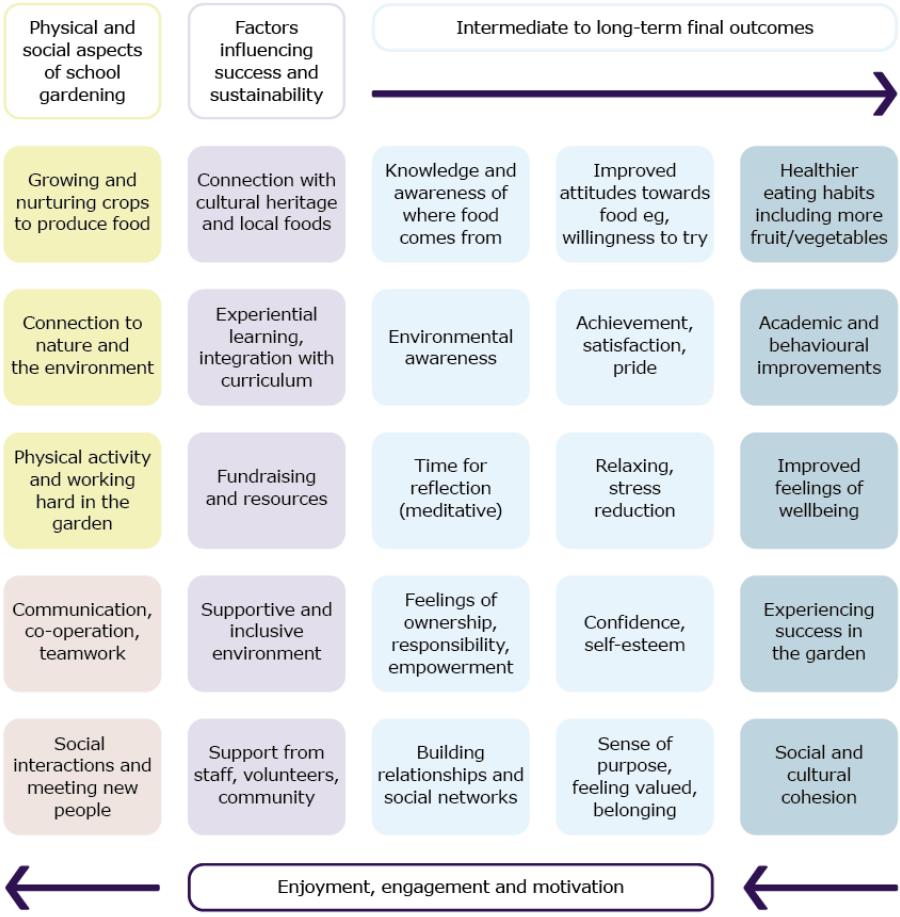
40% registered in the 80s [8]. Activities in their case carried out predominantly indoor may cause loss of attention and concentration in children [7].

Generally, natural environments used to be where childhood playing activities took place, whereas current research results have shown that fewer children have an interest in spending time in nature nowadays. A study published in 2016 by Natural England found that 1 of 10 children across England had not been in nature for the last 12 months. Because people are surrounded by nature, both in rural and urban environments, different nature-based activities can be developed to experience human–nature connection. In this context, the green space heritage – public and private gardens – which surrounds communities should be used for the benefit of children.

In the last few years, gardening workshops have become very popular. In their article, Christian et al. (2014) highlight the obtained results of the *Campaign for School Gardening* (RHS – Royal Horticultural Society), emphasizing the increase in fruit and vegetable consumption among children [9]. Consequently, different measurements were proposed to be integrated in order to obtain a sustainable gardening experience:

- gardening activities included in curriculum,
- connection between children, culture, and gardening,
- involving volunteers and local community in the teaching process,
- presenting gardening as a profession, and
- join with local plant retailers or nurseries and public green spaces.

The landscape design of a school yard is an important aspect which is directly correlated to everyone's well-being. Moreover, according to several research studies, green space could affect children's health. According to the figure below, a conceptual model shows potential health and well-being effects of gardening activities integrated in schools [10]. Therapeutic horticulture makes a positive contribution to the development of the children and helps them in their lives. Several possibilities can be highlighted for integrating nature-based activities, including horticulture therapy programmes, such as gardening, to enhance children's well-being in schools. The psychical and social aspects of school gardening include connection with the nature, interaction with other children, improved sense of well-being, and better school performance (*Fig. 1*).




*Source:* [*11*]

Figure 1. Conceptual model showing the potential health and well-being impacts of school gardening

## 2. Materials and methods

The present study was an experimental research based on the impact of an educative therapeutic horticulture activity – indoor ornamental plant potting and maintenance recorded as a post-test assessment and conducted among volunteer subjects in a Romanian school. The selected participants were 20 children, each of whom was asked to plant an indoor pot plant named spider plant –

*Chlorophytum comosum* (*Fig. 2*) – during an organized and indoor therapeutic horticulture session.

(a) (b)

Figure 2. Seedlings: (a) of *Chlorophytum comosum* prepared for rooting (b) in fresh water

Often called spider plant but also known as airplane plant, this indoor species was chosen based on its air purification qualities, morphological characteristics, growing range, and low maintenance needs [12]. It is one of the most popular room plants, supple and graceful, and a little pretentious, which explains its prevalence [13]. The sensory elements, such as form, leaf texture, and colour, are the main elements included for examination during the programme.

The main objective of this research study was to archive a long-term longevity of the plants throughout a year, in which each student was responsible for providing the necessary elements (light, water) and proper growing conditions. After this period, children were asked to bring back the plant to be able to compare the morphological characteristics such as leaf number and dimension. Also, they completed a questionnaire, developed according to all the levels of Maslow's pyramid of human needs, thus analysing the quality of life following human–plant interaction. The Romanian form of the questionnaire was adopted from the English version described in a research article regarding the benefits of community gardening for the quality of life [14].

During this process, the physiological, safety, social, self-esteem, and self-actualization statements were measured for each child. In the end, 95% of the plants survived and had a good aesthetic development.

## 3. Results and discussions

Based on the investigations made by measuring the effects of the therapeutic horticulture investigation with a view to achieve a long-term belonging to a natural element, such as indoor ornamental plant, this evidence-based research can have a possible effect on physiological, safety, social, self-esteem, and self-actualization statements. According to the data obtained for the experimental group, 19 questionnaires were completed. Based on the 15 questions, the obtained results are presented in the charts below.

Analysing the **physiological** effect (*Fig.* 3) of this research study (1–4), ten subjects "like to work in the soil" during the planting and maintenance processes. The majority (18 children), 94.7% "enjoy working outside" during the planting period. 17 students declared that they could identify the sensory elements of *Chlorophytum* (colour, texture, fragrance), and only one of them thought that this therapeutic horticulture activity was not "working with nature".

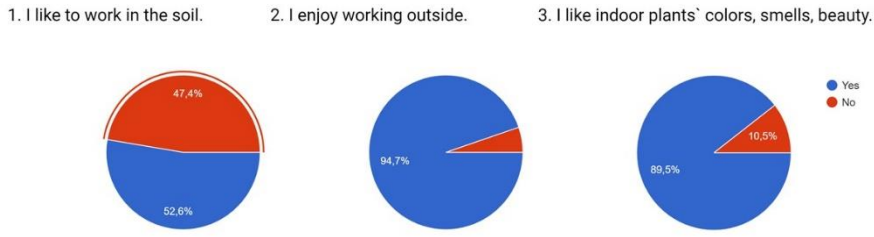



Figure 3. Data about quality of life statements on physiological issues during gardening

Evaluating the safety issue (5), only ten children "feel safe" (52.6%) compared to the other nine (47.4%) who were not so comfortable (*Fig. 4*).

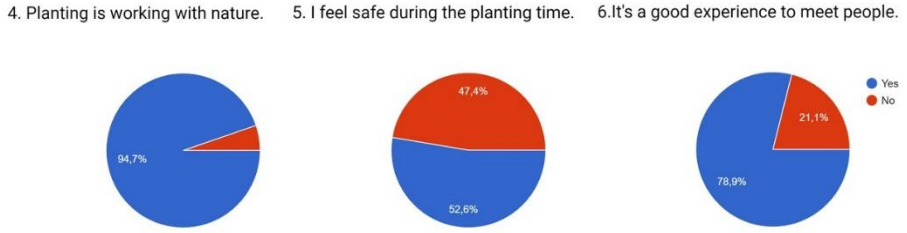



Figure 4. Data about quality of life statements on safety issues during gardening

Testing the **social** aspects (6–10), the majority of them (73.7%) consider that they "enjoy helping others in the planting activity", ten of them say that "gardening experience helps others", 100% of the involved students "care" about

the plant and class community, and the majority does not "enjoy working alone" (*Fig. 5*).

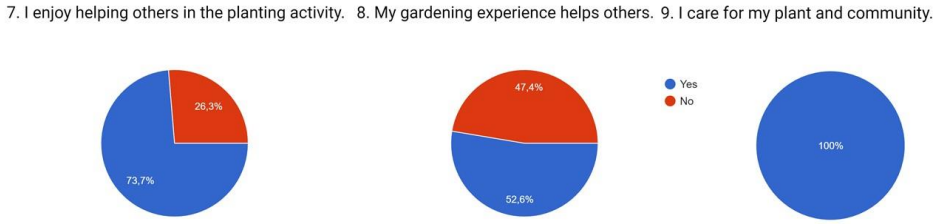



Figure 5. Data about quality of life statements on social issues during gardening

Concerning self-**esteem** (11–13), more than 13 identify beauty (78.9%), feel proud (89.5%), and handle the necessary effort for this activity (*Fig. 6*).

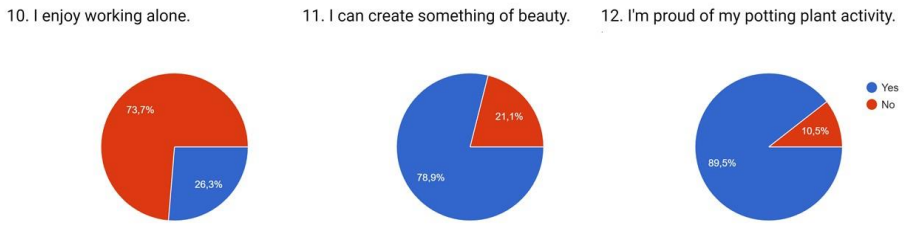



Figure 6. Data about quality of life statements on self-esteem issues during gardening

Analysing the self-actualization statements, 94.7% "feel peaceful" due to the direct interaction with this the plant during the experimental period, and 15 of them intend to take part in other therapeutic horticulture-based activities (*Fig. 7*).


Figure 7. Data about quality of life statements on self-actualization issues during gardening

## 4. Conclusions

In landscape design, the sensory elements, such as texture, colour, and fragrance, have an important role in the spatial perception of the users. Children feel good when they can take part in their environmental design on which they spend their time. The contributions of the presence of indoor ornamental plants can have an influence on children's physical and mental development. The activities with indoor plants are very important because plants can contribute to children's intellectual development and increase their level of creativity. Based on the horticulture therapy intervention, gardening activities specially designed for children can be easily integrated into indoor spaces, influencing their emotional and social developments.

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