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USING MIND MAPS TO PROMOTE ENVIRONMENTAL EDUCATION AND CREATIVE THINKING IN PRIMARY SCHOOL STUDENTS

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Abstract: Improving the effectiveness of the educational process remains one of the most pressing challenges of modern education systems. For primary school students, who's visual and imagery-based thinking is highly developed, learning through direct interaction with familiar and observable phenomena proves particularly effective. In this context, the cultivation of indoor plants provides valuable opportunities for integrating knowledge from biology, ecology, physics, and other natural sciences while fostering environmental awareness.

This study explores the use of a Mind Map titled "Growing Indoor Plants" as a visualization tool for presenting learning content and supporting students' cognitive development. The research demonstrates that mind map–based visualization not only enhances students' understanding of natural processes but also contributes to the development of environmental education, imagination, associative thinking, and creative thinking skills. In addition, engaging students in observing and caring for indoor plants encourages a positive emotional attitude toward nature and promotes environmentally responsible behavior.

The findings indicate that the proposed mind map serves as an effective pedagogical tool for developing students' imagination and creative thinking while simultaneously strengthening their ecological awareness. The study is intended for primary school teachers, students of pedagogical institutes, and researchers interested in innovative approaches to environmental and science education.

Keywords: indoor plants; environmental education; primary school students; mind map; visualization; imagination; associative thinking; creative thinking; ecological awareness; science education;

Introduction. Psychological studies have shown that the presence of indoor plants has a positive effect on human mood and emotional well-being. People surrounded by plants tend to be more attentive to their environment and demonstrate a stronger sense of care and responsibility toward nature. Educating children in such an atmosphere creates favorable conditions for nurturing individuals with refined aesthetic sensitivity and a deep appreciation for the natural world.

At the same time, the primary goal of teaching Natural Sciences (Science) in primary education is to help students perceive the world as an integrated, interconnected, and holistic system, while also fostering the development of inquiry skills and creativity. Through engagement with natural sciences—such as biology, physics, chemistry, and ecology—students come to understand that these subjects are not abstract or overly complex, but rather practical, observable, and engaging. Contemporary learners, compared to previous generations, demonstrate a more conscious attitude toward environmental issues and show an increasing tendency to use digital and mobile applications in caring for plants.

Observing and caring for indoor plants encourages students to explore fundamental concepts in biology, ecology, and physics, including processes such as photosynthesis, light diffraction, and

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environmental interactions. These activities provide opportunities for experiential learning, allowing students to connect theoretical knowledge with real-life phenomena.

This study is devoted to developing environmental education and enhancing students' imagination and creative thinking skills through the visualization of information related to indoor plants and their growth processes using Mind Maps. By presenting interconnected natural processes in a visual and structured format, mind maps support meaningful learning, stimulate associative thinking, and contribute to the holistic cognitive development of primary school students.

Indoor plants are plants cultivated in homes, classrooms, and public indoor spaces. In their natural environment, many of these plants grow in tropical and subtropical regions of the world; however, they can also be successfully cultivated under indoor conditions. Indoor plants are commonly classified into two main groups: flowering plants and ornamental foliage plants. In Uzbekistan, widely grown indoor plants include aloe, amaryllis, begonia, hyacinth, cactus, indoor lemon, rose, African violet, Chinese hibiscus, date palm, and fuchsia.

Indoor plants are typically grown in containers made of wood, plastic, glass, or other suitable materials filled with compost, loamy soil, or turf soil mixtures. They are usually placed on windowsills or in other favorable indoor locations. Proper care requires regular watering, fertilization with mineral nutrient solutions, and periodic cleaning of leaves. Optimal temperature and humidity conditions are essential for healthy plant growth. In recent years, fruit-bearing plants such as lemon, mandarin, orange, and fig have also been cultivated indoors. Additionally, dwarf trees with artificially regulated growth are increasingly grown in indoor environments.

Beyond their aesthetic value, indoor plants contribute significantly to human health, emotional well-being, and overall learning effectiveness. Research indicates that green color has a calming effect on individuals, helping to lower blood pressure and regulate heart rate. Certain plants, such as African violets, stimulate the release of adrenaline, which increases oxygen flow to the brain and promotes relaxation, thereby enhancing learning efficiency and productivity.

The presence of plants in classrooms has been shown to reduce the time required for students to concentrate by approximately 12–15 percent. Some indoor plants, such as English ivy, are recognized for their air-purifying properties, as they absorb harmful substances including formaldehyde and benzene while strengthening students' emotional engagement with their learning environment. Boston ferns increase indoor humidity by releasing water vapor through their leaves, which positively affects respiratory comfort.

Indoor plants are also used for therapeutic purposes. For example, aloe has been known since ancient Egypt as the "plant of immortality" and is still widely used today in the treatment of burns and skin injuries. Certain plants reduce the risk of allergies by absorbing airborne allergens and dust particles. Flowering indoor plants, such as anthurium, help reduce stress levels, while plants like pothos (Epipremnum aureum) reduce eye fatigue and may contribute to the prevention of eye-related conditions.

Research discussion. From an educational perspective, the integration of indoor plants into the learning environment supports the development of students' environmental education, imagination, and creative thinking skills. Observing plant growth, changes, and care processes encourages learners to form associations, reflect on cause–effect relationships, and develop a deeper understanding of natural processes. These outcomes can be effectively achieved through

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the use of Mind Maps, which visualize complex information and foster associative and creative thinking.

The use of Mind Maps as a visualization tool in primary education has demonstrated high effectiveness in developing students' imagination, associative thinking, and creative thinking skills. This approach is particularly beneficial for younger learners, who's visual–imagery-based thinking is well developed and who respond positively to concrete, observable learning objects such as indoor plants.

Mind maps serve as an effective means of organizing information related to indoor plant cultivation and care. By visually representing interconnected concepts—such as plant structure, growth conditions, benefits for human health, and environmental significance—mind maps encourage students to explore relationships between ideas rather than memorizing isolated facts. This process supports the development of associative thinking, as learners identify similarities, differences, and cause–effect relationships among various elements.

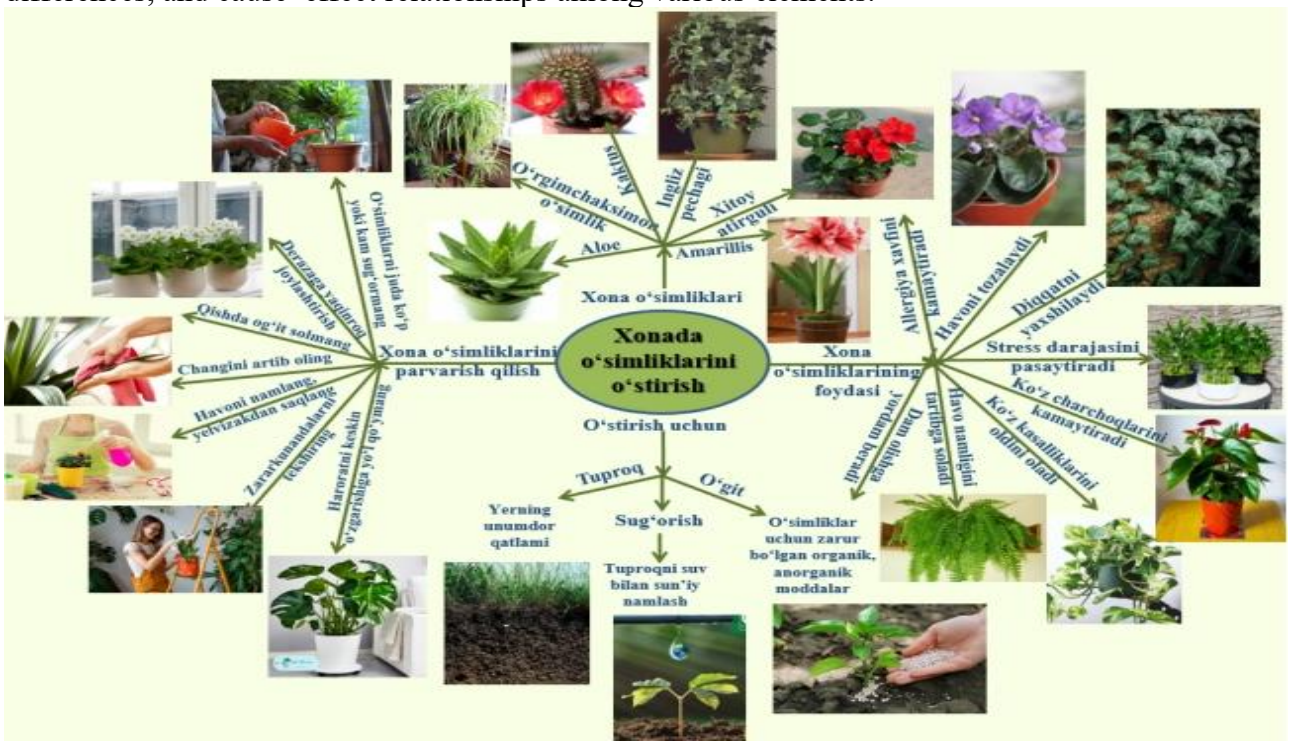

Figure 1. "Growing Indoor Plants" mind map

he "Growing Indoor Plants" mind map integrates information about the beneficial properties of indoor plants, the conditions required for their growth, and methods of plant care within a single coherent structure. Through guided interaction with the mind map, students are encouraged to answer open-ended questions, describe their observations, and share personal experiences related to indoor plants. Such activities stimulate imagination and promote the emergence of multiple ideas, reflecting the principles of radiant thinking.

The process of constructing and analyzing mind maps also contributes to the development of several key cognitive skills. Students expand their vocabulary, learn to analyze and synthesize information, practice comparison and classification, and develop the ability to identify central

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ideas. Furthermore, mind maps support collaborative learning by encouraging group discussions and joint analysis of visual information, thereby enhancing communication and teamwork skills. Visual information presented through mind maps is more easily retained in memory, which improves learning outcomes and long-term knowledge retention. At the same time, mind maps enable the presentation of large volumes of information in a simplified and accessible form, making complex topics more comprehensible for primary school students.

Overall, the results indicate that mind map–based visualization is an effective pedagogical strategy for fostering imagination, creative thinking, and environmental awareness. By engaging students in active exploration and visual interpretation of learning content, mind maps create favorable conditions for holistic cognitive development and meaningful environmental education.

The findings of this study indicate that the integration of indoor plants into the educational process, supported by mind map–based visualization, has a positive impact on both learning effectiveness and students' cognitive and emotional development. Indoor plants not only enrich the classroom environment aesthetically but also create favorable psychological conditions that enhance students' attention, motivation, and engagement in learning activities.

The use of the "Growing Indoor Plants" mind map enables students to perceive information as an interconnected system rather than as fragmented facts. By identifying relationships between plant structure, growth conditions, care practices, and their benefits for human health and the environment, students develop a more holistic understanding of natural processes. This holistic perception is essential for fostering environmental education, as it encourages learners to view nature as an integrated and interdependent system.

Mind map–based activities also play a significant role in developing associative and creative thinking skills. When students explore visual representations and are encouraged to find similarities, differences, and causal relationships, they engage in higher-order cognitive processes. These processes stimulate imagination and support the emergence of original ideas, personal interpretations, and creative responses. Such outcomes are particularly important in primary education, where visual and imagery-based thinking predominates.

Moreover, the results suggest that mind maps facilitate collaborative learning. Group discussions and joint analysis of visual information promote communication, shared reasoning, and mutual learning among students. This collaborative dimension strengthens social interaction and reinforces positive attitudes toward learning and environmental responsibility.

Overall, the discussion highlights that mind maps are not merely auxiliary visual aids but a powerful pedagogical tool that integrates visualization, cognition, and emotional engagement. When applied to the study of indoor plants, mind maps effectively support environmental education while simultaneously fostering imagination, creative thinking, and associative reasoning. These findings confirm the pedagogical value of mind map–based approaches in primary school education and their potential for broader application in science and environmental learning contexts.

The study confirms that the use of indoor plants as learning objects, combined with mind map–based visualization, creates favorable conditions for improving the effectiveness of the educational process in primary schools. Given that young learners predominantly rely on visual and imagery-based thinking, activities involving the observation and care of plants provide meaningful opportunities to develop imagination and creative thinking skills.

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The findings demonstrate that practical activities related to growing and caring for indoor plants not only enhance students' interest in nature but also foster positive emotional engagement and environmental responsibility. Through the use of mind maps, students are able to organize information systematically, identify relationships between natural processes, and develop associative and non-standard thinking skills.

Conclusion. In particular, the "Growing Indoor Plants" mind map enables learners to perceive information about plant structure, growth conditions, and care practices as an integrated whole. This holistic approach supports the development of students' imagination, creative thinking, and environmental awareness while also contributing to deeper and more sustainable learning outcomes.

Overall, the results indicate that mind maps represent a productive pedagogical tool for integrating environmental education with creative thinking development in primary education. Their systematic application in teaching practice can contribute to preparing environmentally conscious, imaginative, and creatively oriented learners.

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