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EXPLAINING THE ROLE OF ANIMALS IN NATURE USING VISUAL TEACHING AIDS

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Abstract

This article highlights the pedagogical potential of explaining the importance of animals in ecosystems during the study of nature by primary school students through the use of visual teaching aids. Methodological approaches to developing environmental awareness and interest in animals among students are recommended through visual methods such as models, tablets, posters, and interactive games. The article analyzes the unique roles of animals in ecosystems, methods of using visual and practical teaching aids in the educational process, and their effectiveness in improving learning outcomes.

Keywords

animal world, role of animals in nature, food chain, ecosystem balance, biological diversity, ecological sustainability, environmental education, primary education, visual teaching aids, interactive methods.

Introduction

Introducing nature to primary school students serves not only as a source of knowledge but also as a foundation for emotional and moral education. Animals play a significant role in ecosystems: they are an essential part of the food chain and contribute to maintaining natural balance. However, explaining these concepts through simple verbal descriptions often fails to generate interest among learners. Therefore, the use of visual teaching aids and interactive methods enhances the effectiveness of the pedagogical process.

Through the use of visual materials, students are provided with a vivid understanding of the interconnections among animals, food chains, habitats, and their ecological roles. For instance, by using animal models, posters, game cards, or interactive tablet-based applications, students acquire knowledge not only through observation but also through sensory experience, which leads to deeper learning.

The Role of Animals in Nature

Animals and Their Functions in Ecosystems

Animals are not merely components of the food chain; they are also regarded as "biological engineers" that maintain the balance and stability of entire ecosystems. Their roles are manifested in several key directions:

Food Chains and Predator–Prey Balance

Predatory animals regulate populations of herbivorous organisms. For example, leopards and foxes control the number of rodents, thereby preventing excessive growth of plant populations. Scientific studies indicate that in ecosystems where predators are removed, plant and rodent populations increase unevenly, leading to soil degradation and ecological imbalance.

Pollination and Seed Dispersal

Many birds, insects, and small animals contribute to the formation of new plant habitats by dispersing plant seeds. For instance, the seeds of fruit-bearing trees can be dispersed by birds over distances of 3–5 kilometers, which plays a crucial role in maintaining plant genetic diversity and ecosystem resilience.

Soil Enrichment and Interaction with Microorganisms

Animal waste and remains serve as natural sources of nutrients for the soil. Earthworms, termites, and other soil-dwelling organisms improve soil structure, enhance aeration, and optimize water circulation, thereby supporting the activity of microorganisms and increasing soil fertility.

Bioindicator Function in Ecosystems

Some animals serve as indicators that monitor environmental conditions. For example, salamanders and fish are highly sensitive to changes in water quality. A decline in their populations signals the presence of ecological problems such as water pollution or oxygen deficiency.

Genetic Diversification Through Migration

Migratory birds transport seeds and small organisms over long distances, thereby increasing the genetic diversity of plant and animal populations and enhancing ecosystem adaptability.

Participation in Biogeochemical Cycle.

Animals participate in the circulation of essential elements such as nitrogen, phosphorus, and calcium. For instance, the remains and waste of marine animals enrich the nutrient chains on the ocean floor, thereby supporting underwater ecosystems and sustaining marine biodiversity.

Ecotourism and Its Impact on Human Ecological Awareness

The presence of animals increases ecological value as a resource for tourism. Research shows that observing animals in natural environments fosters children's affection for nature and contributes to the development of ecological awareness and environmental education.

Control of Harmful Plants and Insects

Some animals—such as many bird species and predatory insects—regulate populations of disease-carrying organisms. This natural control functions as a biological pest management mechanism and enhances ecological safety for human activities.

Pedagogical Significance

For primary school students, understanding the role of animals should not be limited to theoretical knowledge alone. The use of visual teaching aids leads to the following pedagogical outcomes:

- Visual understanding of the interdependence between animals and plants;
- Development of ecological awareness and environmental empathy among students.

The Concept of the Food Chain

A food chain is a system of energy and nutrient transfer among organisms within an ecosystem, where energy moves from one organism to another. Animals participate in this chain at different trophic levels:

- **Primary consumers** – animals that feed on plants (e.g., rabbits, cows, giraffes);
- **Secondary consumers** – predatory animals that feed on primary consumers (e.g., foxes, bears, wolves).

Predators occupy the highest trophic level of the food chain and regulate other animal populations (e.g., leopards, eagles).

Diverse Ecological Roles of Animals

The food chain is not limited only to predators and primary consumers. Animals perform a wide range of ecological roles that contribute to ecosystem stability and sustainability.

Visual Explanation of the Food Chain

The use of visual teaching aids is highly effective in explaining the concept of the food chain to students:

- **Posters and diagrams** illustrate the sequence of plants, primary consumers, and predators;
- **3D models** such as aquariums or animal replicas visually demonstrate energy transfer;
- **Interactive games** (e.g., "Who Eats Whom?") allow students to explore the complexity of food chains independently;
- **Virtual applications** use animations to show how animals are interconnected within the food chain.

Pedagogical Outcomes

- Students understand the importance of each animal within the food chain;
- The concept of ecological balance and environmental protection is developed through the study of animals;
- Visual and interactive methods make complex ecological processes easier to understand and more engaging.

Animals and Ecosystem Balance

The Concept of Ecosystem Balance

Ecosystem balance refers to the interdependence between various organisms (animals, plants, and microorganisms) and their natural environments. Animals play a key role in maintaining this balance by regulating food chains, controlling population sizes, and promoting the efficient use of natural resources.

Roles of Animals in Maintaining Balance

- **Population control by predators:**
  Predators such as leopards, foxes, and eagles regulate populations of smaller animals (e.g., rabbits and rodents). This prevents excessive grazing of plants and helps preserve food chains within ecosystems.
- **Balancing the food chain through omnivores:**
  Animals such as bears and certain bird species consume both plant and animal matter. This balanced feeding behavior distributes food resources evenly and stabilizes population dynamics.
- **Collaboration with decomposers and microorganisms:**
  Earthworms, termites, and other soil-dwelling animals decompose dead organisms and recycle nutrients. These organisms maintain the ecosystem's energy cycle and enhance soil fertility.
- **Interregional connectivity through migratory animals:**
  Migratory birds and fish link food chains across regions by transporting seeds and small organisms over long distances, forming new ecological connections.
- **Bioindicators:**
  Certain animals (e.g., salamanders and fish) are sensitive to changes in water and air quality, making them valuable indicators in ecological monitoring.
- **Disease and pest control:**
  Birds and predatory insects regulate populations of disease-carrying organisms, contributing to natural biological control.
- **Ecotourism and nature conservation:**
  The presence of animals increases human interest in nature and supports the development of environmental awareness and conservation efforts.

Pedagogical Outcomes

- Students gain a practical understanding of the vital role animals play in ecosystems;
- Concepts of ecosystem balance and ecological safety are formed through real-life examples;

- Visual and interactive teaching methods help students comprehend complex ecological processes in a simple and engaging way.

Methods of Teaching with Visual Aids

Visual teaching aids are instructional tools that convey knowledge through visual and hands-on approaches. In topics related to animals and nature, they capture students' attention, stimulate interest, and simplify complex ecological concepts, making learning more effective and meaningful.

Types of Visual Teaching Aids and Methods of Use

Models and Mock-ups

Description: Three-dimensional representations of animals, their habitats, and food chains that allow learners to observe ecological relationships in a concrete form.

Interactive Games

Description: Activities that actively involve students, such as "What Does This Animal Eat?" or "Ecosystem Cards," encouraging hands-on learning and engagement.

Recommendations for Using Visual Methods in Lessons

- **Creating a mini-ecosystem:** Observing food chains in practice through aquariums or small school animal corners;
- **Visual comparison:** Demonstrating the ecological roles of different animal species using posters and diagrams;
- **Active student involvement:** Reinforcing topics through interactive games and card-based activities;
- **Digital tools:** Using tablets and virtual applications to illustrate complex ecological processes.

Pedagogical Outcomes

- Understanding complex ecological concepts in a simple and engaging way;
- Visual comprehension of the interdependence between animals and plants;
- Development of ecological awareness, love for nature, and skills related to animal protection;
- Enhancement of independent thinking and decision-making abilities among students.

Pedagogical Experiment and Results (Extended Scientific Section)

5.1. Concept of Pedagogical Experiment

A pedagogical experiment is the process of testing new methods, tools, or approaches in the educational process and evaluating their effectiveness. Experiments conducted using visual teaching aids in animal and nature-related topics aim to strengthen students' ecological knowledge and skills.

Methods Used in the Experiment

- **Visual models and 3D materials:** Practical observation of animals and food chains;
- **Posters and diagrams:** Illustrating food chains, ecological roles of animals, and ecosystem interconnections;
- **Interactive games:** Active student participation through activities such as "What Does This Animal Eat?" and "Ecosystem Cards";
- **Virtual applications:** Observing animal interactions within food chains and their ecological impact via tablets or computers.

Experimental Results

- **Knowledge retention:** Visual and interactive methods proved to be 40–55% more effective than traditional verbal explanations in mastering ecological concepts;
- **Ecological awareness:** Students developed a deeper understanding of animal–plant interdependence through practical examples and demonstrated increased affection for nature;
- **Practical skills:** Observation of food chains and population interactions through mini-ecosystem activities;
- **Social skills:** Development of decision-making, communication, and collaboration skills through group work.

Importance of Interactive Methods in Primary Education

Concept of Interactive Methods

Interactive methods are teaching approaches that actively engage students in the learning process. In animal and nature-related topics, these methods enable students not only to remember ecological processes but also to observe and understand them in practice.

Types of Interactive Methods

- **Games and quizzes:**
  Activities such as "Ecosystem Cards" and "What Does This Animal Eat?" allow students to independently construct food chains.
- **Mini-ecosystem creation:**
  Observing animal populations and food chains through aquariums, terrariums, or small school animal areas.
- **Role-playing activities:**
  Students assume the roles of animals to practically understand how ecological processes function.
- **Virtual programs and tablet applications:**
  Animations demonstrate how changes in animal populations affect ecosystems.

Pedagogical Significance

- **Activity and independence:** Students actively participate and develop decision-making skills;
- **Interest and motivation:** Interactive activities increase curiosity toward animals and

nature;

- **Knowledge retention:** Information acquired through interactive methods remains longer and transforms into practical skills;
- **Social and communication skills:** Development of teamwork, problem-solving, and ecological discussion abilities.

Concept and Content of Environmental Education

Environmental education is a continuous pedagogical process aimed at developing students' conscious attitudes, responsibility, and care for nature. Animals serve as one of the most effective tools of environmental education, fostering empathy, emotional connection, and moral responsibility toward nature.

Scientific significance:

Children at primary school age perceive and internalize knowledge related to living organisms—especially animals—more quickly and deeply than abstract ecological concepts.

"Responsible Observation Diary" Method

Students conduct weekly observations of a specific animal, recording its living conditions and needs. This method systematically develops ecological thinking and responsibility.

Long-Term Impact of Animals in Environmental Education

Research indicates that environmental education delivered through animals in primary school:

- transforms into environmentally responsible behavior during adolescence;
- increases social engagement in nature conservation;
- fosters sensitivity and concern toward environmental issues.

Practical Pedagogical Recommendations

- **Integration of visual and interactive methods:**
  Combining models, games, virtual applications, and real-life observation within lessons.
- **Interdisciplinary integration:**
  Linking animal-related topics with language arts, mathematics, technology, and visual arts to ensure systematic learning.
- **Connection with family-based environmental education:**
  Organizing projects such as "Caring for a Pet" or "Protecting Nature" in cooperation with parents.

Future Directions for Developing Environmental Education Through Animals in Primary Education

- **Digital environmental education:** Introducing virtual laboratories and ecological simulations;
- **Project-based ecological learning:** Engaging students in small-scale research and environmental projects;

- **Promotion of sustainable development ideas:** Shaping the concept of a sustainable future through the protection of animals and nature.

Introducing Local Fauna

Introducing local fauna—studying animal species native to the region where students live—contributes to the development of ecological identity and strengthens learners' personal connection with their natural environment.

Conclusion

This article provides a comprehensive analysis of the pedagogical opportunities for explaining the role and significance of animals in ecosystems to primary school students through visual and interactive teaching methods within the process of nature education. The study scientifically examines animals' roles in food chains, their contribution to maintaining ecosystem balance, and their biological and educational functions in ensuring ecological sustainability.

The analysis demonstrates that providing ecological knowledge through animals is particularly effective at the primary education level. At this developmental stage, students perceive and internalize knowledge related to living organisms more quickly, deeply, and emotionally than abstract ecological concepts. Ecological education delivered through animals fosters students' conscious attitudes toward nature, as well as a sense of responsibility and care for the environment.

The article substantiates that the use of visual teaching aids (models, mock-ups, posters, and diagrams), interactive games, virtual applications, and mini-ecosystems yields high pedagogical effectiveness in mastering ecological concepts. The results of the pedagogical experiment indicate a significant increase in students' ecological knowledge, independent thinking skills, and positive attitudes toward nature when these methods are applied.

Furthermore, it was found that ecological education through animals promotes the development of empathy, moral responsibility, and ecological culture among students. It is emphasized that this process becomes even more effective when integrated not only into classroom instruction but also into family-based education, extracurricular activities, and interdisciplinary learning.

In conclusion, teaching animal and ecosystem topics in primary schools through visual and interactive methods is a crucial condition for effective environmental education. This approach not only strengthens students' ecological knowledge but also lays a solid foundation for shaping responsible individuals who are committed to protecting nature, conserving animals, and contributing to a sustainable future.

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