

# The Interactive Carpet Made of Textile Materials as an Innovative Educational Tool in Kindergarten

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**Abstract** — Interactive technologies are increasingly entering the educational process, offering new opportunities for learning through play. The interactive textile carpet is one of these innovative means that combines tactile and visual stimuli with educational game methods. The report examines the possibility of including the didactic tool "interactive carpet" in the learning process for preschool children, indicating the positive effects on their cognitive, physical, emotional, social, language and communication development. A classification of children's interactive 3D carpets based on a set of criteria is proposed. Popular commercial brands and individual entrepreneurs, positioned in the market of children's products and offering educational rugs in their assortment, were examined.

**Keywords** — Interactive carpet, preschool, game, learning process.

## I. POSITIONING

Children of the 21st century grow up with electronic toys, phones, and tablets. The advantages of these devices are obvious, but they are overly stimulating. Screens easily develop an addiction in children [1]. The earlier the addiction develops, the greater the damage.

Children exposed to screens in the early years of their life have what is called a "fried brain." Such children find it difficult to concentrate, struggle to develop quality speech, have poor limb coordination, often wear glasses early, have sluggish bodies, are aggressive, and lack adequate socialization [2, 3].

The task of a child up to the age of 7 is to build a healthy physical body, coordinate it, which requires a lot of movement, to be calm, and to play.

At the moment of birth, a baby's brain is not fully developed. The most active growth and development of neural connections occur during the first months and years of life. This process and the number of connections formed are influenced by the environment in which the child grows and the way they are treated.

Preschool age is the period of the most active interaction of the child with the material world. Everything that surrounds children evokes great interest in them. Therefore, the formation of cognitive interests through play activities is an extremely relevant issue.

The development of fine motor skills also aids in the development of the child's speech functions and thinking. If the level of speech development does not correspond to the age norm, the improvement of cognitive functions will be

delayed. A child with a high level of fine motor skills development is capable of logical reasoning.

Textured 3D rugs and toys made from textile materials are often forgotten but very important allies in early childhood development. They have significant advantages, including lower cost, no need for batteries, and the possibility of being used for a longer period. They represent a beautiful interior item, providing a tactile range of textures and entertainment. They require the child to use their imagination and are perfect for unobtrusive learning through play.

## II. POSITIONING THE DIDACTIC TOOL "INTERACTIVE RUG" IN THE CHILD'S LEARNING PROCESS IN KINDERGARTEN

According to Ordinance No. 5 of June 3, 2016, on preschool education in the Republic of Bulgaria, the main form of pedagogical interaction in kindergarten is the pedagogical situation, which predominantly takes the form of play (Art. 23, para. 1) [4]. Learning through play is a key method that integrates educational objectives with play activities, stimulating the natural curiosity and development of children. Play has an exceptionally important role in the development of children during this period. Through play, children not only have fun but also learn, develop physically, emotionally, and socially, and acquire important skills and knowledge.

The children's educational rug made from textile materials is one of the most important toys for a young child from the moment of birth. With its help, the child learns to perceive and understand the world around them and to interact with their environment. The first educational rugs appeared on the toy market relatively recently—in 1993. The Israeli company Tiny Love, which has been producing toys for more than 30 years, is considered the pioneer [5].

The interactive rug represents an innovative educational tool that integrates various technologies and methods to stimulate children's development through play. During object-based play activities with the rug, conditions are created for enriching and accumulating sensory experience for the children; for the development of speech and mental processes; for the development of fine motor skills, attention, and memory.

During play with the rug, various didactic tasks can be implemented regarding:

- Training in self-care skills: Children can button and unbutton buttons, fasten and unfasten belts with buckles, zip

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and unzip zippers, use Velcro; tie and untie laces; braid and unbraid cords; and handle clips.

- Developing habits for perceiving objects and their properties, recognizing and distinguishing them; learning the names of objects and their characteristic properties (shape, size, color).

By touching different fabrics—soft, smooth, fluffy, hard, cool, or warm—the child masters the technique of sensory perception. Details of various shapes and sizes allow the child to become familiar with concepts such as "big-medium-small," "thin-thick," "round, triangular, rectangular, oval," and others. Multicolored materials introduce the basic colors and their shades.

- Vocabulary Development: By naming the properties of an object, the adult expands the child's vocabulary.

- Development of Logical Thinking, Memory, Imagination, Attention, and Fine Motor Skills:

- Enhancing Skills for Free Communication between Child and Adult:

- Teaching Mathematical Skills.

Incorporating the interactive rug into the educational process will aid in the cognitive, physical, emotional, social, linguistic, and communicative development of young children. Through the play-based pedagogical interaction technologies embedded in this didactic tool, mastering educational content within unregulated pedagogical play-based learning situations [6] will help capture the children's attention for the given task, facilitating the work of their thinking and imagination.

### III. CLASSIFICATION OF TACTILE DIDACTIC TOOLS /EDUCATIONAL RUGS/ FOR LEARNING THROUGH PLAY

After a thorough and in-depth study of numerous online sources regarding the educational rugs available for children up to 7 years old, a classification of children's interactive 3D rugs is proposed (TABLE I, TABLE II). The classification is based on the following criteria: age group of the children, type of educational rug, types of interactivity, educational objectives, materials used, design, and manufacturer.

TABLE I  
CLASSIFICATION OF CHILDREN'S EDUCATIONAL RUGS




AGE GROUP	FEATURES	TYPE OF RUG
Newborns and Infants up to 1 Year	1. Rugs with high-contrast colors to stimulate vision 2. Built-in mirrors and safe soft toys 3. Musical and vibration functions for sensory stimulation	1. Classic educational rug 2. Rug with arches 3. Rug with borders 4. Swing rug 5. Transformer rug 6. Puzzle rug 7. Musical rug
Young Children (Ages 1-3)	1. Rugs with thermo-sensitive panels that change color upon touch. 2. Images of animals, letters, and numbers for early learning.	1. Classic educational rug 2. Transformer rug 3. Puzzle rug 4. Musical rug

	3. Interactive elements such as sounds and lights. 4. Motor development features (various textures, small toys).	
Children in Preschool Age (3-7 years old)	1. Rugs with thematic play scenes (e.g., farm, zoo). 2. Complex puzzles and tasks to develop logical thinking. 3. Built-in interactive games and educational scenarios.	1. Classic educational rug 2. Transformer rug 3. Puzzle rug

TABLE II  
CLASSIFICATION OF CHILDREN'S EDUCATIONAL RUGS



CRITERIA	FEATURES OF THE RUG
Functions and Interactivity	<p><b>1. Thermo-sensitive rugs:</b></p> <ul style="list-style-type: none"> <li>- Change color upon touch.</li> <li>- Develop tactile senses and observation skills.</li> </ul> <p><b>2. Musical and sound rugs:</b></p> <ul style="list-style-type: none"> <li>- Built-in sensors that activate sounds and music upon pressing.</li> <li>- Include songs, animal sounds, and various melodies.</li> </ul> <p><b>3. Glowing rugs:</b></p> <ul style="list-style-type: none"> <li>- Built-in LED lights that activate upon touch or movement.</li> <li>- Suitable for playing in a darkened room, stimulating visual skills.</li> </ul> <p><b>4. Multisensory rugs:</b></p> <ul style="list-style-type: none"> <li>- Combination of thermo-sensitive, light, and sound elements.</li> </ul>
Educational Goals	<p><b>1. Development of Motor Skills:</b></p> <ul style="list-style-type: none"> <li>- Rugs with various surfaces to stimulate fine motor skills.</li> <li>- Interactive mazes: paths and routes that children follow with hands or feet.</li> <li>- Exercise-oriented rugs: encourage jumping, running, and other physical activities.</li> </ul> <p><b>2. Development of the Sensory System:</b></p> <ul style="list-style-type: none"> <li>- Rugs with different textures and tactile elements.</li> </ul> <p><b>3. Cognitive Development - Teaching Basic Concepts:</b></p> <ul style="list-style-type: none"> <li>- Rugs with educational games and tasks (letters and numbers, geometric shapes, colors and sizes).</li> <li>- Aid in early learning of mathematics and literacy.</li> </ul> <p><b>4. Development of Creativity and Imagination:</b></p> <ul style="list-style-type: none"> <li>- Rugs with opportunities to create their own games and stories.</li> <li>- Include role-playing games and interaction scenarios.</li> </ul>
Materials Used	<b>1. Ecological Rugs:</b>

	<ul style="list-style-type: none"> <li>- Made from biodegradable and non-toxic materials.</li> <li>- Suitable for parents seeking sustainable products.</li> </ul> <p><b>2. Soft and Safe Rugs:</b></p> <ul style="list-style-type: none"> <li>- Made from soft materials with additional padding for safety.</li> <li>- Safe for play, even if the child falls or slips.</li> </ul> <p><b>3. Rugs from Soft Textile Materials</b></p> <p><b>4. Rugs from Waterproof Materials</b></p>
Design and Theme	<p><b>1. Animal Themes:</b></p> <ul style="list-style-type: none"> <li>- Rugs featuring images of animals and their habitats (farm, safari, underwater world).</li> <li>- Aid in teaching children about different animals and their sounds.</li> </ul> <p><b>2. Nature Themes:</b></p> <ul style="list-style-type: none"> <li>- Rugs depicting various natural landscapes (forest, ocean, mountains, space).</li> <li>- Encourage learning about the environment and natural sciences.</li> </ul> <p><b>3. Fantasy Themes:</b></p> <ul style="list-style-type: none"> <li>- Rugs with mythical plots, characters, and magical scenes.</li> </ul>
Type of Manufacturer	<p><b>1. Major Commercial Brands:</b></p> <ul style="list-style-type: none"> <li>- Standardized products with high quality and variety.</li> </ul> <p><b>2. Individual Entrepreneurs:</b></p> <ul style="list-style-type: none"> <li>- Handcrafted rugs sold at local markets and online platforms like Etsy, Ярмарка Мастеров, etc.</li> <li>- Personalized thematic rugs made to order.</li> </ul> <p><b>3. Individual Manufacturers:</b></p> <ul style="list-style-type: none"> <li>- Handcrafted unique rugs with a specific design for preschool education purposes.</li> </ul>

	imagination. Bright, eye-catching colors; numerous interactive elements.	
<b>Fisher Price</b> /USA/ [7]	Rugs with arches and borders. Bright and pleasant color schemes. Interactive elements. Sensors activating sounds and music.	
<b>Lionelo</b> /Poland/ [8]	Modern design, intense, contrasting colors that stimulate the child's vision, develop their imagination, and enhance their ability to concentrate.	
<b>Infantino</b> /China/ [9]	Focus on early education and development of basic skills. Play elements, noisy and squeaky parts, moving elements, and a mirror. Development of sensory perception, attention, and imagination through exploring surfaces.	

Individual entrepreneurs offering handmade educational rugs in custom designs and catalog designs are presented in Table IV.

TABLE IV  
DESIGNER EDUCATIONAL RUGS


BRAND	CHARACTERISTIC	POPULAR DESIGN
<b>Krokozyablik</b> /Russia/ [10]	<p><b>For the youngest:</b></p> <ul style="list-style-type: none"> <li>- Interactive rugs with numerous tactile elements that encourage the development of fine motor skills. They feature whimsical characters that entertain and delight the baby.</li> </ul> <p><b>For older children:</b></p> <ul style="list-style-type: none"> <li>- Multi-functional play mats with 3-D elements; massages the feet; for learning (names of plants, animals, insects); aids in developing fine motor skills, imagination, aesthetic taste. Materials: natural fabrics, felt, polyester filling; buttons, zippers, beads, cotton yarn.</li> </ul>	  

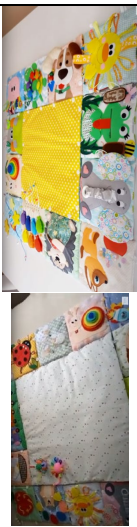
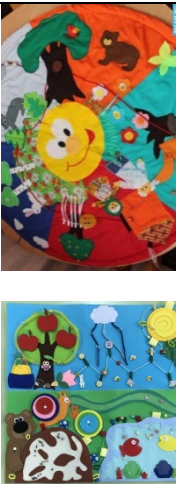
IV. ANALYSIS OF ANALOG MODELS OFFERED IN THE GLOBAL MARKET FOR INTERACTIVE EDUCATIONAL CHILDREN'S RUGS

Interactive children's rugs vary in terms of functionality, price, and target age group. Major commercial brands offer high-quality products with diverse educational and interactive elements. These rugs are designed to support cognitive, emotional, social, and physical development in children while they play.

Popular commercial brands positioned in the children's products market and offering educational rugs are presented in Table III.

TABLE III  
COMMERCIAL BRANDS

BRAND	CHARACTERISTIC	POPULAR DESIGN
<b>Tiny Love</b> /Israel/ [5]	Developing and selling smart toys for children. Rugs with thematic themes and scenarios that encourage role-playing and	

<p><b>Galina Chechina</b> /Russia/ [11]</p>	<p>Educational rugs with modules that can be transformed, allowing for the execution of various educational and developmental tasks. They promote active speech development; teach colors, shapes, and sizes of objects; and develop counting skills. These rugs enrich tactile experiences, enhance fine motor skills, introduce children to the surrounding nature and its phenomena. They broaden children's horizons, promote cognitive development, and enhance imagination and fine motor skills.</p>	
<p><b>Teachers in kindergartens</b> /Russia/ [12, 13, 14]</p>	<p>Development of universal educational tools like interactive rugs aimed at their use in various pedagogical situations for preschool-aged children. Playing with the rug contributes to the development of imagination, stimulates intellectual and creative activities, alleviates psycho-emotional stress, creates a positive emotional mood, develops perceptions, enhances visual thinking, attention, memory, fine motor skills, and tactile sensations. It also forms and activates the child's vocabulary and fosters communicative skills.</p>	

#### IV. CONCLUSION

In an era of overstimulation and constant stress, toys that promote a quieter and more resilient play environment can be extremely beneficial for children and their cognitive development.

The didactic educational carpet represents a comprehensive children's playground that develops coordination, creativity, and teaches the child to orient themselves in space. Through it, they recognize their surroundings and cultivate their imagination.

Incorporating such an innovative educational product into the educational process will lead to improving conditions for developing independent cognitive activities, fostering intellectual curiosity, and enhancing logical and creative thinking in preschool-aged children.

The interactive carpet, through a combination of original designer solutions and educational-playful elements, would support the overall development of children.

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