



## DEVELOPMENT OF ENGINEERING SKILLS THROUGH STEAM ACTIVITIES IN PRESCHOOL CHILDREN

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### **Annotation:**

This article discusses the advantages of Lego construction, the development of children's logical thinking skills through STEAM education, design activities, robotics training, and the development of engineering skills in preschoolers through STEAM activities.

**Keywords:** Creativity, imagination, emotions, initiative, mobility and flexibility, formation of logical thinking, engineering, design, independence in the educational process, integrated education, STEAM technology, preschool education  
STEAM activities are ideal for preschoolers. Preschoolers are more intrigued by doing experiments, practical instruction, and discovering how things function around them. At this age, kids are able to comprehend more complex ideas. Additionally, they may reflect more deeply on what's happening in their environment and discuss topics that interest them. This is a fantastic chance to engage the youngster in STEAM activities at this time. Giving the youngster a chance and allowing him to explore his imagination are essential.

Children employ construction toys, construction paper, natural materials, abandoned items, and other materials in preschool education. The type of construction is determined by the type of material. Geometric shapes in both tiny and huge sizes make up the construction materials (cubes, cylinders, prisms, etc.). The exercises include the use of several tiny sets of building supplies. There should be an abundance of training resources. When organizing building-making activities using building materials to help a child develop engineering skills, it is appropriate for the educator to select small toys that represent people, animals, plants, and vehicles. Young children create tangible objects around them, such as a bridge for automobiles and people, or a house for a rabbit. A child's growth of gaming activities and the establishment of engineering abilities are greatly impacted by the use of toys in constructing and manufacturing. Building supplies are arranged in designated cabinets in a systematic way.





**Constructors.** A range of construction toys, including cubes, legos, bricks, and constructors, as well as instructive activities to play and resources to foster young children's mathematical creativity. Older preschoolers employ a variety of wooden, platform, and metal creations outside of the classroom. They construct machines with a more intricate part arrangement with the aid of these kits. Children use the straightforward combination approach to create a variety of moving constructions while being guided by the teacher. The major emphasis is on teaching kids how to combine different elements of themselves. The hand muscles of children, which are still developing at this age, are implicated in this. The meticulous steps for putting together the constructor are first taught to the teacher. Children are given construction tools and constructors one after the other while being supervised by the teacher. Children are primarily introduced to building materials - cubes, bricks, varied



forms, and their location - in the development of engineering abilities through the creation of various devices (a brick is lying down, standing up). Additionally, they demonstrate how to create a fence, a home, stack cubes on top of one another, and more using cubes. Children are instructed to identify between the primary construction elements (cubes, bricks, and plasticine), give them names, learn the definitions of words like big, little, long, short, high, and low, and arrange the bricks evenly apart.

One of the industries with the fastest growth rates is engineering. It is essential to create an engineering curriculum for kids, as well as a topical order and engaging activities and seminars. Children's critical thinking is developed, and design abilities are developed via exploration. Kids plan, create, test, and change their robotic inventions in teams as part of the engineering design process. It describes the deliberate application of scientific knowledge to the design, manufacture, and utilization of engineering and technical products that are the end product of engineering operations. Engineering is the practice of creating, inventing, and designing.





Engineering's initial stage is robotics. By setting up robotics classes, it allows kids the chance to delve deeply into the field, learn about computers, and develop robots. The benefit of robotics education is that while solving fun tasks, children may develop their cooperation abilities as well as their understanding of science, technology, engineering, and math. Children's success in any career they decide to follow in the future depends on their ability to work together.

### **The benefits of robotics training include:**

- ✚ Development of creative thinking skills;
- ✚ Development of social skills;
- ✚ Development of problem-solving skills;
- ✚ The ability to program a computer, basic concepts about computer devices are formed;
- ✚ Increment of motivation (desire to learn);
- ✚ Development of engineering skills through robotics training.

In preschool robotics engineering programs, educational materials like LEGO are used. Children are introduced to computer programming and robot design, utilizing fundamental machine concepts to build robots that can carry out easy tasks.

### **Three stages of engineering activity:**

1. technical activity - planned practical studies, experiments;
2. design activity - design, creation and testing of experimental samples (models, prototypes) of technical devices, design;
3. technological activity - collecting engineering developments, creating a corner, using them.

Three-dimensional representations of the actual world and a theme-game environment are frequently employed for the kid's learning and development, and **Lego** creation is one of the most contemporary trends in child development. Children may learn via play thanks to LEGO. Giving kids the chance to "reside" with engaging materials is the most crucial factor. Children learn to communicate their responses to



events as they discover new things. Children become builders, architects, and creators throughout their educational activities; they come up with and carry out their own ideas while playing. A variety of tasks, including psychological and cognitive activity, emerge during action. Kids create designs and diagrams. Children also grow





in their ability to communicate, inventiveness, and curiosity at the same time. The most important aspect is that there is no audience present—just enthusiastic participants. Children's knowledge is important and crucial for them.

**Lego**, a constructor, helps kids learn how to build and how to correctly pick action sequences, connection methods, and color and form combinations. Preschoolers have a strong urge to create things. The ability to mentally break down an object into its constituent parts and piece together a whole from parts, develop fantasy, constructive imagination, and the capacity to creatively use the acquired skills are all skills that are formed by the development of stable interest. Mathematical knowledge about calculation, shape, proportion, and symmetry are also formed.



Lego - the constructor promotes the growth of hands' fine motor skills while also aiding in the development of attention, concentration, memory, and reasoning. LEGO design combines game elements with experimentation, which stimulates preschoolers' mental and verbal activity, helps them develop design and technical thinking skills, as well as their imagination and communication abilities. It also aids in interpretation and self-expression and boosts cognitive activity. to the high level of preschoolers, which is one of the factors in their success in post-secondary education. The utilization of LEGO construction kits is a fantastic integrating technique for preschoolers' cerebral development.

**Ole Kirk Christian**, a modest Danish firm in Billund that specialized in the production of wooden toys, invented **Lego** in 1932. Every youngster enjoys playing and want to do so, but ready-made toys deny the child of the chance to autonomously create. The Lego Creator opens up a whole new world for children. Children learn social skills like activity, independence, responsibility, mutual understanding, effective cooperation, "I can" emotional and muscle tension, use of instructions and drawings, diagrams ability develops, logic, and design thinking is formed. Children also become builders, architects, and creators as they play, come up with and implement their own ideas, and engage in educational activities. Lego is a labor of both the intellect and the hands, not merely a game to enjoy. Although all children like playing and desire to do so, ready-made toys prevent them from having the opportunity to independently create. A





completely new universe is accessible to kids thanks to the Lego Creator. Children gain social skills such as initiative, self-reliance, accountability, reciprocal understanding, efficient collaboration, "I can" confidence, capacity to follow directions and follow diagrams, reasoning, and design thinking. As they play, develop and execute their own ideas, and take part in educational activities, children also develop into builders, architects, and creators. Not only a fun game, Lego requires both mental and physical exertion.



The primary goal of the teacher-student collaboration on Lego design is to foster the child's uniqueness and creative potential. The activities are built around the ideas of collaboration and co-creation between the students and the instructor as well as between the students themselves. The kid may design, demolish, and reconstruct his own structure using the Lego builder. Children strive to determine what an object is and how it varies from others in cooperative LEGO building activities. They also learn how to measure an object's

width, length, and height. They also start to solve design challenges "by sight." They also start to develop inventive thinking. Studies to explain the equipment in various spatial situations, the training process, the development of delicate motion (handful), the creation of creative counsel, the development of dialogical and monologues, and the expansion of language are all carried out. The improvement of logical and spatial thinking is given special consideration. Children learn how to construct a building using a design, given circumstances, and a model while using provided directions, schemes, and building materials. When dealing with children, it is important to start with the simplest buildings, teach them appropriately, link the pieces, have them look at a sample, "read" the diagram, and then relate it to the exact model of the building. When building buildings, kids first examine a sample or construction plan, identify the major components, explain and demonstrate the specifics of how these components are made, and then decide the order in which the various steps should be completed. Each kid who participates in the suggested activity discusses the task's progress, the goal of the structure, and his or her attitude about the finished product. After finishing each individual task, we check with the kids to make sure the components are connected





correctly and compare to a model or diagram. In a more complicated process known as constructive activity, the youngster not only performs practical tasks with his hands but also takes in and considers the structure or craft that is being made. The fundamental goal of designing is to check items analytically and synthetically to identify the design approaches. The educator is assisted in selecting the techniques of examination of the sample and its construction not only by visual perception but also by carefully arranged cognitive activity. The youngster develops a concept and designs the building process using analytical-synthetic activity. The preschooler's capacity for planning and direction control is a key factor in how well the plan is carried out. A preschooler's **constructive creativity** is built on their improved analytical and synthetic skills. A preschool educational institution's evolving educational system should include constructive activities that allow children to express their creativity, improve their emotional experiences, and realize their demands in terms of cognition and aesthetics. Does Lego building help kids improve their creativity, imagination, and memory, or is it just a simple game for kids to enjoy?

Working with the constructor allows you to build models while also learning, having fun, and playing. When you create your own models, you'll feel like a skilled engineer, mechanic, builder, or excellent designer. And it's fantastic! You have total mobility because of this. The art is engaging and fascinating, opening up entirely new vistas in which the imagination is the only restriction. LEGO encourages youngsters to construct and imagine, to work enthusiastically and to see the results of their labor. Construction fosters the growth of intelligence, dexterity, imagination, and a creative bent. It contributes to the development of skills including concentration, partner cooperation, and most crucially, self-assurance. Early curiosity will convert into the capacity to study design in a concentrated manner and welcome innovation with great interest. Children may learn the most complicated mathematical concepts while also honing their synchronization of movement, fine motor skills, and eye-hand coordination with the aid of a Lego constructor, which allows them to design their own unique environment. Lessons in design foster curiosity, the growth of figurative and spatial thinking, the activation of fantasy and imagination, the encouragement of independence and initiative, as well as the interest in creation and creativity. The primary responsibility of the instructor is to set up the environment so that kids are interested in learning and may express their potential via engaging activities.





### **The developing role of lego constructor:**

- ✚ Mental development: creation of spatial reasoning, imaginative creativity, and long-term memory.
- ✚ Physical development: establishment of the hand's muscles and skeletal structures, as well as the synchronization of the hands and eyes during movement.
- ✚ Language development: use of active and passive vocabulary, creation of dialogic and monologue speech.

### **Developmental and educational tasks of the LEGO design process:**

- ✚ fostering young children's interest in modeling and design and encouraging their technical inventiveness;
- ✚ learning how to create using a model, sketch, or predetermined scheme;
- ✚ development of the circumstances required for educational activities: the capacity and desire to work, to follow directions and do acceptable tasks, to finish the work that has been begun, and to plan future work;
- ✚ discovering gifted youngsters with unconventional creative thinking abilities; to enhance kids' communication skills when working in pairs or teams;
- ✚ encourage future verbal and mental development, improve hand fine motor skills;
- ✚ the capacity for cognitive activity, fantasy, and creative initiative; the capacity for designing and putting together structures;
- ✚ capacity to study a thing, identify its key components and distinguishing qualities, and relate an object's function to its structure;
- ✚ Children's teamwork, task division, and communication abilities all increase;
- ✚ The capacity and willingness to work, following directions and achieving goals, finishing work that has already begun, and preparing for future work are all important circumstances for educational activities.

People need to have a deeper understanding of STEAM subjects in order to keep up with the current world, which is developing daily. Additionally, STEAM teaches toddlers transferable qualities like cooperation, persistence and hard work, creativity and invention, logical reasoning, and critical thinking that are not directly connected to the subject matter. Preschoolers can also pick up some fundamental STEAM ideas. One of the best things about STEAM education for preschoolers is that the abilities they gain, such process skills in math, physics, or art, can be used in any topic and in daily life. fundamental abilities. Children in preschool have a natural passion for science as well as a creative imagination.







Children at this age have a strong interest in building, modeling, robotics, and programming. Our STEAM approach to education places a strong emphasis on exposing kids to the appropriate activities at the appropriate times. When a kid is developmentally ready, we introduce them to new concepts and abilities, making learning enjoyable and natural.

Every piece of knowledge that is offered to a child may be connected with practice through STEAM. Children engage in modeling work, building, and making on each subject in STEAM activities. Children could construct a model of a car, test it, and then try to determine why it did not provide the desired outcome. For instance, perhaps the automobile's wheel is too large. Each time he fails a test, the youngster improves. Children make bridges, model cars and airplanes, test the models, and then refine them as they gain confidence. Children develop active communication and collaborative abilities. The youngster can independently communicate his opinions via communication. There is developed a free environment with disagreements. The most important thing is that the child is not bored. Lego creation is a useful hobby that relies on imaginative modeling and a variety of generic Lego pieces. The usage of Lego builders facilitates the completion of important educational activities because they provide settings that encourage a preschool child's overall development through engaging creative and cognitive play. Preschoolers' overall growth is aided by the ideal conditions set during the design phase. Lego technology is an illustration of how all educational disciplines may be combined, both in formal educational activities and in children's independent play.

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