

# Green Toys for Early Childhood Care & Education



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**Abstract** Activity based teaching is a methodology which builds interest among the children by keeping them engaged and making them learn concepts while playing. In this study, the activities are developed using locally available material with a meaningful purpose and finally to come out with affordable solutions for the effective implementation of developmentally appropriate early childcare and education. These engaging products can help in reducing dropouts at early childhood and can be very useful in the effective implementation of new NEP (National Education Policy). The study uses a design and development research methodology. In the design phase, focus group discussions were held with educator to determine the objectives of the activity. In the development phase, prototypes developed were evaluated among children and educators. Each phase was reported and many design guidelines emerged. It also indicated the process of being self-reliant for the rural preschools rather than being dependent on a global supply chain. This can be a game changer for Anganwadi schools and for effective implementation of the new NEP.

**Keywords** Activity based teaching · National education policy · Early childhood education · Rural livelihood · Anganwadi schools

## 1 Introduction

This study is based on the fundamentals that there is a need of an ecosystem consisting of stakeholders like designers, psychologists, researchers, artisans, packager, marketer, etc. who together can design and manufacture toys from locally available materials which can be of tremendous usefulness in the preschools including the rural preschools. This will also open up market for the artisans and if branded

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properly then it can emerge into a new business for the artisan clusters present in the region. This is a multidisciplinary study which includes child development, child psychology, interaction with environment, product design, standards, ergonomics, aesthetics, safety, etc. In this study, some aspects of toys & activities, designer, toy design and guidelines, etc. have been provided.

### ***1.1 Toys and Activities and Their Importance in Children Life***

Toys and activities have been an integral part of children's life. For children play is the most important work. They learn while playing rather than reading and writing. All the children love to play and when they look for a playmate, toy is their first friend. Playing games and playing with toys help to develop their mental and physical health in addition to the occupation of just being engaged. Plays and toys also help to find out the disorders like autism at an early age. This also helps to get away from digital addictions [1]. The earliest toys were made of material found in nature such as rocks, stones, sticks and clays. The great toys are those which can imbibe discovery, enhance child-play environment, fun and educational learning and are age appropriate [2]. Children's brain grows fastest in the age of 0–5 years. The factors which need to be considered for designing of toys is very important so that the relevant toys can help to impact the behavior of child, develop their social skill and hand–eye coordination, be suitable for age group, and of course safety [3].

### ***1.2 Designers***

Designers are very important stakeholders for the designing of toys & activities. They are the ones who will understand the learning outcome and accordingly design the relevant product for different learning outcomes. The designer needs to keep in mind the sizes, and material to be used, and keeping in mind the cost and safety parameters [3]. Designers while designing such activities need to be very careful on the safety of children and attractiveness of the product for children [2]. The toy or activity designer needs to collaborate with various stakeholders like artisans who will produce, the educators who will facilitate, marketer who will market the product, researchers who are doing study with children and most importantly the children who utilize the products. The designers need to have proper knowledge of design parameters and design guidelines. Designers should understand children's psychological needs; the products should have good design orientation and can better meet the need of users, through the product children should better understand the object world and should help in the development of physical and mental health of children [4].

### ***1.3 Artisans***

North eastern states have some of the finest artisans in the country who have the skill of working with bamboo for various product developments. However, they face challenges in designing new products specifically children's toys as there is no connection between the artisans and market. The craft work at present is going on in a cottage industry scale and most artisans are unorganized. Government of India has taken multiple initiatives of forming clusters for organizing these artisans for product development on a large scale and also creating market linkages. However, there is still a gap for branding and proper packaging of the product which can make these products compete in the domestic and international markets. While interviewing with the department of design at IIT Guwahati and conducting focus group discussions with artisans it came to light that there are multiple design projects being done at IIT Guwahati which remain as research work and there are several instances when artisans required design support for product development and packaging but then they remained unaddressed as there is no connecting of such design schools with ground level artisans.

### ***1.4 Toy Designing Guidelines***

Fun, engagement, emotional stimuli, physical and mental challenges, socializing, and creativity are the main goals of toy design. The focus of toy development is that it should be interactive with a better user experience. The global toy industry is growing and is very dynamic. The Chinese toy industry has grown multiple times compared to Indian toy industry. This is quite visible from the export data i.e. our toy export to China is only 0.34% of the total toy export to the entire world and our import from China is 77.4% from China of the total import of toys [5]. The competitiveness of the Indian toy industry is declining compared to both the world and China which is a major concern for the Indian toy industry. The majority of toys available in the market are made of plastic and are not of a sustainable nature. Moreover, when there is a pandemic situation and disruption in the supply chain the schools and children in the rural area suffer. So, it is very important to come out with policies by the government to develop toys from locally available materials with a definite purpose. This will also open up opportunities for the artisan clusters and entrepreneurs to develop toys for both local and national markets. Some of the common hazards occurring from toy usages which need to be taken care of while designing the toys are [6].

- Ingestion of magnetic toys
- Choking or aspiration due to small parts of the toy
- Cuts by sharp parts of the toy
- Motor toy vehicle incidents
- Chemical substances in the material.

## 2 Methodology

The initial phase of the study was a focus group discussion with educators of various preschools in north east India mainly from the rural areas. This was particularly done to identify the problems regarding engaging activities in the schools and the discussion brought out some factors which are to be taken care of while designing the activities. Based on these factors some toy design guidelines were created and then prototypes were developed. These activities were then tested with a group of students facilitated by an educator in the school environment.

Factors which were noted during focus group discussions were that the toy should

- Provide excitement to children
- Develop hand–eye coordination
- Build up strength
- Create intellectual stimulation
- Develop knowledge and understanding
- Build social skills
- Age appropriate
- Parent friendly
- Attractive design aspects
- Safe
- Affordable.

### Child development

Plays and toys have a very important role in the overall development of a child. Toy is the first playmate of a child. Activities and toys stimulate the intellectual mind of a child, fine motor skill develops through play, a child learns shapes, colors, geometry through toy and while playing in a group develops its social skill [1].

### Age appropriate

Most of the children get hurt by the usage of a product when the product is not of their age. The toy makers need to follow the guidelines of age appropriateness of Consumer Product Safety Commission [7]. The guidelines consider size as one of the main criteria, the child must be able to physically manipulate and play with the toy and the child should understand how to use the play [8].

### Parent friendly

Most of the time the child is at home and playing with siblings of parents/guardians. Nowadays due to nuclear families child stay only with their parents and siblings if any. At many homes, there is only single child and they look for playing with their parents. These days in many cases both the parents are working, as a result, parents get very less time to play with their children and sometimes when they have time, they feel like not to play as the toys and games are not designed considering the parent factor. They have a hard time to play with the toys & games with children.

Though the designers cannot change the social problem they can create guidelines for incorporating parent–child factors in the toys [9].

#### Design aspects

It is now well known fact that toy makers are segmenting toys according to gender. A study of US Disney store website shows that toys are segmented according to color and type of toys. The bold color toys like black, red, brown or gray toys and with action figures, weapons, vehicles and building toys are typically “boy’s only”. Pastel colored like pink or purple colored toys and those are dolls, kitchen sets, cosmetics, jewelry or domestic-oriented are “girl’s only” [10].

#### Safety

Children are very delicate and they try to put anything in their mouth, so safety of toys is very important. Toys can cause severe injuries including death of a child. Toys sold in European Union and US have to be approved by various safety norms. There are several safety guidelines like Toy Safety Directives 2009/48/EC [11]. Most of the injuries are avoidable if the following things can be avoided while designing a toy:

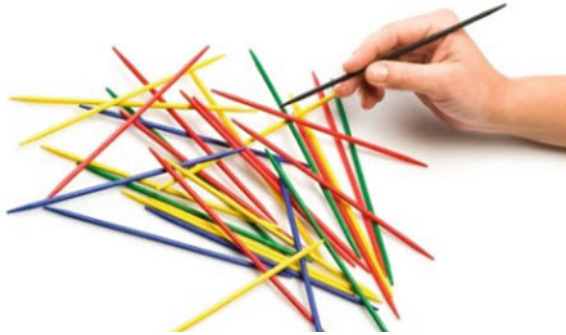
- Toys with small removable parts.
- Toys with sharp objects.
- Toys which produce loud noises.
- Toys with strings or cords with more than 7inches.
- Toys painted with lead paint.

#### Affordability

The toys plays a vital role in the life of a child however adult pays the price of the toy and if it is affordable then it can serve the purpose to a large population. A child should get the opportunity to play with multiple toys so that various stimuli can be worked on. A toy should be usable by a variety of age groups and should be playable at multiple positions. A toy should have the purpose of developing certain specific skills and should be affordable to the mass population.

### 3 Results and Discussions

The use of locally available material for the development of activities can be well received by pre-schoolers at early childcare and educational institutions and at home. While playing they engaged themselves with friends, educators at school and parents and relatives at home. The children expressed their imagination, patience, independence, and developed their communication and sharing skills. The activities were designed with a purpose and children could achieve the goal of the designed activity while playing. The level of learning and achieving the goal for most of the children lay in building and compiling the puzzles and games. The motivation of this

**Fig. 1** Mikado

study is the fact that there are only a few guidelines for activity based toy design using locally available material but most of these guidelines can be created from practical experience and empirical research. This study hence determines that the designer can learn more about children and toy design by interacting with educators, psychologists and researchers who are working with children related research. This paper can be very useful for toy designers and who are looking to start business in toy manufacturing. Few of the toys/activities which were designed and made with locally available material and which are tested among the children are.

### ***3.1 Mikado***

The inspiration of this Mikado is a pick-up stick game, played with a set of same-length bamboo sticks which can measure between 17 and 20 cm. Each stick has got a specific score (number). The sticks are bundled and taken in one hand that touches the table or ground. These sticks are then released which creates a circular jumble. Now the players take turns, in which one stick after another should be taken up without moving or touching others. The take-away could be by hand, possibly through pressing on a stick's tip or if one has already picked up a special stick (Mikado), it could be used as a helper, possibly to throw up another stick. On a fault, the turn ends (the last stick taken is not counted). The next player bundles and drops the sticks again. After several rounds, the one with the highest score—the total of the values/score of all the sticks that have been picked up—is the winner (Fig. 1).

### ***3.2 Sorting Box***

Sorting box is made of bamboo and the tiles are made of hard corrugated cards. This is a classification game for children of the age between 3 and 5 years. A child drops each tile into the box where it belongs according to the category marker placed

**Fig. 2** Sorting box



on the top. On placing each tile into a different hole, the child builds vocabulary skills. Finally, the child opens the roof to retrieve the tiles which were put and an adult verifies that (Fig. 2).

### 3.3 *Spindle Box*

A box made of bamboo with ten compartments numbered 0–9 along the back and 45 bamboo sticks. The sum of the numbers 1–9 is 45, so there is exactly the right number of sticks for the exercise. If a mistake is made, the child will find that he has either too few or too many sticks when he comes to the last compartment. He can correct his work independently. This game helps the child to learn number, counting and helps the child to associate number with its real quantity. This game is suitable for 4 years and older children (Fig. 3).



**Fig. 3** Sorting box

### 3.4 *Phonetic Game*

This game is made for 10+ years of age group of children. The parts of the game are made with chart paper and for standardization, a printer is used for taking print on card papers. On the back of each card, three to four clues are given and from each clue a word is obtained. In the next stage, these words are phonetically rearranged to create a new word which is displayed on the front side of the card. This game can be played between 2 and 3 players or more and also in teams where each team can consist of multiple persons.

The children when were administered with the above games, they enjoyed and they wanted to do repeat play. The adults who played with the children also didn't get bored or didn't find it difficult to play. They developed their social skill while playing with others, intellectual stimulation was created, hand-eye coordination was developed, developed knowledge and understanding and provided excitement. The toys were developed with locally available material so were not very expensive and affordable for rural preschools and also for parents.

Two schools were selected and from each school, a group of 15 students were taken and divided into three categories:

Group 1 (School 1 & 2): 5 students who were given activity based toys

Group 2 (School 1 & 2): 5 students who were given paper and pencil and some task to be done using paper & pencil in a traditional manner

Group 3 (School 1 & 2): 5 students who were not given any assignment.

It was found that activity based games are more effective than traditional learning methods. The effectiveness was measured with the following parameters. The quality of experience was measured and it was found that activity based games were more enjoyable as confirmed by educators. These games were described as 'fun' 'exciting' and 'fantastic'. More than 90% of students children found it interesting than the paper based exercises. 100% of students wished to play more the 'Mikado' game, 80% wished to play more the 'spindle box' game when the category marker placed on the top was modified, 70% wished to play more the 'spindle box' game when the game was made a bit more challenging i.e. when they were asked to finish in a shorter period of time. On the other hand, only 40% wished to solve additional paper based exercises. The group found it more motivating as the educators could often help them while playing the game compared to the paper based exercises.

As per the experts, all these games helped in developing hand-eye coordination. The spindle box game helped in developing the skill of estimation and counting. All these games hone fine motor skills. Since all these games are three-dimensional, this also helped in creating spatial awareness among the children.



## 4 Conclusions

Based on the theoretical aspects and also testing the developed toys & activities from locally available material, it is clear that a number of such activities can be designed from locally available material. These activities can be of tremendous value for the children for their multiple developments. Such activities can be very useful for effective implementation of the new NEP. The new NEP gives importance to play based, activity based and inquiry based curriculum. The new NEP supports physical and motor development, cognitive development, development of communication and early language, literacy and numeracy. So the discussed activity based toys in this paper and similar toys of this kind will support the new NEP. Further, a detailed research needs to be conducted and more such activities need to be designed which can be a good handbook for the rural preschools and specially the Anganwadi schools. Youths can venture into entrepreneurship and develop such toys and activities and can improve the design by collaborating with a design school and brand it properly and come out with a good brand with an exhaustive list of toys and activities.

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