Developing the Skill Set of Generation Alpha through Toy Engagement: Building a Novel, Toy-Based Pedagogy (TBP)

Ann Rose E.* and Mary Rani Thomas

School of Commerce, Finance and Accountancy, Christ University, Bengaluru, India
Email: annrose.e@res.christuniversity.in (A.R.E.); maryrani.thomas@christuniversity.in (M.R.T.)
*Corresponding author
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***Abstract*—Toy-Based Pedagogy (TBP) is a relevant, recognized teaching approach adopted by educational institutions to enhance the learning curve of children. Toys help Generation Alpha children develop skills, and the current paper underlines the need to include these skills into India's Toy-Based Pedagogy (TBP) and suggest revisions. The data for the current study is directly elicited from Generation Alpha which is a novel intervention in pedagogical research. Educational pedagogies should be constantly revised and updated catering to the needs of the current generation. The findings of the study are highly relevant, as they highlight what Generation Alpha seeks and values in the current Toy-Based Pedagogy (TBP). The data was collected directly from primary school children aged 6 and 7 years. The paper adopts qualitative methodology and purposive sampling technique to obtain data from children through one-on-one interviews using an interview schedule. Thematic analysis employed suggested that children developed different skills through toy engagement. Furthermore, the study gives deep insights on the revisions required for the existing TBP to better suit the educational needs of Generation Alpha.**

***Keywords*—curriculum, generation alpha, skills, toys, Toy-Based Pedagogy (TBP)**

I. Introduction

The elementary stages of primary education play a significant role in rationally and pragmatically moulding students [1]. Numerous writings have been identified on the need to push boundaries of how a child learns, transitioning from K-12 to college and graduate levels, specifically beginning with the endless possibilities in primary education. The challenges of the 21st century need to be contemplated and met by elementary education. Curriculum design and pedagogical innovation across subject boundaries to widen children's learning opportunities present substantial obstacles in producing a creative and competitive curriculum [2]. According to Pardamean *et al.* [3], constructive learning in primary schools should focus on putting more efforts to revamp the quality of education.

Play and toys have a dominant presence in the initial years of childhood education and cannot be replaced by anything else [4]. The dimensions of technological advancements are observed in toys employed in education process, and smart toys have been developed by embedding the features of digitisation into toys [5]. Children's personal interactions with toys during play, has a crucial role in early-age skill acquisition [6–8]. Children choose toys that aid them in skill development [9]. Play is indispensable in the early years of life and through play engagement, a child can learn varied skills such as creativity, imagination, social, physical, and problem-solving [10]. The pivotal focus of Toy-Based Pedagogy (TBP) should be in coaching teachers on the theoretical conceptualization and potential practical application in bringing novel practices with the aid of design-based and indigenous toys in the teaching-learning process of a classroom environment [11, 12].

Mark McCrindle introduced the term "Generation Alpha" in 2005 which referred to the generational cohort succeeding Generation Z. It is presumed to be the first generation to fully grow up in the era of digitization and are assumed to be differently wired than the earlier generations [13]. This generational cohort is considered to be born between 2010 and 2025 [14]. The proximity of Generation Alpha to screens and smart devices is also elucidated by Drugas [15] in his study. The potential educational paradigms for Generation Alpha are embedded in technology without any doubt [16, 17]. This finding is additionally supported by the results of [18] which talk about the integration of new technology for ensuring ideal learning atmosphere for Generation Alpha.

In view of this context, the current study delves into the role of toy engagement in building the skill set of Generation Alpha and whether a revised, novel TBP, based on the results of the study can be incorporated into primary education. For this purpose, the theoretical background offers an exploration of Lev Vygotsky's Sociocultural Theory of Cognitive Development, Jean Piaget's Theory of Cognitive Development, TBP and Skill Acquisition and how these constructs are inter-related to each other. The paper's originality lies in eliciting data directly from Generation Alpha. The pivotal focus is on what children aged 6 and 7 veritably perceive from toy engagement rather than relying on secondary sources.

Though Toy-Based Pedagogy (TBP) has been adopted in India, there is limited research that highlights the developmental and evolving expectations of Generation Alpha. Most of the existing TBP frameworks are based on conventional developmental theories and may not completely emphasize the skills, learning styles and interests of this generation. This is a solid gap while aligning pedagogical tools with the current needs of Generation Alpha. The current study bridges this gap by qualitatively investigating how Generation Alpha engage with toys, what cognitive, emotional and social skills they develop and how these experiences can be incorporated into and enhance TBP in the Indian context. The urgency of the research stems from this generation's unending exposure to technology, reduced attention spans and the increasing focus on 21st century skills that the current TBP may not adequately address. Therefore, this research is significant as it offers suggestions and practical insights for revising TBP, in addition to highlighting

the behaviours and voices of Generation Alpha children. This will aid policymakers, curriculum designers and educators in ensuring that early childhood education is engaging, relevant and future-ready.

Against this background, the current study addresses the following two research questions:

1) What are the skills developed by Generation Alpha through toy usage that can be incorporated into the existing Toy-Based Pedagogy (TBP)?
2) How can the existing Toy-Based Pedagogy (TBP) be revised to cater to the current educational needs of Generation Alpha?

II. Literature Review

A. Theoretical Background

Lev Vygotsky and Jean Piaget are considered to be two of the most pivotal influencers of educational practices specifically pertaining to the field of early childhood. Both the philosophers share common beliefs on the relevance of play in the initial learning and development phase of children [19] .

1) Lev Vygotsky's sociocultural theory of cognitive development

Social connections are important for a child's cognitive development, according to Vygotsky. According to him, adults encourage this by putting kids in difficult circumstances. Teaching strategies like scaffolding and reciprocal teaching, in which peers or teachers employ useful resources to direct learning, reflect this [20, 21]. A learning environment which implements mutual collaboration and cooperation among students and teachers accelerates co-operational and operational development in children [22]. According to Vygotsky, learning should take place in settings that encourage the development of new abilities. Social connection during early group learning prepares them for individual learning later on [23]. As explained by Vygotsky, pretend play helps in stimulating creative play. During pretend play, imagination is identified as a higher mental function, which results from internalisation of speech [24]. Vygotsky's main focus was on socio-dramatic role play as it clearly represents the relevance of play in the initial years of childhood [25]. Play and interaction with toys help in key formations in children from the preschool age [26].

2) Jean Piaget's theory of cognitive development

Piaget addressed that a child passes through different cognitive stages as they transition from one age to another. Each stage had its own unique learning capabilities and cognition. These stages were (1) Sensori-Motor Stage (0–2 years) (2) Pre-Operational Stage (2–7 years) (3) Concrete Operational Stage (7–11 years) (4) Formal Operational Stage (11 and above). Researchers have identified that Piaget's theory can be applied in teaching and framing educational policies [27–31]. Teachers who align their teaching pedagogy to these cognitive stages will aid children in improving their understanding, critical reasoning and engagement. This emphasizes on the need for teacher training in Piaget's theory and the relevance of curriculum framework that aligns with the developmental stages of children [32]. Piaget's theory focuses on the relevance of learning through active learning or direct experience. This can be implemented in everyday classroom activities, such as engagement with the right materials and objects, hands-on projects and exploration of the environment that help children to interact with the real world. This approach not only makes learning more interesting and fun for children, but also ensures deeper understanding as children relate their experiences to new concepts learnt [33]. The study conducted by Indriyani *et al.* [34] reveals that the application of Piaget's theory through color play has a significant effect on the fine motor and cognitive development of children. The findings of this study highlight the relevance of learning media that are adjusted according to each developmental stage of the child to increase learning effectiveness. The current study uses the theories propounded by Lev Vygotsky and Jean Piaget which focus on the sociocultural development and cognitive development of children as they transition from one age to another. Both the theorists have emphasized on the importance of play which crucially helps children in cognitive development and knowledge enhancement [35].

3) Connected learning theory—Mimi Ito

Connected Learning Theory, a more modern pedagogical approach influenced by the digital era, introduced by Mimi Ito and her colleagues in 2013, is a good fit for Toy-Based Pedagogy (TBP). The Digital Media and Learning Research Hub created connected learning, which emphasizes academically oriented, peer-supported, and interest-driven learning. It frequently uses digital technologies and networks to produce worthwhile educational experiences. Additionally, as TBP develops, it incorporates interactive technologies and digital toys more and more further connecting it to the digital aspect of connected learning. By preparing students for a future in which digital and physical literacy are entwined, this hybrid approach makes TBP not only compatible with but also enhanced by contemporary pedagogical paradigms such as Connected Learning.

B. Toy-Based Pedagogy (TBP)

Toys are significant in early child development as they help in cognitive development, symbolic and pretend play, language interactions, problem-solving, physical activity and social interactions as children transition from infancy to toddlerhood [36–41]. In the 21st century, Toy-Based Pedagogy (TBP) has been identified as a novel and valuable approach to education. It plays a vital role at the primary stages of education as it is effective in engaging young learners and promotes holistic development [42]. The findings by Vansdadiya and Gondaliya [43] emphasize on the relevance of comprehending teachers' practices and perceptions in implementing play-based pedagogy within the early years of childhood education. TBP offers an extensive approach in stimulating cognitive, emotional, social and physical development in children. Adequate training and positive teacher attributes are perceived to be vital in the successful adoption of this pedagogy. It is the incorporation of toys and games in the teaching-learning process to make it more engaging, joyful and inspiring [44].

Play based pedagogy is investigated as a productive platform for skill enhancement, directing children to drastically transform in their cognitive, social and physical

capacities [45]. Furthermore, Allee-Herndon *et al.* [46] state that the best effective strategy to augment the learning needs of students will be in combining play-based teaching methods and organised, direct instructions. According to Matafwali and Mofu [47], in order to ensure that learning and development are viewed to be influenced by responsive play rather than direct teaching and instruction, pedagogical practices need to be rethought.

C. Skill Acquisition

In-depth investigation on skills discloses that soft and hard skills frequently overlap and that there is a need to identify the various components of any skill to develop individuals effectively and efficiently [48]. According to Kachinske [49], skill acquisition is the gradual transition from an effortful and conscious use of a cognitive skill to a more fluent and automatic use of the same. Throughout childhood, play is essential for the mental and physical development of children [50, 51]. According to the results of Umami *et al*. [52], Paper Toy was deemed to be effective, feasible and improve the fine motor skills of children. Construction toys help in augmenting spatial skills in children [53]. Computational skill is an essential skill for the children to acquire in the digital world [54].

Smart toys help in developing 21st century skills such as computational thinking and Science, Technology, Engineering and Mathematics (STEM). This is in contrast to the first 20 years where the interest was focused more on transverse skills such as emotional thinking, collaboration, symbolic thinking, problem-solving and story-telling [55]. Computational kits and toys are identified as effective learning tools for learning integrated spatial [56], mathematical and computational thinking concepts [57]. The results of the study conducted by Hu *et al.* [58] recommend that the integration of self-made, low-cost toys and robots in project-based learning is an impactful and practical approach to strengthen primary school students' learning attitudes and outcomes in STEM education. The findings of Luen *et al.* [59] state that children's development of various intelligences is substantially aided by varied play experiences, including social, imaginative, and constructive play. Their emotional and cognitive development is significantly influenced by toys.

Fig. 1 shows the flow chart explaining the link between the theories of Lev Vygotsky and Jean Piaget to Toy-Based Pedagogy (TBP).

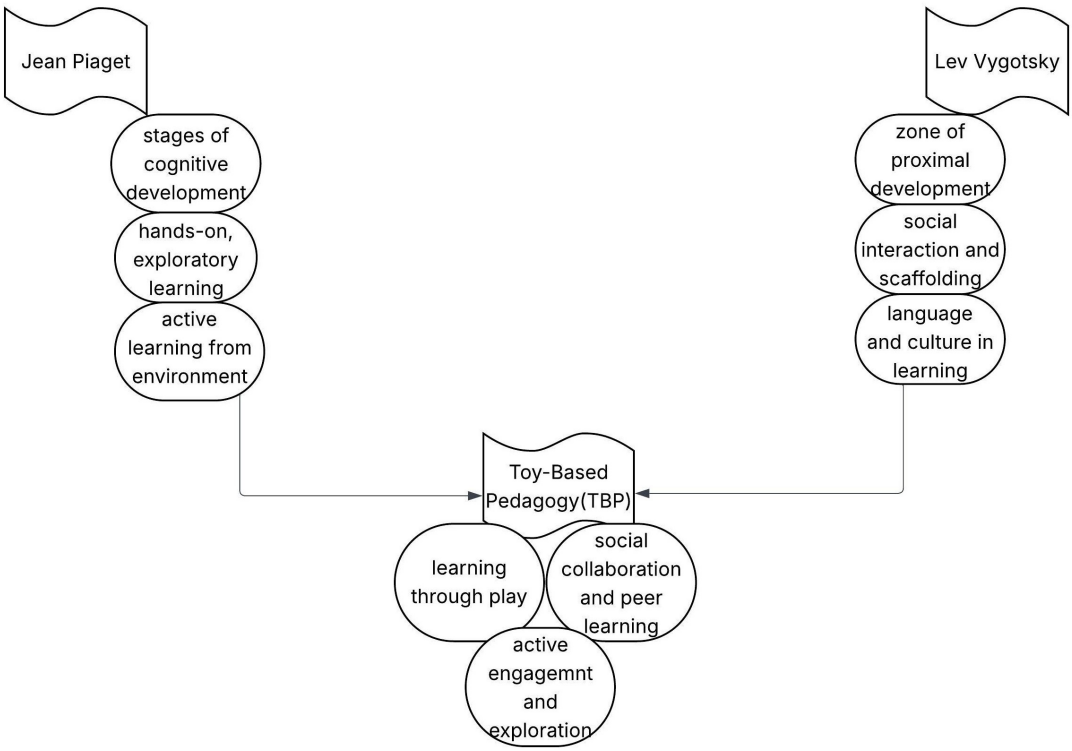

Fig. 1. Flow chart explaining the link between the theories of Lev Vygotsky and Jean Piaget to Toy-Based Pedagogy (TBP).

III. Materials and Methods

A. Research Design

An informed consent form was produced and provided to the participating children's legal guardians. The purpose of the study, the information acquired throughout the investigation, and the procedure for processing the data were explained to them. Only children who had written approval from their legal guardians were included in the study.

Participants were guaranteed that their information would be used anonymously and that no personal information would be revealed. Participants were given the freedom to withdraw from the study at any time without offering an explanation or facing any consequences. One-on-one interviews were conducted with the participating children for three weeks (December 2024). Ethical permission was granted by the Research Conduct and Ethics Committee (RCEC) from the researchers' university, Christ University, Bengaluru, Karnataka, India (ref no: CU: RCEC/00496/09/23).

B. Sampling Strategy

The participants were contacted through various primary

schools in Bengaluru, Karnataka. Meetings with the principals and legal guardians were scheduled in advance. The study was explained in detail at each meeting highlighting on the participants' rights and responsibilities apart from giving them a written description about the study. The school principals contacted the legal guardians of the children who participated in the study. The only condition for the participation was that the children should be aged 6 and 7 years. The age limit was selected based on the developmental stages under Jean Piaget's Theory of Cognitive Development: Pre-Operational stage and Concrete Operational stage. Since the cognitive development at these two stages are marked by curiosity, symbolism, seriation, logic, classification, cause-and-effect, and deduction [60], children from these stages were selected for the study. No much previous studies have covered data elicited directly from Generation Alpha aged 6 and 7. Past research have mainly focused on Generation Alpha's parents, teachers, carers and guardians. This adds a solid, novel intervention in the current study.

C. Sample

Twenty Generation Alpha children aged 6 and 7 participated in the study. Ten participants were boys and the other ten girls. The children's average age was 6.5 years (SD = 0.51). The respondents belonged to the Indian Certificate of Secondary Education (ICSE) schools from Bengaluru, Karnataka. ICSE schools were chosen as the study's inclusion criterion to ensure consistency in the respondents' access to the educational curriculum, which emphasizes on enhancing verbal abilities, passing competitive tests, and achieving a global reputation. The respondents were identified through purposive sampling technique as the sample was purposefully selected with a definite set of common characteristics in the researchers' minds. Table 1 describes the characteristics of the sample.

Table 1. Sample characteristics

ID	Age(years)	Gender(M/F)
P1	6	Male
P2	6	Male
P3	6	Male
P4	6	Male
P5	6	Male
P6	7	Male
P7	7	Male
P8	7	Male
P9	7	Male
P10	7	Male
P11	6	Female
P12	6	Female
P13	6	Female
P14	6	Female
P15	6	Female
P16	7	Female
P17	7	Female
P18	7	Female
P19	7	Female
P20	7	Female

D. Tools for Data Collection

Data was generated through qualitative, semi-structured, one-on-one interviews with Generation Alpha. The interview was conducted using an interview schedule validated by two experts in child psychology and education. According to Mashuri *et al.* [61], there are two primary reasons as to why qualitative researchers employ semi-structured interviews rather than structured and unstructured interviews. The first reason is that it is more powerful in the sense that it aids the researcher in acquiring in-depth information about the respondents while in comparison with structured interviews. The second reason is that semi-structured interviews are more adaptable and flexible. In a qualitative study, an interview schedule helps the moderator significantly in conducting the interviews smoothly [62]. A semi-structured, interview guide which is well-developed becomes a valid and authentic source of data collection whereas a poorly developed interview guide misrepresents the research findings resulting in invalid, unreliable and inaccurate data [63]. Few questions were modified and few were eliminated post the validation process. The questions were asked to comprehend if the children were able to develop certain skills through toy engagement. The questions revolved around four different toys namely Building Blocks, Indian Map Puzzle, Clay and Snakes and Ladders. These toys were selected on the basis of familiarity and accessibility. Their common use in everyday settings ensures that research findings can be generalized and applied to diverse populations. Typical questions asked to the respondents were 'What can you see?', 'What else do you make out of this?', 'Can you identify the states in the map?', 'How do you feel about the clay?', 'Can you explain the game to me?', 'Can you narrate a story with building blocks?', 'Will this puzzle be helpful?', 'Does playing with clay make you think better?', 'What is the function of dice in Snakes and Ladders?'. The duration for each interview differed based on the responses of the children. All the toys were physically shown to the children. The questions were altered based on the responses received in order to prompt the children to answer. If a child failed to respond even after cues, the researcher moved on to the next question. The responses of the children were elicited under the presence and supervision of their legal guardians. All the interviews were recorded for the analysis with the consent of the legal guardians.

E. Process of Data Analysis

Each interview was transcribed, and prior to data analysis all the respondents' personal information was anonymised. Thematic analysis was employed in the study for data analysis. In qualitative data analysis, thematic analysis is considered a straightforward method to identify patterns and themes that describe them [64]. Data collected at different times under various circumstances can be analyzed through thematic analysis and hence it is considered one of the best approaches in qualitative data research [65]. The six stages of thematic analysis suggested by Braun and Clarke [66] were used to identify themes.

The researchers became acquainted with the data gathered from the children during the first phase. To record preliminary ideas, the data was sorted, transcribed, and then read again. The researchers created the first codes in the second phase. It was a condensed version of the transcript from the interview (e.g., mentions the toy's name, describes it, explains how it works, and clarifies why it is being played with). In the third phase, the researchers began looking for themes and sub-themes after all of the transcripts had been coded. Phase four involved a comprehensive critical examination of the identified themes to ascertain their viability in addressing the study objectives. Phase five

involved naming and defining the themes. All of the information that had been found and refined were combined in the sixth and final phase to provide a comprehensive, critical analysis report. The outcome of this analysis revealed three prominent themes which can be categorized as Toy Identification, Toy Illustration and Toy Cognition. Each theme holds significance in terms of the skills developed by Generation Alpha through toy engagement. Table 2 depicts the themes derived from the thematic analysis.

Table 2. Themes derived from the thematic analysis

Toys	Themes identified		
	Toy Identification	Toy Illustration	Toy Cognition
Building Blocks	✓	✓	✓
Indian Map Puzzle	✓	✓	✓
Clay	✓	✓	✓
Snakes and Ladders	✓	✓	✓

IV. Results

The primary objective of this research was to identify the various skills developed by Generation Alpha through toy usage that can be incorporated into the existing Toy-Based Pedagogy (TBP). The study also set out to understand how the existing TBP can be revised to cater to the current educational needs of Generation Alpha. The responses from Generation Alpha emphasized the importance of toys in skill development. Children could easily identify, describe, and reason with each toy. Three major themes emerged as a result of this: toy cognition, toy illustration, and toy identification. Building blocks aided in the growth of hand-eye coordination, imagination, and creativity. The Indian map puzzle improved critical thinking, spatial awareness, problem-solving skills, and hand-eye coordination. Children's creativity, hand-eye coordination, and spatial skills were enhanced by clay. Snakes and Ladders encouraged teamwork and critical thinking. The researchers identified these seven skills by employing thematic analysis for the responses elicited from the children. It was observed while conducting the study that Generation Alpha was more curious, alert, and happy to speak and learn about the toys, which was a total change from their routine classroom materials and setup. The researchers were able to build an instant rapport with the children through the display of toys, thus emphasizing the need for TBP and its effective revisions in the existing curriculum for Generation Alpha.

Toys are crucial for developing children's critical thinking abilities because they encourage creativity, curiosity, and problem-solving. Children learn to make decisions, forecast results, and comprehend cause and effect through activities including role-playing, classification, and construction. By letting children freely experiment, make mistakes, and explore, toys promote critical thinking. When adults provide structured activities that are in line with learning objectives, free play frequently turns into directed play. This combination of purposeful instruction and unstructured play fosters creativity and cognitive growth. Additionally, toys promote the growth of logical reasoning and spatial awareness. Construction sets, puzzles, and sequencing games improve mental imagery, planning, and attention to detail.

Toys can help achieve educational objectives when they are carefully incorporated into classrooms. For instance, counting blocks can help with math development, while dolls can improve language skills. A cycle of observation, facilitated involvement, and reflection underpins toy-based learning. This method promotes active learning and links play to real-world ideas. Therefore, toys serve as a link between intentional education and exploratory play. Each theme is described below with anonymized quotations selected to illustrate a range of responses.

A. Toy Identification

Most of the children were able to identify the four toys shown. Most of them were able to recognize the toys by giving more information about its appearance, color varieties, place of purchase, their fondness towards the toy, who do they play with, when do they play with it and how do they play with it?

When Building Blocks were shown to the children, 13 children identified it as Building Blocks, 5 children identified it as Blocks, 1 child identified it as Lego and 1 child identified it as Toy Building. Children spoke about who they played blocks with (P3, P15), from where were the blocks bought and what was it made up of (P9).

This is building blocks…me and my brother play with it. (P3)

This toy is Lego. It has different colors and is made with plastic… my mom buys it from shops. (P9)

This is blocks. I just love playing with it with my friends. Sometimes we fight when we play with blocks. But always I... but always my buildings and shapes all the time is best. My favourite toy is blocks. (P15)

When Indian Map Puzzle was shown to the children, 12 children identified it as puzzle, 1 child identified it as Sponge, 1 child identified it as Country Map and 6 children could not identify it. Out of the 6 children who could not identify, 2 children identified the puzzle as India Map and Map respectively when a prompting question of 'What is the puzzle about?' was asked. Children were able to identify which country the puzzle depicted, the texture of the puzzle (P5) and the places of purchase (P16).

This is India's puzzle. So many states I can see. It is very nice to touch the soft puzzle. So many pieces are there. Some pieces will go missing sometimes. You should know everything in puzzle, only then you can fix it properly in each space. (P5)

Sponge like game. I have seen it in shops. It is so big but pieces are small. I like other games better. One small one I have it in home and my friend's place also. One day I broke one piece also. (P16)

When Clay was shown to children, all the 20 children identified it as Clay. Children were able to identify the various shapes that can be made with clay, discover its color varieties and their fondness towards clay (P11, P13).

It is clay. I love playing with clay. You can make different shapes with it. It is in different colors, I love orange, pink, blue and yellow color clay. (P11)

Clay…mmm…in different shapes you can make clay...circle, house, vegetables, kite…I just love touching it and playing with it. You get it in different colors and packets. In my school also, we play with clay. At home I play with my friends after school. (P13)

When Snakes and Ladders was shown to the children, 18 children identified it as Snakes and Ladders. 1 child identified

it as Chess and Snakes and Ladders and 1 child identified it as Snake Game. The children identified the game and spoke about when they play it, who they play with, and the nature of the game (P7, P14).

This is chess and snakes and ladders. I play it at home with my parents when I eat snacks. I love throwing the white color…white color also and black dots dice always. When snakes bite, I don't like at all. (P7)

I just love snakes and ladders. It is a game of luck. I play it to have no tension. I play it with my family. My mother, father, grandparents and my two brothers. My mother always wins. She is so lucky always. (P14)

B. Toy Illustration

Most of the children were able to illustrate and describe the toys shown to them. Most of them described the shapes that can be made out of the toys, the amount spent for the toys, the toy's functioning, the texture of the toy and their personal opinion on the toys.

When building blocks was shown, all the children were able to illustrate it in terms of the shapes that can be made from it and its size (P1, P10, P17), the price of the toys (P4) and their opinion on the toy (P1).

This is blocks. Big and small buildings you can make. One day I made a very very high building. I took picture also of it. I just love this toy…it is the best toy. (P1)

My dad pays a lot of money for blocks. (P4)

We can make many shapes…big, medium, small, with building blocks. (P10)

I make square, rectangle, tower, train and ship with blocks. (P17)

When Indian map puzzle was shown, 16 children could illustrate it and 4 children could not. Children were able to describe the states in the puzzle (P8), illustrate how the puzzle was supposed to be played and their opinion on the toy (P8, P18).

This is India, our country's puzzle. There is Karnataka, Kerala, Delhi, Chennai then so many other places. We should fix each sponge part in the space given. I will go wrong mam if I play with this. So many places to fix and keep the sponge so I am confused. (P8)

This is Puzzle. Of India. There are many places. Each place we have to keep. The pieces we should be careful when we keep. We can't break any part. It is good. I like it. Other puzzles I have seen. This first time I am seeing. (P18)

When clay was shown to the children, all the 20 children could describe it. Children spoke about its texture, the shapes that can be made out of it and their personal opinion on clay (P3, P6, P20).

Clay is always very smooth, cold hard. It is most of the time in dark colors…colors like brown, black, dark grey and all. I make shapes with clay. It is so sticky. It can bend. It is not there at school only home. (P3)

Clay is squishy, soft and flexible. I love playing with it. My mother showed me to make fruits, carrots, vegetables with it. In my house I have brown, black and red clay. I just love making shapes. I want to paint on clay too. (P6)

Soft, hands will become dirty. We should not eat it or smell it. It is not good. We can make 5 shapes with it. It is very soft, so soft, then it is cold, small rounds you can make with it. It is so sticky. We should wash hands properly. (P20)

When Snakes and Ladders was shown to children, all the children could describe it. Most of the children illustrated how Snake and Ladder is played by stating its rules (P12, P19).

We have to roll a dice whatever number comes we have to move the coin and there is a ladder and there is a snake, if we get the ladder we move up and snake comes down. Snake will eat us. Ladder helps us win. There are too many snakes- some small, some big. You get snake or ladder sometimes. (P12)

Put a dice, if get 1 or 6, you can go and up the ladder, snakes will leave us down. The last snake is always scary. It can make us lose. Sometimes you win fast. I... I…always lose when I play with my brother...hehe. (P19)

C. Toy Cognition

Most of the children were able to point out the rationale and purpose behind the use of the four toys shown to them. They were able to incorporate sound cognition and reasoning in their answers. Children were able to narrate instant stories related to the toys, explain the usefulness of the toys, elucidate on the toy's role in enhancing imagination and describe the function of various toy elements.

When building blocks was shown to the students, 18 students were able to narrate an instant story revolving around toys. The stories involved forests (P2), towers (P7) and dragons (P16) as well.

Once upon a time, there were three shapes. One shape was triangle, one shape was circle and one shape was square. They went to the forest to meet other shapes and lived happily. (P2)

There was a tower made with building blocks of different shapes. One day it rained heavily and completely got destroyed. (P7)

One day, a dragon lived in a cave with two children. They were all fond of blocks and played with it all the time. (P16)

When Indian map puzzle was shown to the kids, all the children were able to describe how the puzzles will help them in future. They spoke about how puzzles helped in increasing their focus and memory power (P4), gain knowledge (P9), aid in thinking better and have more idea about places and geography (P20).

It helps in speed and focus and memory. It makes kids smarter. (P4)

Yes, to learn about states and gain knowledge. (P9)

It helps my brain to think better and have more ideas about places. (P20)

When clay was shown to the children, all the children were able to elucidate on how it helps in thinking better. They spoke about how clay helps them to think of various shapes, sizes and how it stimulates the functioning of their brain (P6, P12).

Clay helps in thinking better. When I play with clay, it makes me think of various shapes and sizes. I sometimes think of the shapes I study at school. I think of how many shapes I can make with clay. It is a useful toy. (P6)

Playing with clay helps me think and imagine better. I think of fruits, vegetables, cars, stars when I play with clay. It is good for our brain to play with clay. It is a very good toy. It is so squishy just like slime. (P12)

When Snakes and Ladders was shown to the children, they were able to articulate with reasoning about the role of the dice, snake, ladder and the luck factor of the game. (P3, P10,

P17).

Even if snake bite it is okay, because it is a lucky game. If you get ladder, you are lucky. It is a fun game. You should be lucky when you throw the dice in the air (P3).

We shouldn't be eaten by snakes, then we lose the game. It is a game, based on luck. There is no plan here. Everything is about your luck…if you are lucky…mmm…you win or not lucky, you lose. (P10)

Roll the dice, start the game. Snake's mouth means you go back to the first number and play once more. Ladder is used to move up. (P17)

V. Discussion

As children developed various skills through toy usage, it is important to find ways to incorporate integrative interaction of toys into learning [67]. The current study provides insights into Generation Alpha's toy-based skills, how relevant they are to the Toy-Based Pedagogy (TBP) curriculum for children, and what revisions the TBP should make to accommodate the most dynamic generational cohort. The existing TBP should be focused on honing 21st century skills that are necessary for Generation Alpha's growth and learning. It majorly focuses on four key soft skill components identified as the "4Cs" namely critical thinking, creativity, communication and collaboration [68]. It is essential to have a curriculum tailored for Generation Alpha which uses toys as a medium to instil relevant skills [69].

From the responses elicited from Generation Alpha pertaining to the questions asked on Building Blocks, Indian Map Puzzle, Clay and Snakes and Ladders, it was discovered that children were able to identify, illustrate and cognize with the toys. A detailed thematic analysis of their responses led to the conclusion that Generation Alpha acquired a variety of skills through the use of toys. From the responses, it was discovered that toy engagement helps children in developing various skills such as imagination, creativity, hand-eye coordination, problem-solving, spatial awareness, critical thinking and teamwork. The results of the study revealed that playing with Building Blocks have improved children's hand-eye coordination, creativity and inventiveness. The interactive and tactile character of Building Blocks help children to experiment with spatial arrangement, create constructions and visualize results, all of which support cognitive development.

Indian Map Puzzle was identified to be useful for developing various skills such as problem-solving, critical thinking, spatial awareness and hand-eye coordination. It helps children in fostering spatial awareness and thinking as they are challenged to place puzzle pieces together in a spatially accurate way. Children should employ problem-solving and critical thinking skills to solve the puzzle because they must determine how the parts go together and use methods to finish the assignment. Playing with Clay helps children in improving spatial awareness, creativity and hand-eye coordination. Children can mould and shape clay due to its malleability which improves artistic expression, creativity and fine-motor skills. It has been discovered that the traditional Snakes and Ladders game helps in fostering critical thinking and teamwork. This game enhances children's ability to think critically while they create strategies for moving through the game. When played in groups, the game also promotes social contact and cooperation, which aids in the development of children's teamwork abilities.

The findings of the study conducted by Yonzon *et al.* [70] disclosed that the varied use of play accessories, books and figurines helped children in transitioning from the embodiment of experience to an abstract and intellectual space signalling the emergence of early levels of their imagination. Children are guided to learn what they need to learn with enthusiasm and pleasure, and quality toys when used suitably, provide children with a wide gamut of opportunities for creativity, effective participation and social interaction with adults [71]. Educational toys help in stimulating eye-hand coordination in the initial years of childhood [72] and smart toys support in developing problem-solving skills [73]. Tangible play significantly aids children in improving their spatial awareness, fine motor skills and five senses [74]. Digital games as learning or teaching tools can augment children's higher order thinking skills such as critical thinking, problem-solving, creativity and collaboration [75]. Primary school children have the spirit of fun and adventure like group competitions and activities. Toys with customized, teamwork building, logical and challenging attributes are more suitable for this age group [76].

Though TBP has been integrated into the Indian curriculum, it is still at the initial phase. Limited access to quality toys, cultural disparities in play patterns, lack of sound infrastructure, concerns on age-appropriate toy selection and teacher training gaps signal that a well-developed TBP curriculum is the need of the hour. The constraints posed by the local realities of the Indian school system have been widely discussed in the study of [77]. The results of this study suggest that in order to better meet the developmental needs of Generation Alpha, the existing TBP may need to be revised. In comparison to traditional classroom materials, which are sometimes seen as unduly formal or uninspired, children today are more aware, inquisitive and excited about learning through toys. The children's responses on toys revealed a high degree of enthusiasm and interest, underscoring the potential of toys to revitalize the classroom experience and match it with the educational interests of Generation Alpha.

The study's findings suggest that there is a great opportunity to revise the existing TBP to better suit Generation Alpha's needs. There is little empirical data to support the claims made in earlier research that children's engagement with toys improves and develops their academic performance. With pertinent evidence, the current study aids in a thorough understanding of this. The study's conclusions center on how Toy-based Pedagogy (TBP) incorporates a number of 21st century skills, including communication, creativity, critical thinking, teamwork, collaboration, digital fluency, adaptability and leadership. This is a major shortcoming of the current TBP. First, it is evident that toys can be effective tools for promoting a wide range of developmental skills. These skills can be developed by integrating toys into the curriculum in a planned and structured manner, guaranteeing that children are equipped to handle the complexities of the modern world. Second, the children's positive responses to toy-based learning support the need for the curriculum to include more interactive,

hands-on activities. Engaging Generation Alpha in traditional classroom setups may not be possible which often place a strong emphasis on passive information absorption and memorization. By updating TBP to include more skill-building toys, teachers can make the classroom more dynamic and interesting. Though past studies have stated that toy engagement helps children in enhancing academic performances, empirical evidence on toys aiding children in skill development is scarce. The current study helps to understand this clearly with relevant evidence.

Toys are frequently employed as instruments to reinforce preset concepts without promoting inquiry or originality, and traditional toy-based education mostly emphasizes rote learning and passive involvement. On the other hand, Toy-Based Pedagogy (TBP) that integrates 21st-century skills actively engages kids in inquiry-driven, hands-on activities, revolutionizing the educational process. The toys used in this contemporary method are not just playthings; they are dynamic educational resources that promote creativity, imagination, hand-eye coordination, problem-solving, spatial awareness, critical thinking, and teamwork. Students build, explore, and collaborate instead of just following directions, acquiring critical cognitive and social-emotional skills that equip them for problems in the real world. The structured yet adaptable integration of skill development with intentional play distinguishes Toy-Based Pedagogy (TBP), which instills 21st-century skills, from other worldwide play-based learning methods. The intentional emphasis that TBP places on developing fundamental skills sets it apart from many other global play-based models that prioritize unstructured play and social engagement. It combines play with particular learning objectives, frequently with the help of interactive, culturally appropriate tools that encourage creativity and curiosity. TBP makes sure that play directly contributes to holistic cognitive and social growth, which makes it a more focused and effective way to develop future-ready learners than some international models that place more emphasis on exploratory or theme play without obvious skill alignment. Indian toy-based pedagogy places a strong emphasis on using interactive, culturally appropriate toys to foster experience and contextual learning while fostering 21st-century abilities like creativity, problem-solving, and teamwork. International play-based learning models, on the other hand, like those influenced by Montessori or Reggio Emilia, frequently emphasize child-led inquiry and unstructured play to promote cognitive and emotional development in a variety of international situations. Table 3 describes the skill integration through enhanced TBP.

This is a small reference and not an exhaustive list. Elaborate and exhaustive studies can be conducted from the given suggestions. As an implication to imbibe policy and practice, this table is created as a ready reckoner, to assist practitioners, policy makers and other stakeholders in primary education to enhance TBP which further can be taken up by researchers in the field of education. Further studies can be conducted on how each skill can be mapped to different subjects to increase the effectiveness of the teaching-learning process.

Prioritizing the integration of TBP in the curriculum for Generation Alpha and aspiring teachers is critical for educational institutions. The existing TBP can combine digital elements with physical toys, keeping the digitally immersed Generation Alpha in mind. Introduction of effective Science, Technology, Engineering and Mathematics (STEM) toys and promotion of social-emotional learning through collaborative play can be another great addition to TBP. Various toy companies have launched STEM-based toys in the contemporary market, but sufficient evidence-based research papers on the same are yet to be explored. Further research can gauge this gap and carry out comprehensive analysis. Integration of culturally diverse toys, toys that aid in individualized learning, foster creativity and real-world problem solving should be an integral part of this pedagogy. Engaging play-based assessments and enhancing feedback mechanisms in toy interaction can positively impact the children to a great extent. Future educators will have more capabilities to help their students build and enhance skills which are essential for success both inside and outside of school.

Table 3. Skill integration through enhanced TBP

Toys	Skills identified	TBP
Building Blocks	Imagination, Creativity and Hand-Eye Coordination	SCIENCE: where solar system is taught to encourage creativity, model building can be initiated
Indian Map Puzzle	Problem-Solving, Hand-Eye Coordination, Spatial Awareness and Critical Thinking	TECHNOLOGY: as the curriculum is integrating gamification at a very young age, puzzle can be the early learning tool to ignite young minds
Clay	Creativity, Spatial Awareness and Hand-Eye Coordination	ENGINEERING: engaging in clay modeling can make engineering concepts more engaging and tangible for children from a young age
Snakes and Ladders	Critical Thinking and Teamwork	MATHEMATICS: learning math concepts such as addition, subtraction, probability from a young age through snake and ladder simulations can be explored

VI. Conclusion

The research focused only on Generation Alpha aged 6 and 7. Other age categories were not considered in the study. The study included students only from the ICSE board. Other educational boards were not included. Only four toys were shown to the children namely Building Blocks, Indian Map Puzzle, Clay, and Snakes and Ladders. Children's opinions on various other toys could have resulted in different results. The research was limited to the respondents from only one Indian metropolitan city, Bengaluru, from the state of Karnataka. The TBP discussed in the study is reflective of the pedagogy followed solely in India. Other toy attributes such as price, design, size, shape and safety which could have influenced Generation Alpha were not considered in the study. The perspectives of Generation Alpha's parents and their teachers on TBP were not focused in the study.

Regardless of the limitations mentioned, the current study strongly emphasizes that building a novel, revised TBP is essential for the digitally immersed Generation Alpha. The existing TBP followed at Indian primary schools should be reintroduced by considering the elements of age-appropriate skill enhancement, global exposure, modernisation and peer learning. Educational institutions should exercise due

diligence in developing curriculum that build foundational skills like creativity, problem-solving, critical thinking and collaboration. The educational demands of the 21st century majorly signal a revamp in the existing TBP practised in India. This necessitates the acceptance of a drastic pedagogical shift from traditional rote learning to harnessing 21st century skills. These skills are essential for a student's career readiness. By the integration of modern educational toys that promote interactive learning and hands-on experience, Indian educators can mould children with the necessary skills and prepare them for the endless future challenges and opportunities in an increasingly competitive and complex world. Restructuring TBP would also help in bridging gaps in accessing quality education and supporting more personalized learning experiences for all students, particularly in underserved regions.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Ann Rose E conceptualized the paper. Ann Rose E and Mary Rani Thomas designed and wrote the original draft. Ann Rose E conducted the research interviews. Data analysis and theme development was done by both Ann Rose E and Mary Rani Thomas. The paper was reviewed by Ann Rose E and Mary Rani Thomas. Both the authors had approved the final version.

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