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Educational Games and Cognitive Development and Learning in Preschool Children

Abdelaaziz MAHDAOUI ¹, Ahmed MOUSSAOUI ², Zhor MOUSSA ³

1. Regional Academy of Education and Training, Fès-Meknès, moussaoui.physique@gmail.com
2. Regional Academy of Education and Training, Fès-Meknès, moussazhor@gmail.com
3. Regional Academy of Education and Training, Fès-Meknès, mahdaoui.abdelaaziz@gmail.com

Abstract

Educational games have a huge role in the overall development of children in creche. They are a teaching tool to promote early learning through play that is tailored to the cognitive, motor, social and emotional needs of young children. This article analyses the influence of educational games on preschool learning, emphasizing their impact on the development of language, motor skills, socialization, and autonomy. The study is based on a theoretical review of research within early childhood education and developmental psychology and on a questionnaire for parents. Results show that parents encourage the use of games in children's learning.

Keywords: educational games, learning, preschool, early childhood, playful pedagogy, cognitive development.

1. Introduction

Early childhood is a critical period in a child's development. This is a critical time for experiences to occur so that future cognitive, social, and emotional skills can develop.

Educational games are an important pedagogical tool in the nursery context; they allow active learning through play.

Research discussed in [1] has indicated that learning via play promotes student growth. First findings showed that pupils love games. But towards the conclusion of the third week, the youngsters found pleasure in collaborating with pupils they hardly knew. Research indicates that children learn better when they play meaningful games. The author stresses, hence, that play significantly promotes pupils' development intellectually, socially, and emotionally.

Debbie Bagley's article [2] shows that play-based learning promotes children's cognitive, social, and emotional development by stimulating their creativity, curiosity, and communication skills. Research also shows that playful activities make students more engaged and motivated, which improves their learning abilities and interactions with others.

The study by Wulandari Sitorus et al. [3] shows that play-based learning contributes to the cognitive, social, emotional, and physical development of young children by fostering creativity, critical thinking, social skills, and motor development. The results also highlight the importance of

integrating play-based activities into school curricula to ensure children's overall development while reconciling developmental progress with academic success.

The paper by Garaigordobil et al. [4] This study evaluates the effects of a play program on the creativity of preschool children using a pretest-post-test experimental design with a

control group. The results show that a weekly 75-minute play session significantly improves verbal and graphic creativity as well as creative personality traits in children, with no notable difference between boys and girls.

This document [5] highlights the importance of play in the overall development of young children, particularly in social, behavioral, language, and cognitive areas. Research shows that play allows children to acquire essential skills through varied life experiences, thus underscoring the need for educators and families to provide greater support for learning through play.

Constructivist theories developed by Jean Piaget, as well as the socio-constructivist approaches of Lev Vygotsky [6], emphasize that children progressively construct their knowledge through interactions with their environment and with others. From this perspective, play appears as a natural means of learning, stimulating exploration, discovery, and creativity.

The purpose of this research is to investigate the impact of educational games on the learning of children in preschool. It also aims to show how these fun activities help to improve the cognitive, social, and emotional capacities of young students. The study emphasises, via this review, the pedagogical benefits of play in the learning and teaching process. At last, it stresses the need of incorporating play-based methods customized to meet the needs of preschool children. The study is founded on a survey given to the parents of the children as well as a review of the literature.

2. Theoretical framework

2.1. Definition of Educational Games

Educational games are playful activities designed to develop specific skills in children while maintaining an element of fun and motivation [7], [8], [9]. An educational game is a playful resource that has been specifically developed to initiate or reinforce specific learning in children of all ages. Play-based learning combines serious educational intent with engaging, playful mechanisms. Educational games take various forms, such as: sensory games; construction games; symbolic games;

puzzles; educational digital games; and musical and motor activities [10].

2.2. Types of Educational Games

Educational games can be classified according to their medium and learning objectives. First, there are analogue games (board games, card games, role-playing games, tabletop games) which promote conceptual learning and psychosocial skills such as collaboration, communication, and creativity [11], [12]. Digital games include digital educational games and serious games, often used in science, engineering, medicine, or environmental education [13]. Other typologies distinguish games by genre: puzzle games, strategy and reasoning games, robot games, role-playing games, simulation games, adventure games, action games, and construction games [14], [15]. Finally, some studies group games according to their educational function: games as teaching tools, games created by students, games used as a mechanism for competition or simulation of real situations [15].

2.3. Learning in Preschool

Preschool education is mostly based on concrete experiences customized to the child's natural growth [16], [17]. Children learn primarily through action, observation of their environment, and social interaction at this stage. Experimentation helps them to progressively learn their surroundings via trial and error and personal insights. Observation is also essential because youngsters acquire their understanding by observing adults, instructors, or classmates conduct several tasks.

Moreover, imitation is a core process in preschool education [18], [19]. Children replicate the actions, gestures, and words they see all around them, hence fostering the growth of language, social skills, and school habits. Social interaction is also vital since interactions with other youngsters promote communication, teamwork, and sharing. By way of these interactions, kids acquire self-assurance, learn to respect regulations, and learn to communicate their feelings [20], [21]. Learning in preschool also depends on manipulating objects. Children improve their fine motor skills, curiosity, and reasoning ability by touching, constructing, moving, or experimenting with many materials. Learning becomes more engaging and more approachable with concrete activities [22], [23], [24].

In this context, play proves to be a highly effective teaching method. It naturally incorporates all these facets into everyday tasks. While having fun, children experiment, observe, copy,

exchange ideas, and manipulate objects. They then experience none of the constraints of formal instruction. Play thus makes the classroom vibrant and motivating. Children learn with joy. They gain independence. They gradually acquire their mental, social, and emotional skills.

3. Impact of Educational Games on Learning

Educational games are crucial for kids' learning at preschool age, as shown in figure 1. Children at this age learn through exploration, manipulation, and interaction with their environment. Thus, play is a natural and motivating way to encourage the acquisition of new knowledge and skills, while at the same time respecting the pace of development of each child.

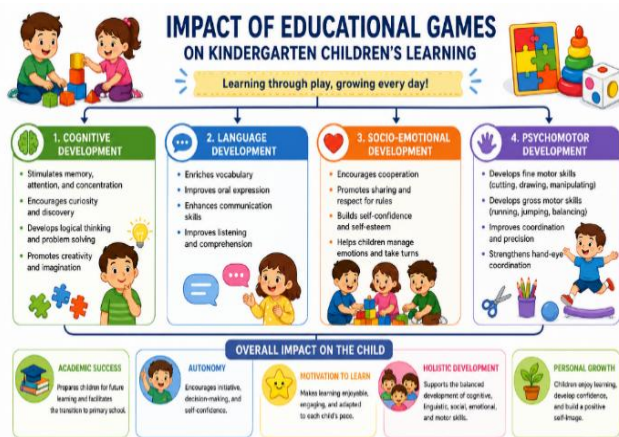


Figure 1. Impact of Educational Games on Learning

3.1. Cognitive Development

Recent studies show, see figure 2, that educational games, notably interactive digital games, can improve young children's memory, attention, and cognitive ability development [25], [26], [27]. Interactive educational games, structured into sorting, classifying, and puzzle-solving tasks, enhance focus and improve retention of knowledge in memory. They also enhance problem-solving by engaging kinesthetics, auditory, and visual memory simultaneously [27]. Pre-school and nursery-age children's number sense is enhanced by digital games that include numbers. These consequences endure [25]. Moreover, construction and manipulation games including blocks, jigsaw puzzles, and free-form building are related to improved visuospatial ability. They also enhance spatial visualization and visuomotor coordination, supporting logical reasoning and future learning in mathematics and science [28], [29], [30]. Additionally fostering divergent thinking, discovery, self-control, reasoning, and the capacity to derive conclusions is this kind of creative play. They lay the groundwork for understanding

fundamental ideas (shapes, sizes, spatial relationships) and for addressing straightforward challenges [28], [30].

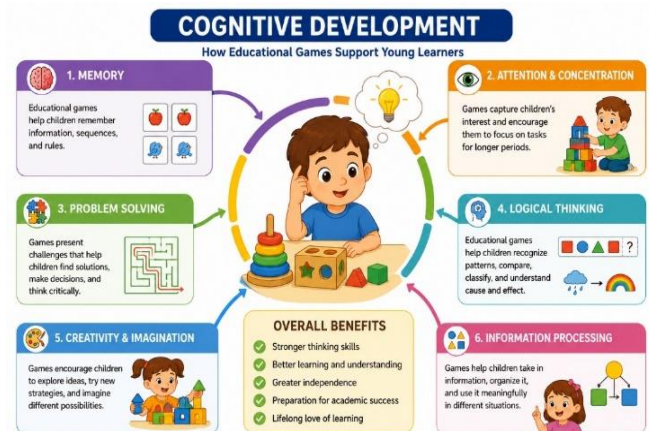


Figure 2. Cognitive development

3.2. Language Development

A recent study reveals that fun interactive activities are essential for young children's language development, as shown in figure 3. According to [31], a home environment rich in games, stories, sketching, music, toys, and play is related to a more developed vocabulary and greater grammatical abilities up to the age of nine. Structured games, like tablet-based or English game-based learning, help preschoolers independently acquire new vocabulary, transfer it to long-term memory, and enhance their verbal communication and listening comprehension [32], [33], [34]. According to [35], more focused play-based therapies, including language-action linking using playdough, improve receptive and expressive vocabulary, syntax, and conversational initiatives more than classic play with toys.

Simultaneously, parent-mediated play-based interventions demonstrate moderate benefits on the social communication and language abilities of preschool-aged children with autism [36], [37]. Last but not least, motor and physical activities integrated into games and natural environments offer more chances for communicative interaction and can help improve spoken language [38].

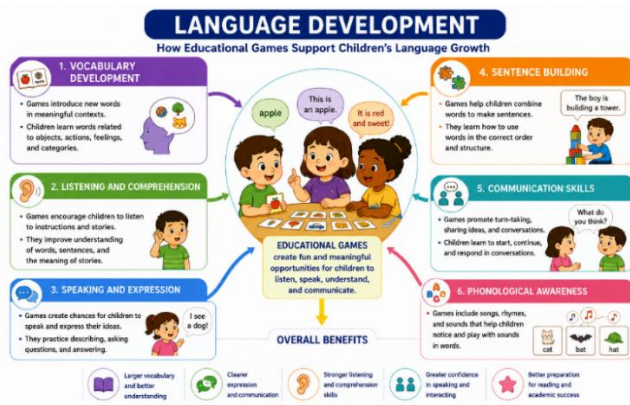


Figure 3. language development

3.3. Social and Emotional Development

Group and cooperative games at school, see figure 4, foster numerous prosocial behaviours in children—such as helping, cooperating, sharing, negotiating, and respecting turn-taking and shared norms—while reducing aggression, isolation, and anxiety or shyness [39], [40], [41]. In these contexts of rule-based play, children learn to follow shared instructions, control their behaviour, and assume responsibilities, thereby reinforcing respect for rules and a sense of democracy within the group [39][42]. Structured programs involving cooperative games and social-emotional learning also improve empathy, cooperation, mutual aid, and mutual encouragement, as well as self-image, self-esteem, and confidence in one's ability to cope with stress and anxiety [43], [44]. Finally, group creative activities (musical games, dramatic play, and symbolic play) develop the ability to put oneself in another's shoes, understand others' emotions, and reduce confrontations, thereby strengthening empathy and group cohesion. [39], [40], [43].

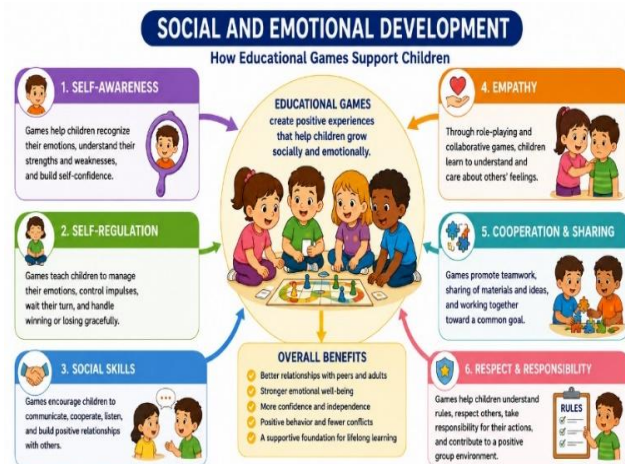


Figure 4. Social and emotional development

3.4. Motor Development

Games with rules and group games enhance children's prosocial actions (sharing, assisting, cooperation, nonviolent problem-solving) and improve peer connections, self-esteem, and emotional stability [44], [45]. Experimental research reveals that children share more and show more pro-social actions following cooperative play sessions, with no significant difference between girls and boys [40], [46], [47]. Particularly good for lowering anxiety and building critical socio-emotional skills, including empathy, cooperation, trust, and emotional regulation, are cooperative play situations, including exergames [39], [48], [49]. Lastly, collaborative school environments, where teamwork and mutual support are cherished, are linked to a better set of socio-emotional skills (empathy, cooperation, optimism, and tension resiliency), therefore fostering students' well-being and self-confidence [45], [49], [50]. (See Figure 5.)

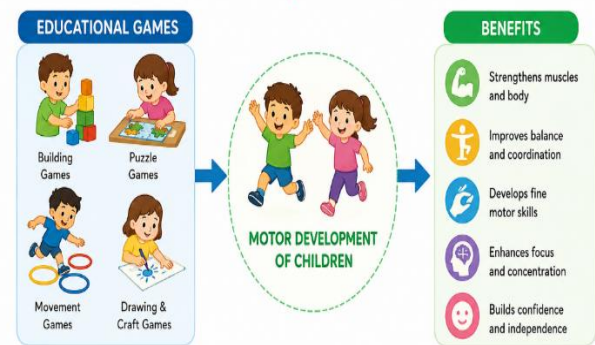


Figure 5. Motor development

4. The Role of Educators in Preschool

Educators, as present in figure 6, are the key to the effective implementation of educational games, as they plan, organise and evaluate activities on the basis of the well-being, development and learning of children, adapting strategies to the context and needs of the group [51], [52]. Through playful pedagogy teachers observe, interact, support and guide the game so that activities are connected to curricular objectives encouraging creative exploration, initiative and cooperation among peers [53]. If a safe, structured and inclusive environment is created with clear rules, small groups and enough tools (playful language, concrete material and enough time to play), all children, including the most vulnerable, can participate and feel more belonging [54]. Finally, professional development programmes for pedagogical interactions have a significant positive impact on the quality of emotional support, classroom organisation and cognitive guidance, which affects the effect of play-based activities on children's general development [55].

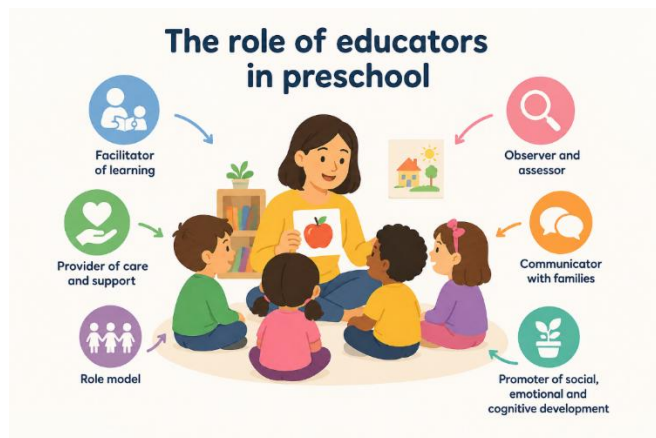


Figure 6. Role of educators in preschool

5. Limitations and Difficulties of Games in Education

Recent studies show that although digital games in schools have benefits, they have many material and educational limitations. Future teachers identify the lack of money and infrastructure (hardware, software, maintenance) and the absence of a clear institutional framework for the inclusion of digital games in the classroom as major obstacles [56]. One of the main obstacles is the lack of training and digital skills of teachers regarding technical competence, classroom management during games, and activity design with real educational value [57][58]. At the same time, a large body of literature points to the potential negative effects of excessive screen time—especially among young children—on physical health, motor skills, language development, self-regulation, and quality of spontaneous play [59], [60]. Therefore, the recommendation is to strike a balance between digital play activities and traditional or outdoor games, with an emphasis on intentional, time-limited, and adult-guided use, while still providing ample opportunities for rich, non-digital, physical, and creative play [61], [62].

6. Results and Interpretations

This study sought to determine how parents view the influence of educational games on preschool children's learning. Data were gathered from twelve parents via a questionnaire including three closed-ended questions:

- Does your youngster love learning via educational games?
- Do games that are good for education help your child develop their skills?
- Does your child show greater engagement during play activities?

Parents answered either “yes”, “to some extent” or “no”. The following tables (table 1, table 2 and table 3) show derived data.

Tableau 1. Frequencies and percentages of the question "Does your child enjoy learning through educational games?"

Answer	Frequency	Percentage
Yes	10	83.3
To a certain degree	2	16.7%
No	0	0%

Tableau 2. Frequencies and percentages of the question "Do educational games contribute to the development of your child's skills?"

Answer	Frequency	Percentage
Yes	4	33.3%
To a certain degree	7	58.3%
No	1	8.4%

Tableau 3. Frequencies and percentages of the question "Does your child participate better during play activities?"

Answer	Frequency	Percentage
Yes	5	41,7%
To a certain degree	5	41.7%
No	2	16.6%

Analysis based on weighted averages shows that alternatives were tallied on a three-point Likert scale (Yes = 3, About = 2, No = 1) to help one decipher the questionnaire replies. To evaluate the degree of agreement among the responders, a

weighted average (μ) was then computed for every item. The better the evaluation, the closer the average is to 3.

The number of answers for each item determines the average that is computed using equation (1) below:

$$\mu = \frac{\sum(f_i \times x_i)}{N} \quad (1)$$

where:

- f_i : frequency (number of responses)
- x_i : value assigned to the response
- N : total number of respondents

Table 4. Weighted average

Question	Average (μ)	Level
Does your child enjoy learning through educational games?	2,83	high
Do educational games contribute to the development of your child's skills?	2,25	middle
Does your child participate better during play activities?	2,25	middle

Table 5. Interpretation criterion

Average interval	Level
1,00 – 1,66	Weak
1,67 – 2,33	middle
2,34 – 3,00	high

Based on table 4 and table 5, the average of 2.83 is very close to the maximum value (3), indicating a very high level of appreciation for learning through play among children. The average of 2.25 reveals a moderately positive perception of the effect of educational games on skills development. Parents generally recognize their usefulness, but with some reservations. The average of 2.25 shows that playful activities

promote children's participation according to the majority of parents, although this effect is not perceived as entirely unanimous. The calculation of the overall average of 2.44 (high level) presents a value that indicates that parents have an overall favourable opinion regarding the effect of educational games on children's learning in preschool. The results notably show strong agreement with the idea that children enjoy learning through play, while the effects on skills development and participation are considered positive at a moderately high level.

The results of the descriptive analysis reveal that the overall average score is 2.44 out of 3, which corresponds to a high level. This shows that parents have a positive perception of the contribution of educational games to children's learning. The highest-rated dimension concerns children's interest in learning through play ($\mu = 2.83$), while the dimensions relating to skills development and improved participation each have an average score of 2.25, reflecting a moderately positive assessment. These results confirm the importance of educational games as a tool for promoting children's engagement and learning in preschool education.

Statistical analyses performed using SPSS software show that educational games have a positive impact on children's learning in preschool education. The results reveal strong parental support for the playful approach, particularly with regard to children's motivation and participation in educational activities. These results highlight the importance of integrating educational games into preschool teaching practices in order to promote more active and motivating learning.

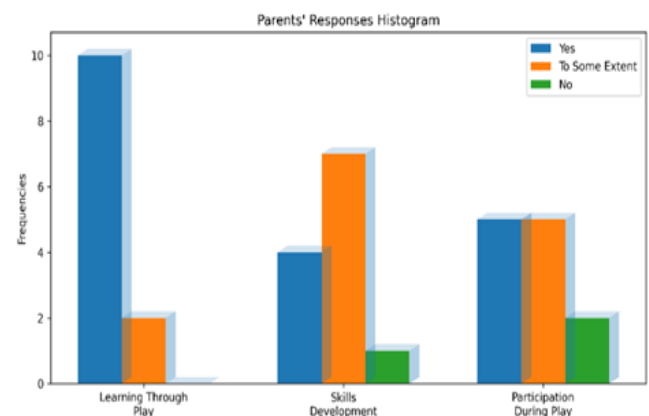


Figure 7. Histogram of parents' responses

Figure 7 and results analysis indicate a very positive perception of parents towards the use of educational games in preschool education. Most respondents regard these activities as useful in improving children's learning and strengthening

their motivation. There are very few negative responses, which means there is a lot of support for this pedagogical approach. Educational games also encourage active participation of children and stimulate children's interest in school activities. These findings show the importance of learning through play for the development of cognitive and social skills. Thus, the use of educational games seems to be an effective way to improve the quality of learning in preschool institutions.

Conclusion

In the current study, a literature review and empirical approach, parents' perceptions of the use of educational games in preschool were evaluated. Analysis of the questionnaires filled in by parents shows that the vast majority of respondents report that their children are very interested in learning while playing. Most parents are confident that educational games help to develop children's skills, but some answers indicate a moderate impact. "Moreover, the findings indicate that these games facilitate the enhancement of children's participation in educational activities. They promote the cognitive, linguistic, social, and motor development of young learners and at the same time enhance their motivation and enjoyment of learning. Therefore, the role of play in the practices of preschool education seems to be a factor capable of promoting more active, interactive, and lasting learning.

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