

Play and Cognitive Development: Formal Operational Perspective of Piaget's Theory

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Abstract

Cognitive development is the construction of thought processes, including remembering, problem solving and decision making, from childhood through adolescence to adulthood. Play contributes to cognitive development in a number of ways. It helps children to develop imaginary and memory which is essential for thinking about past, present and future. The main purpose of the study was to find out the role of play regarding cognitive development of children. This study was quantitative in nature. Survey method was used to collect data. A sample of three hundred students was selected from both public and private sector schools of Lahore city. A five point Likert scale was used to collect data. Mean, t-test, One Way ANOVA and percentages were applied to analyze the data. The major finding of the study indicated that students feel curiosity to explore new things, new ideas by play.

Keywords: Play, Cognitive development, Formal operational stage

1. Introduction

Cognitive improvement is the development of thought processes, including recalling, critical thinking and basic leadership, from youth through youthfulness to adulthood. The assorted changes in feeling that happen over the life range, in relationship with expanding physiological maturity (development) and experiences (Sternberg, 2003). Cognition incorporates each mental procedure that might be depicted as an affair of knowing (counting, seeing, perceiving, considering, and thinking, as recognized from an ordeal of feeling or have will (Britannica, 2006). Psychological improvement concentrates on how kids learn and handle data. It is the improvement of the reasoning and arranging frameworks of the psyche. It includes dialect, mental symbolism, considering, thinking, critical thinking, and memory advancement. Play has a significant role in the development of a child's creative abilities. Hestenes and Carroll (2000) quoted that according to the vygotsky, play signals the beginning of imagination and the ability to think creatively. Another element of early child Education (ECE) curriculum is art activities. Art is considered a best way to enhance the cognitive abilities of young children (Jones, 2003).

Researches show that appropriate use of computer enhances creatively using appropriate software make significant picks up in insight, nonverbal aptitudes, basic learning, long haul memory and complex being (Johnson, 1999). There is also fixed time for story telling in which children are to read different story books. It enhances the young children's curiosity and exploration (Lanchester, 1990). All mentioned activities play a vital role in the cognitive development of the students who are getting early child Education (ECE) experience by enhancing their abilities.

A study was conducted in which investigated the presence and growth of Early child Education (ECE) students met cognition as they engaged in the writing process, the students were found able to provide appropriate answers to questions that required them to talk about thinking (Sandall, 2004).

According to Santrock (2005) Play exercises offer numerous open doors for controlling, investigating and honing and are hence profoundly suggested as road for cultivating the intellectual skills of youthful kids. In other words of Wood and Attfield (2005) many advocate of Early child Education (ECE) emphasize the importance of play. Frobel through his gifts and occupations and Montessori, through her sensory materials, saw children's active participation with concrete influences contemporary thinking about the cognitive basis for play. From piagetian perspective play is literally cognitive development. Through play children learn information and acquire skills that are crucial to their cognitive development. The child who is playing on a water table may be

discovering some objects sink while others float. The one on the swing is exploring notion, gravity and safety. The child who is playing with blocks is learning about colors, balance, depth and volume (Abott & Moylett 1999).

Play contributes to cognitive development in a number of ways. Play helps children to develop imaginary and memory which are essential for thinking about past, present and future (Klein, Wirth, & Linas, 2003).

Play gives children opportunity to practice problem solving and decision making abilities, two important elements of cognitive development. Play can have a significant role in the development of a child's creative abilities. The development of creativity is also related to cognitive development because creative thinking contributes to problem solving. Through play, teen-agers learn how to cooperate with others, create dialect aptitudes perceived and take care of issues, and find their human potential. To put it plainly, play helps kids understand and discover their place on the earth. Most children's cognitive skills increase rapidly during formal operational stage. It is essential to remember that children of the same age may not have the same levels of cognitive competence.

2. Literature Review

Play is the vital part, the vehicle by which youngsters impart, entertain, find out about their general surroundings, comprehend themselves as well as other people, manage their-issues, and practice a portion of the abilities they will use later on" (Harley, 1971).

"Play is that absorbing activity in which healthy young children participate with enthusiasm and abandon" (Bergen, 2002). "Through play, children learn about cultural norms and expectations, discover the workings of the world, and negotiate their way through their surroundings" (Klein, Wirth, & Linas, 2003). Play helps children in cognitive development. As from above definition through play children learn about their environment and through play they discover their world. They know about new things. Play has fundamental means by which they learn new skills and management skills and also develop problem solving skills. Play also helps children in cognitive development in a number of ways. It helps children in their imaginary and memory which are essential in their thinking.

As adolescents play with materials, they have the chance to get things going or change things; in this way, they encounter some control over their reality. Since they are in control when they play, they for the most part pick materials and exercises for which they have a few abilities or interest, so they are relaxed. Their play encounters are effective, so their certainty is improved (Brewer, 1995). Through play, kids interface with their reality and the majority of its items, procedures, and occasions If you observe even the most youthful kid with an obscure article you will see first the procedure of investigation touching, noticing, tasting, looking, and listening took after by control of the articles. Play with articles, circumstances, forms, and different parts of their reality is kids' method for social affair data and interfacing the new data with what they have beforehand experienced or definitely know (Jones, 2003).

Here and there through enthusiastic physical play and infrequently through imagine play, children can tell grown-ups what they are feeling. They will be unable to name or enlighten us regarding their apprehension of creatures, however they can indicate it as they profess to be fierce beasts or to flee from the creatures. Youngsters can't let us know that they're disappointed, however they can express it by slamming cymbals together or playing an extremely bossy grown-up to their dolls. Play permits one to express the full extent of feelings euphoria, delight, torment, disappointment, resentment, and invigoration (Santrock, 1990).

Researchers Hestenes and Carroll observed the play of twenty nine children with and without incapacities in their classroom and on the play area to better comprehend the encounters of inclusive preschool settings for children. Legislative mandates have required that children be placed in the least restrictive environments, resulting in a huge increase in inclusive programs for children of all ages. Even though the preschool children in the study had diverse levels of capacity, every kid occupied with the majority of the different sorts of play accessible. Both gatherings of youngsters, those with inabilities and their regularly creating peers, invested a greater amount of their energy in gross and fine engine play than in tangible or sensational play.

In this study, instructor nearness was a huge indicator of kids' comprehensive collaborations. Former research had proposed that educators could start and encourage play between ordinarily emerging youngsters and toddlers with incapacities through their modeling and supervision. Although we need to understand better how teacher interactions influence children's play in inclusive settings, this study and others make it clear that a teacher's presence and support is a key factor in the frequency of inclusive interactions. It is a reminder that we need to go beyond just placing children together; we must learn more about how to support them in inclusive settings (Hestenes & Carroll, 2000).

2.1 Piaget's Theory of Cognitive Development

Jean Piaget's (1896-1980) background was in biology and intelligence testing. He worked at Alfred Binet's experimental laboratory, where the first intelligence test was developed. While conducting intelligence "tests with young children, Piaget became interested in the children's responses, particularly the wrong answers. The pattern of incorrect responses seemed to correlate with the age of a child, which led to Piaget's hypothesis that young children think in an entirely different way than older children and adults (Ginsburg & Opper, 1988).

Piaget's research on children's thinking led to his theory based on four phases of subjective advancement, Sensorimotor 0-2 years, Preoperational 2-7 years, Concrete operational 7-11 years and Formal Operational 11-15 years. In which a child ready to take care of conceptual issues in intelligent style. Turns out to be more investigative in considering. Creates worries about social issues, character.

The formal operational stage, which shows up somewhere around 11 and 15 years old, is the fourth and last Piagetian stage. In this stage, people move past solid encounters and think in dynamic and more consistent ways. As a major aspect of speculation all the more uniquely, teenagers create pictures of perfect conditions. They may consider what a perfect guardian resemble and contrast their folks with their optimal principles. They start to engage conceivable outcomes for the future and are intrigued with what they can be. In taking care of issues, formal operational masterminds are more efficient and use logical reasoning.

The conceptual nature of the immature's idea at the formal operational level is obvious in the young verbal critical thinking capacity. Though the solid operational scholar needs to see the solid things to build up the sensible requests. For Piaget the coming full circle accomplishment of intellectual improvement is the capacity to utilize hypothetico-deductive thinking. Hypothetico-deductive thinking is the utilization of deductive (thinking from general standards to specific conclusions) to deliberately control a few variables, test their belongings methodically, and achieve right conclusions 'Piaget tried youths' creating utilization of hypothetico-deductive thinking by utilizing a few assignments, large portions of which included material science or science (Ginsburg & Opper, 1988; Piaget & Inhelder, 1969).

At formal operational stage, there is a significant achievement of this age group is concept acquisition. Woolfolk (1995) defines concepts as categories used to group similar events, ideas, objects, or people, and states that "most of what we know about the world involved concepts and relationships among concepts. What is significant about the achievement of concept acquisition is that children of this age are able to work with abstractions (concepts). Concepts are vague and unlike the concrete learning that preschool children do so well. So, children in kindergarten and primary grades begin to move from physical examples to an understanding of complex concepts, such as numbers and time. Preschoolers often recite numbers and can count from 1 to 10 or more, but it doesn't mean that they understand what 1 is or what 10 is. By age 6 or 7, children's understanding of one-to-one correspondence and number is complete, but not until after age 8 are children reasonably accurate in placing events in a time sequence (Bredenkamp & Copple, 1997). Concept acquisition means that children are moving beyond memorization to understanding. Gardner (1993) says that they then have the capacity to "take knowledge, skills, and concepts and apply them appropriately in new situations".

Children's play, sometimes called work" by them, promotes development in all aspects of growth. Play is the best context for children's learning and development in that it is open ended and free, children have control over it, it can be done alone or with others, it can even occur without any materials or equipment, and it can take place in many settings. Play comes naturally to children, so it makes sense that they learn from it. Through his research, Piaget found that people's needs for creating order in their lives is a central drive Piaget, he called this the drive for equilibrium, or a state of balance. To reach equilibrium, people have biological tendencies to organize and adapt (Piaget, 1952).

Despite what might be expected Piaget asserted that we never achieve a lasting condition of balance. He trusted that we are perpetually adjusting and rearranging our psychological structures and working "toward better balance" Piaget did not, nonetheless, imagine further significant redesigns of subjective structure or the improvement of subjectively more progressed or various types of thought (Piaget, 1985).

3. Objectives of the Study

This study was conducted by the following objectives to:

1. Find out the impact of play on the cognitive development
2. Find out the student's perception regarding children's cognitive development
3. Determine the effect of play on sharing skills

4. Research Method and Procedure

It was a descriptive research and Survey method was used in this study. Descriptive includes gathering information with a specific end goal to test speculation or answer questions identifying with the present status of the undertaking of the study. The population of the study was all the middle schools students of Lahore city. Schools were randomly selected from towns of Lahore. Three hundred students were selected conveniently by

using convenient sampling technique. A five point Likert type scale was designed for assembling responses of the selected sample.

4.1 Instrumentation

A self-developed questionnaire was used for identifying the role of play in the cognitive development at formal operational stage. Questionnaire was consist of 20 items on the basis of four factors Memorization Ability, Exploration Abilities, Understanding Abilities and Problem Solving Abilities of cognitive development. A five point Likert type scale was designed for assembling responses of the selected sample.

5. Data analysis and Results

Statistical package of Social sciences, (SPSS 15) was used for entering data and subsequent statistical analysis. Descriptive statistics, mean scores, standard deviation, and ANOVA and t-test in inferential statistics were applied for analysis.

Table: 01

Sample Description of the Study on the Basis of age

Age	Frequency	Percent
8 to 10	58	19.3
10 to 12	167	55.7
12 to 15	74	24.7
Total	300	100.0

Table 4.1 describes that 19% of students were 8 to 10 year old 55% of students were 10 to 12 years old and 24% of students were 12 to 15 in the sample. So it is concluded that the majority of the students were 10 to 12 years old.

Table: 2

Sample Description of the Study on the Basis of class

Class	Frequency	Percent
5th Class	98	32.7
6th Class	134	44.7
7th Class	68	22.7
Total	300	100.0

Table 4.2 shows that 32% respondents were 5th class, 44% respondents were 6th class and 22% were 7th class in the sample. So it is concluded that the majority of the respondent were 6th class.

Table: 3

Sample Description of the Study on the Basis of play hours

Play Hours	Frequency	Percent
1 Hour	118	39.3
2 Hour	103	34.3
3 Hour	56	18.7
4 Hour	23	7.7
Total	300	100.0

Table 4.3 describes that 39% of students were play 1 Hour, 34% of students were play 2 hour, 18% of students were play 3 hour and 7% of students were play 4 hours from the sample. So it is concluded that the majority of the respondent were play 1 hour in a day.

Table: 4

Responses of Sample Students about Role of play in the cognitive development

Statements	Mean	SD
I remember any incident for a long time	3.94	1.448
I feel difficulty to learn historical lessons	2.86	1.472
I learn school work very soon	4.15	1.187
I remember my lesson just by lecture	3.75	1.249
I learn my lesson soon separately	4.05	1.327
I feel curiosity to explore new things	3.69	1.464
I have new ideas in my mind	3.92	1.331
I do not pay attention on new ideas	3.15	1.553
I try to explore new things by new ideas	3.94	1.331
I take help from friends to find new things	3.54	1.410
I understand my course easily	4.01	1.229
I understand easily with pictures	3.93	1.414
I take help of others to understand lessons	3.43	1.421
I need time to understand things	3.15	1.502
I try to understand closely my environment to participate in play	3.93	1.337
I try to control of any problem	4.01	1.349
I run away from problems	2.94	1.631
I confuse from problems	3.42	1.455
I feel relax after solve the problem	4.24	1.231
I always ready for problem solving	4.11	1.303

Table 4 shows that majority of the students showed maximum (mean = 4.24, SD = 1.231) I feel relax after solve the problem and minimum (mean = 2.86, SD = 1.472) I feel difficulty to learn historical lessons.

Table: 5

Responses of Sample Students about Factors

Factors	Mean	Std. Deviation
Memorization Abilities	18.7533	4.43298
Exploration Abilities	18.2300	4.48451
Understanding Abilities	18.4500	4.56915
Problem Solving Abilities	18.7233	4.19987

Table 5 indicates that mean value for the memorization abilities (m = 18.7533, S.D = 4.43298), exploration abilities (m = 18.2300, S.D = 4.48451), understanding abilities (m = 18.4500, S.D = 4.56915), and problem solving abilities (m = 18.7233, S.D = 4.19987). It is concluded that the mean of Memorization Abilities higher than the other factors.

Table: 6

Comparison of Perception of the Students satisfaction' on the Basis of age regarding memorization abilities.

Factor		Sum of Squares	df	Mean Square	F	Sig.
Memorization Abilities	Between Groups	124.420	3	41.473	2.134	.096
	Within Groups	5751.327	296	19.430		
	Total	5875.747	299			

This table shows that $F = 2.134$, $df = 3$ and $p = .096$ there was not significance difference between memorization abilities on the basis of their Age. In other words memorization abilities do not affect the role of play in the cognitive development.

Table: 7

Comparison of Perception of the Students satisfaction' on the Basis of students age regarding exploration abilities.

Factor		Sum of Squares	df	Mean Square	F	Sig.
Exploration Abilities	Between Groups	51.691	3	17.230	.856	.465
	Within Groups	5961.439	296	20.140		
	Total	6013.130	299			

This table shows that $F = .856$, $df = 3$ and $p = .465$ there was not significance difference between exploration abilities on the basis of their Age. In other words exploration abilities do not affect the role of play in the cognitive development.

Table: 8

Comparison of Perception of the Students satisfaction' on the Basis of students age regarding Understanding Abilities.

Factor		Sum of Squares	df	Mean Square	F	Sig.
Understanding Abilities	Between Groups	50.164	3	16.721	.799	.495
	Within Groups	6192.086	296	20.919		
	Total	6242.250	299			

This table shows that $F = .799$, $df = 3$ and $p = .495$ there was not significance difference between understanding abilities on the basis of their Age. In other words understanding abilities do not affect the role of play in the cognitive development.

Table: 9

Comparison of Perception of the Students satisfaction' on the Basis of students age regarding problem solving abilities.

Factor		Sum of Squares	df	Mean Square	F	Sig.
Problem Solving Abilities	Between Groups	93.077	3	31.026	1.773	.152
	Within Groups	5180.960	296	17.503		
	Total	5274.037	299			

This table shows that $F = 1.773$, $df = 3$ and $p = .152$ there was not significance difference between problem solving abilities on the basis of their Age. In other words problem solving abilities do not affect the role of play in the cognitive development.

Table: 10

Comparison of Perception of the Students satisfaction' on the Basis of play duration regarding Memorization Abilities.

Factor		Sum of Squares	df	Mean Square	F	Sig.
Memorization Abilities	Between Groups	336.111	3	112.037	5.986	.001
	Within Groups	5539.635	296	18.715		
	Total	5875.747	299			

This table shows that $F = 5.986$, $df = 3$ and $p = .001$ there was significance difference between memorization abilities on the basis of their play duration. In other words memorization abilities do affect the role of play in the cognitive development.

Table: 11

Comparison of Perception of the Students satisfaction' on the Basis of play duration regarding Exploration Abilities.

Factor		Sum of Squares	df	Mean Square	F	Sig.
Exploration Abilities	Between Groups	500.276	3	166.759	8.954	.000
	Within Groups	5512.854	296	18.625		
	Total	6013.130	299			

This table shows that $F = 8.954$, $df = 3$ and $p = .000$ there was significance difference between exploration abilities on the basis of their play duration. In other words exploration abilities do affect the role of play in the cognitive development.

Table: 12

Comparison of Perception of the Students satisfaction' on the Basis of play duration regarding Understanding Abilities.

Factor		Sum of Squares	df	Mean Square	F	Sig.
Understanding Abilities	Between Groups	174.632	3	58.211	2.840	.038
	Within Groups	6067.618	296	20.499		
	Total	6242.250	299			

This table shows that $F = 2.840$, $df = 3$ and $p = .038$ there was significance difference between understanding abilities on the basis of their play duration. In other words understanding abilities do affect the role of play in the cognitive development.

Table: 13

Comparison of Perception of the Students satisfaction' on the Basis of play duration regarding Problem solving Abilities.

Factor		Sum of Squares	df	Mean Square	F	Sig.
Problem Solving Abilities	Between Groups	320.827	3	106.942	6.391	.000
	Within Groups	4953.210	296	16.734		
	Total	5274.037	299			

This table shows that $F = 6.391$, $df = 3$ and $p = .000$ there was significance difference between problem solving abilities on the basis of their play duration. In other words problem solving abilities affect the role of play in the cognitive development.

6. Conclusion

In light of the consequences of the study, it is inferred that there was not significance difference between memorization abilities, exploration abilities, understanding abilities and problem solving abilities on the basis of their Age of students. But there was significance difference between memorization abilities, exploration abilities, understanding abilities, and problem solving abilities on the basis of their play duration. It means that those students who give more time to play in a day, their abilities of cognitive development are enhanced rapidly due to play duration and their achievements level is also high at formal operational stage. They think more logically and solve the problem in better way than others. The consequences of the study likewise demonstrated that that age factor of the students or children does not affect the role of play in the cognitive development. So, it's revealed that children of formal operational level enhance their cognitive thinking on the basis of play duration not on the basis of their age factor. This thing also show the importance and value of play in daily life. The unique nature of the immature's idea at the formal operational level is clear in the youthful's verbal critical thinking capacity. In taking care of issues, formal operational scholars are more methodical and use consistent thinking.

7. Recommendations

In the light of findings of study, following recommendations are being presented to improve the cognitive development through play.

- Teachers should educate parents and caregivers about benefits and importance of play.
- Teachers should encourage the positive cognitive development aspects of students.
- Teachers should give free hands to make decision about play.
- Teachers should give importance to students' opinion's to select the play games.
- Students should do respect and give importance of teachers in a play field.
- School should provide all the material for play. There should be a balance between play and class work.
- School should take interest in different play and to develop cognitive development of students.
- Parents should give opinions and suggestions about play to improve the cognitive development.

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