

Development of Cognitive Skills in Early Age

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Abstract

Cognitive skills are the brain-based skills that includes the mechanism of how we learn, recognize, solve a problem, and pay attention. This development occurs at early age in human beings. Developing cognitive skills and educating children of early age is a proactive step to reduce the risk of various uncertainties in future. Cognitive Learning Theory is an important milestone in the study of cognitive skills in early childhood where Emotional Quotient, Intelligent Quotient and Skill Quotient plays a vital role in development of cognitive skills since childhood. It has great impact on various domains of cognitive development such as Socio-cultural, Neurological, Psychological, Economic and Educational development.

Keywords: Cognitive skills, Emotional Quotient (EQ), Intelligence Quotient (IQ), Skill Quotient (SQ), Cognitive Learning Theory (CLT), Cognitive Behavioral Theory (CBT), Cognitive Development

I. INTRODUCTION

Early age of human beings is most crucial time for development in context of their physical and mental growth. Children develop cognitive skills, particularly learning, thinking, reasoning along with their social and emotional development. It provides the basic structure for the child's learning through 'learning environments' created by their families, schools and the society. The child's brain has numerous powerful mechanisms of learning such as Casual learning, learning by imitation, learning by analogy, Statistical based learning by neural networks etc. [1]. Therefore, pre-school time is crucial for rapid growth of cognitive skills. In this age- group, a child learns to use symbolic thoughts, e.g. language and symbol use. Their attention is restricted to only one aspect of a situation or object. Thus, memory plays a significant role. Memory abilities may be developed individually by using on-line activities as every child shows his own way of reasoning, and problem solving [2]. There are various theories, proving this concept like Piaget's theory, Plowden's report [7], vygotsky's theory [8-9] etc.

According to Plowden Report "child psychology assumes that all the basic forms of learning and reasoning are available from baby- and toddler-hood" [7]. With the help of abstract material, it develops the imagination and logical thinking in young child as demonstrated in Vygotsky's theory of cognitive development [8] [9].

Lev Vygotsky explained that social interactions and problem solving approach leads to advancement in cognitive skills [8] [9]. Further, it was demonstrated that with the help of a More Knowledgeable Other (MKO) i.e. an adult, mentor or skilled peer, there was noticeable increase in child's ability. He believed that the major challenge lies in the child's "Zone of Proximal Development (ZPD)," which can be optimized by scaffolding i.e. by giving proper support and guidance through MKO. "It is not believed that a child cannot be taught until she/he is cognitively 'ready'" [7]. Instead, it is crucial "to assess how far a child can go under the guidance of a teacher within the 'zone of proximal development'" [8] [9]. It was emphasised in [8-9] that a child's use of language is the foundation of their executive functional skills, planning, memorization, including attention, impulse control, etc.

Preschoolers are in the stage Piaget called the preoperational (pre-logical) period (age 2-7 years). Piaget explained that in this time period children's logic is ruled by perceptions not by reasoning [1]. In young children, the time from 3-5 is the essence of symbol development. It imply the ability to use one thing to represent another. Preschoolers use images, words, and drawings to represent tangible objects [2].

For better understanding of the above mentioned theories, first we have to understand what is Cognition or cognitive skill? Section II enumerates the objectives of our study followed by detailed discussion on cognitive skills theory in section III. In section IV, we highlight cognitive development theory in various domains. Finally, we conclude the paper in section V.

II. OBJECTIVES OF THE STUDY

- 1) To study the development of cognitive skills in the early age of childhood.
- 2) To know children's development, learning and attainment requirement.
- 3) To explore the key features of early learning, developed by cognitive skills and its impact on various domain.
- 4) To study the impact of cognitive development theory in various domains.

III. COGNITIVE SKILL

The word Cognition is extracted from Latin word ‘cognoscere’ which means “to know”. In human beings, the ability to process the information that is received through the senses is referred as cognition. Cognitive skills are the brain-based skills that are used in our daily activities from the simplest to the most complex task. This includes the mechanism of how we learn, recognize, solve a problem, and pay attention, rather than actual knowledge.

In kids, cognitive skills refers to their mental and logical power that leads towards right decision making power [3]. Developing cognitive skills and educating children of early age is a proactive step to reduce the risk of various uncertainties in future. It builds a sense of proper decision making in the child to face various problems and challenges in future. With the help of this skill we can build a strong foundation of future- a smart, intelligent and ethical generation. For this, early age is very crucial time of life. Cognitive Learning Theory (CLT) is an important milestone in the study of cognitive skills in early childhood.

According to Sincero, “CLT explains that as we learn things, the brain act as the most incredible network of information processing and interpretation in the body” [4]. By learning we mean “to think using the brain”. This basic concept of learning is the main viewpoint in the CLT. The journey of learning is influenced by intrinsic and extrinsic factors. CLT explains the mental process by which the learning develops in an individual. CLT implies that by analysing mental processes, one can explain different processes related to learning. It postulate that with effective cognitive processes, learning becomes easier and new information can be retained for long duration in the memory. On the contrary, there might be difficulty in learning in case of ineffective cognitive processes. The Social Cognitive Theory (SCT), and the Cognitive Behavioral Theory (CBT) are the two sub-divisions of this theory.

A. Social Cognitive Theory (SCT)

In SCT, we consider three factors: Behavioral factors, Environmental factors (extrinsic), Personal factors (intrinsic) as indicated in fig. 1. These interrelated factors are the causes for learning. SCT includes several basic concepts like Observational Learning, Self-regulatory capability, Self-efficacy, Reproduction, Emotional coping, etc.

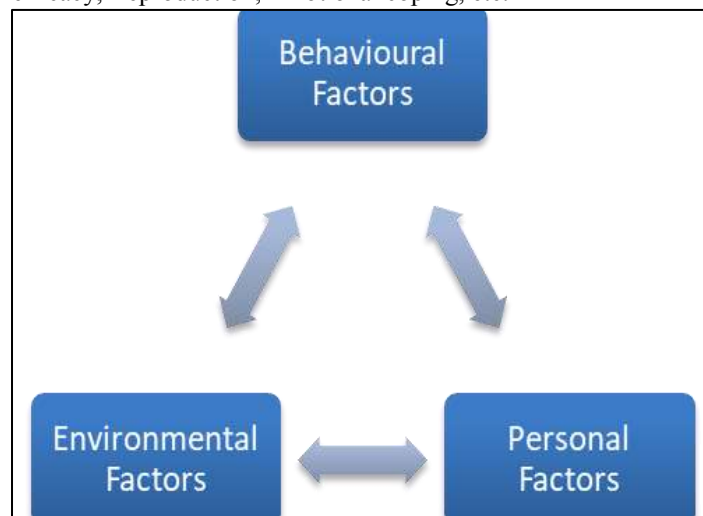


Fig. 1: Variables of Social Cognitive Theory

B. Cognitive Behavioral Theory (CBT)

It describes the role of cognition to determine the behavioral pattern of an individual. CBT was developed by Aaron Beck. According to CBT, individuals develop self-concepts that affect the behavior they show. These concepts may be affected by an individual’s environment [4].

A cognitive model based on the development of cognitive skills in early age is given in [3]. Figure 2 depicts various components of this model: EQ (Emotional Quotient), IQ (Intelligence Quotient), and SQ (Skill Quotient) in the early age. These components should be formed gradually for the child’s cognitive development. Emotional quotient is the ability to perceive, understand, use, and manage emotions. Intelligence quotient covers mental abilities like problem solving, reasoning, abstract thinking, and understanding new ideas [11]. Skill quotient relates to maintain internal and external factors of a child’s environment and channelize the output by driving him to take right decision based on EQ and IQ developed earlier.

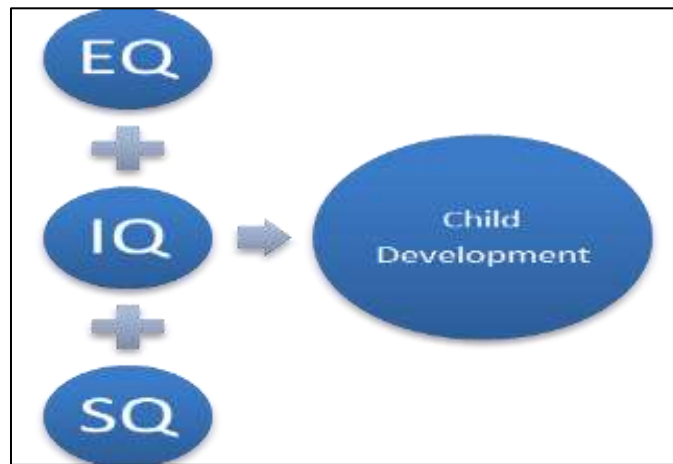


Fig. 2: Development of Cognitive Skills

IV. COGNITIVE DEVELOPMENT IN VARIOUS DOMAINS

Cognitive Development is the study of child's development of brain in terms of Socio-cultural, Neurological, Psychological, and Economic and Educational development [12]. The cognitive development process was first described by Jean Piaget, in his Theory of Cognitive Development [10]. In this section, we enumerate various examples of cognitive skill development in early age:

A. Socio-Cultural Learning and Development

The development of child occurs with the family, community, and society rather than in isolation. In early childhood, this socio-cultural understanding develops [13]. Geraldine French has highlighted the research emphasizing child's early learning and development [5]. The paper deals with the context for early childhood care and education in Ireland in context with economic and multicultural society; laws and policies. From this perspective, learning and development are inextricably intertwined and are enmeshed within the milieu of social relationships [5].

B. Economic Development

Life cycle skill formation is a dynamic process in which early inputs strongly affect the productivity of later inputs. The mastery of skills that are essential for economic success and the development of their underlying neural pathways follow hierarchical rules. From the point of view of economic efficiency, an equates returns across all stages of the life cycle to the opportunity cost. Many societies look towards the schools to reduce skill gaps across socio-economic groups.

The article written by James J. Heckman summarizes the effects of early environments on child, adolescent, and adult achievements [6]. The author emphasized on the sustainability of the gain obtained from effective early interventions. This is achieved if they are followed by continued high-quality learning experiences. Further, skill formation technology shows that for the individuals with higher ability and those whose ability is developed at early age, the returns on school investment and post school investment are higher. In order to achieve maximum value later investments must be done after early investments [6].

C. Neurological Development

Learning by the brain depends on the development of multi-sensory networks of neurons distributed across the entire brain. For example, a concept in science may depend on neurons being simultaneously active in visual, spatial, memory, deductive and kinaesthetic regions, in both brain hemispheres. Ideas such as left-brain/right-brain learning, or unisensory 'learning styles' (visual, auditory or kinaesthetic) are not supported by the brain science of learning [14]. The research survey conducted by Usha Goswami found that the brain learns the statistical structure of 'the input'. It can be important for teachers to assess how much 'input' a child's brain is actually getting when individual differences appear in learning. Differential exposure will lead to differential learning. Thinking, reasoning and understanding can be enhanced by imaginative or pretend play contexts. Individual differences in the ability to benefit from instruction (the zone of proximal development) and individual differences between children are large in the primary years, hence any class of children must be treated as individuals [1].

D. Educational Development

Knowledge gained through active experience, language, pretend play and teaching are all important for the development of children's causal explanatory systems. Language is crucial for development. The ways in which teachers talk to children can influence learning, memory, understanding and the motivation to learn. There are also enormous individual differences in language skills between children in the early years. Interactions around books are one of the best ways of developing more complex language skills.

This research survey by Usha Goswami find that Learning in classrooms can be enhanced if children are given diverse experiences and are helped to develop self-reflective and self-regulatory skills via teacher modelling, conversation and guidance around social situations like play, sharing and conflict resolutions [1]. Children think and reason largely in the same ways as adults. However, they lack experience, and they are still developing important metacognitive and executive function skills. Language is crucial for development. The ways in which teachers talk to children can influence learning, memory, understanding and the motivation to learn [15]. There are also enormous individual differences in language skills between children in the early years. Interactions around books are one of the best ways of developing more complex language skills. Even basic perceptual learning mechanisms such as the statistical learning of linguistic sounds requires direct social interaction to be effective. This limits the benefits of educational approaches such as e-learning in the early years [1].

V. CONCLUSION

Learning is a complex, dynamic and interactive process whereby knowledge is created through the transformation of experience. There are various learning, attainments and requirements in early age. With the help of cognitive skills we can understand it in a better manner. It has a great impact on various domains that are crucial for early age development. Various domains are socio-cultural development, economic development, neurological development and educational development. There are various findings from these domains helpful for the development of cognitive skills in early childhood. With the help of these findings, the researchers can gradually explore the key features of early learning development with the help of cognitive skills and models.

REFERENCES

- [1] Usha Goswami , “Children’s Cognitive Development and Learning”, CPRT, Univ. of York, UK, Feb2015.
- [2] Michelle Anthony, “Cognitive Development in 3-5 Year Olds”, <http://www.scholastic.com/parents/resources/article/stages-milestones/cognitive-development-3-5-year-olds>.
- [3] Bhavika Ganatra and Roshni Rawal. (2017, March). “Exploration of Cognitive Skills in Kids through Cyber Crime Ethics Education: A Prevention Method”. IJIRST, National Conf. on LTNCS, pp-121-124.
- [4] Sarah Mae Sincero. (2011, March). Cognitive Learning Theory. <https://explorable.com/cognitive-learning-theory>.
- [5] Geraldine French, “Children’s early learning and development”, Aistear, NCCA, Dublin, 2007.
- [6] James J. Heckman. (June 2006).” Skill Formation and the Economics of Investing in Disadvantaged Children “, vol. 312, www.sciencemag.org1900.
- [7] Plowden, “Children and Their Primary Schools”, CACE, HM Stationery Office, England, 1967.
- [8] Vygotsky, L. (1978). “Interaction between learning and development”. *Readings on the development of children*, 23(3), 34-41.
- [9] Vygotsky, L. S. (1986). “Thought and Language-Revised edition”. Cambridge, MA: MIT Press
- [10] Piaget, J. (1971). “The theory of stages in cognitive development”. In D. R. Green, M. P. Ford, & G. B. Flamer, *Measurement and Piaget*. New York: McGraw-Hill.
- [11] Jennifer Graham Kizer, “IQ & EQ: Understanding Intellectual Quotient & Emotional Quotient”, <http://www.parents.com/baby/development/intellectual/iq--eq-understanding-intellectual-quotient--emotional-quotient/>.
- [12] Elman, J.L. (2005) ‘Connectionist models of cognitive development: where next?’ *Trends in Cognitive Sciences* 9(3): 111-7.
- [13] Hughes, C. (2011). *Social Understanding and Social Lives: From Toddlerhood through to the Transition to School*. Hove: Psychology Press
- [14] Baillargeon, R., Li, J., Ng, W. and Yuan, S. (2009) ‘An account of infants’ physical reasoning’, in A. Woodward and A. Needham (eds) *Learning and the Infant Mind*, 66-116. New York: Oxford University Press.
- [15] Goswami, U. and Bryant, P. (2010) ‘Children’s cognitive development and learning’, in Alexander et al (eds) *The Cambridge Primary Review Research Surveys*, 141-69. London: Routledge.