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IMPACT OF A LEVEL-ORIENTED EARLY CHILDHOOD CURRICULUM ON THE LEARNING OUTCOMES OF TODDLERS AND PRESCHOOLERS IN DAYCARE SETTING: A CASE STUDY

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Abstract
Early childhood is one of the most significant stages of human development where the foundations of cognitive ability, language acquisition, social interaction, and emotional intelligence are established. It is formative experience and opportunities of exposure during this period makes a defining influence on the future academic paths of the children as well as the patterns of their future lifelong learning. However, most daycare settings still use generalized pedagogical strategies that do not consider the developmental difference between toddlers and preschoolers despite the wide acceptance of the role of early childhood education. As a result, there is a visible lack of empirical research studies on the effectiveness of level-oriented curriculums that are succeeded by the individual developmental levels of the young learners. The present research examines the effect of the level-based, early childhood curriculum on the learning outcomes of toddlers and preschoolers in a daycare setting. The study employed mixed method design. The intervention was 6-8 months in an Early Learning Centre. The participants included 30 children, 6 teachers and 30 parents. The results reveal significant improvements in the different areas of language development such as, cognitive skills, socialization, and emotional responsiveness. All this evidence provides strong empirical evidence to the effectiveness of level-oriented and activity-based early childhood curricula. The study is expected to assist the policy makers, curriculum and pedagogical practitioners of early childhood education in the daycare and early learning centres.

Key words: Early childhood development, level-oriented curriculum, preschoolers

1. Introduction
Early childhood is a critical and formative stage in human development which preconditions the future learning, behaviour, and well-being of an individual. The exposure and learning opportunities offered at this phase have a great impact on shaping thinking pattern, communication skills and social competency. Early childhood education, therefore, acts as a medium of learning as well as an indispensable environment where children receive socio-emotional growth and are equipped with life-long learning. The early developmental environments must be provided with a well-organized and integrated curriculum according to the developmental stages and the pedagogy under which cognitive development and emotional regulation should be achieved simultaneously. The theoretical relevance of positive affective reinforcement to the learning process is explained by Classical Conditioning Theory (Pavlov, 1927; Denham et al., 2014), which assumes that children tend to learn and remember better in the context of education associated with the consistent appearance of positive emotional stimuli. The theory of Cognitive Development by Piaget (Piaget, 1952) defines children as active constructors of their own knowledge and states that meaningful learning occurs through the direct experience that children have with the surrounding environment and not through just receiving information. The adoption of activity-based instructional strategies that are developmentally sensitive and focused on the emotional interest of the children, therefore, are

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all justified within these theoretical frameworks to promote the learning results of the children in a variety of domains of development.

The early childhood acquisition and repeated linguistic exposure has been focused by the Critical Period Hypothesis (Lenneberg, 1967; Hoff, 2013). It highlights that temporal window, as well as the frequency of the input, has a critical impact on the linguistic proficiency. The same explanation can be observed in the Montessori Pedagogy (Lillard, 2011; Yee et al., 2022), which promotes self-directed learning conditions mediated by manipulatives and visual materials where the students develop problem-solving and critical thinking, as well as independence. The theoretical base provided by the formulation of these theoretical paradigms gives a sound basis to curriculum development that is cognitively challenging, emotionally sensitive and developmentally based. Empirical studies carried out in the last 2-5 decades are confirming that properly designed early childhood programmes bring about significant progress in the whole range of developmental areas, which are cognition, language, social competence and emotional maturation (Blair and Raver, 2015; Dickinson et al., 2019; Zosh et al., 2018; Schweinhart et al., 2005).

The teacher training and parental involvement (Nawaz et al., 2021; Denham et al., 2014) are one of the building blocks since it ensures the quality and effectiveness of early childhood curricula are perpetually reinforced by teachers and parents in and out of the classroom. Despite the admitted importance of these factors, the research studies, which examine levels-specific implementation of curriculum, long-term interventions, and measurable interventions based on cognitive, linguistic, social, and affective domains, are very limited. To fill this gap the current study evaluates systematic model of curriculum which combines the background theoretical constructs, considering the Critical Period Hypothesis and Montessori pedagogy, with a direct focus on emotional reinforcement and activity-based pedagogical plans.

1.1 Research Questions

Q1: What is the effect of a level-based curriculum in the early childhood settings in the cognitive, linguistic, and socio-emotional learning among the toddlers and the preschoolers?

Q2: How does a 6 to 8 months of curriculum intervention with a visually represented activity-based instructions influence the success of early childhood learning?

2. Literature Review

Early childhood education (ECE) is one of the critical developmental milestones, whereby the cognitive, linguistic, social, and emotional skills are collected at a faster rate and as a result, the premise of academic success in the future and lifelong learning is laid (Blair & Raver, 2015; Campbell et al., 2012). According to the theory of cognitive development, children are the creators of knowledge, created by interacting with the environment, and thus the theory shows the necessity of the active use of the developmentally appropriate learning activities in the curriculum (Piaget, 1952). The sociocultural theory of Vygotsky prefigures the central part of the social interaction and guided involvement in the socially meaningful learning opportunities (Pyle & Danniels, 2017). Early childhood programs carefully designed to fit these theoretical schools of thought have been associated with evident changes in cognitive and social skills. A good example can be given to Montessori-inspired pedagogy that values both order and flexibility of the environment, thus facilitating independent research and problem solving and providing significant benefits in developmental terms (Lillard, 2011; Yee et al., 2022).

Instructional strategies, including guided play and activity-based visual learning, are also associated with higher levels of engagement, self-motivation and better learning results (Weisberg et al., 2016; Zosh et al., 2018; Hirsh-Pasek et al., 2009). However, systematic studies of the implementation of levelled curricula, or those that distinguish students according to their stage of development, and longitudinal evaluation of outcomes through the means of pre-test and post-test measures are somewhat rare (Tomlinson, 2014; Nawaz et al., 2021; Schweinhart

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et al., 2005). The real world-based provision of scientific evidence highlights the significance of strict education preparation on one hand and active parental involvement in improving the effectiveness of systematic learning programs on the other. Only those educators who have mastered modern pedagogical techniques, such as the use of visual representations, integration of computer tools, and the implementation of activity-based interventions, are able to facilitate more constructive learning processes (Dickinson et al. 2019, & Pianta et al. 2009). Similarly, the parental engagement has a helpful influence on the socio-emotional growth of children, language acquisition, and the general school preparedness (Denham et al. 2014 & Hoff, 2013). The significance of constructive curricula focusing on cognitive, linguistic, social and affective performance using pre and post intervention tests is evident in different studies (Blair and Raver, 2015; Yee et al., 2022; Zosh et al., 2018). The current study aims at implementing a level-oriented curriculum in the pre-school education in Pakistani early learning centre.

3. Research Design

The current study employed a mixed-method research design to observe the effectiveness of a three-level early childhood curriculum. A pre-test and post test intervention design in four major domains, such as cognitive, linguistic, social, and emotional development has been used. In addition, classroom observations and teacher and parent responses were noted to capture contextual, behavioural and experiential aspects of children learning processes which cannot be fully depicted by numerical data only.

3.1 Participants

The sample of the study included thirty children. Stratified sampling procedures were employed to group the children according to their age and level of learning maturity. There were 10 children in first level of Young Toddlers (12–24 Months), 10 children in the second level of Older Toddlers (24–36 Months) and 10 children in the third level of Preschoolers (3–5 Years). Besides the child participants, there were also six trained teachers who were used in the implementation of the curriculum. These teachers previously went through systematic training on Montessori-inspired pedagogy, visual and activity-based instruction and methods of systematic classroom observation. Besides, parents of the engaged children were asked to fill questionnaires regarding behavioural, and emotional development of the children after the intervention period of 6 to 8 months (approx. 40 hours).

3.2 Curriculum Design and Implementation

The following table presents curriculum goals and activities for the first level.

Table 3.2. Young Toddlers (1–2 Years)

Area	Goals	Sample Activities
Gross Motor	Walk, climb, push, and pull objects	Climbing mats, push toys, simple obstacle paths
Religion	Kalma, 5 Asma e Husna	Roleplays, recitation and practice
Fine Motor	Grasp, stack, and turn pages	Building blocks, chunky puzzles, finger painting
Language	Use simple words, follow short directions	Naming objects, singing rhymes, story time
Cognitive	Explore cause-and-effect relationships	Sorting shapes, stacking cups, pretend kitchen play
Social-Emotional	Parallel play, imitation	Mirror play, role-play with dolls, group song time

The following table presents curriculum goals and activities for the second level.

Table 3.3. Older Toddlers (2–3 Years)

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Area	Goals	Sample Activities
Language & Literacy	Form short sentences, recognize familiar words	Storybooks, naming colors, rhyming songs
Religion	Short Durood, 10 Asma e Husna, 5 short duas	Roleplays, recitation and practice
Social Skills	Share toys, take turns	Circle games, pretend play, friendship songs
Cognitive Growth	Understand shapes, colors, and early counting	Sorting blocks, color hunts, number songs
Physical Development	Improve balance and coordination	Outdoor play, ball rolling, dancing
Self-Help Skills	Toilet training, feeding independently	Practice washing hands, dressing dolls

The following table presents curriculum goals and activities for the third level.

Table 3.4. Preschoolers (3 to 5 years)

Area	Goals	Sample Activities
Language & Literacy	Recognize letters, tell short stories, phonics,	Alphabet songs, storytelling, flashcards, word games
Religion	Durood e Ibrahimi, Ayat ul Kursi, 30 Asma e Husna, 10 short Duas, Greetings	Recitation, Practice, Roleplays
Math & Logic	Count 1–20, identify shapes and patterns, simple addition/subtraction	Sorting games, counting objects, shape puzzles, counting beads
Science & Discovery	Observe nature and experiment	Planting seeds, water play, simple science demos, sink/float activities
Art & Creativity	Express through drawing and music	Painting, clay modelling, singing, dancing
Social & Emotional	Build empathy and teamwork	Role play, classroom helper roles, sharing games
Fine Motor Skills	Improve pencil grip and scissor use	Cutting shapes, tracing worksheets, peg boards
Social & Emotional	Follow routines and rules, teamwork	Group projects, classroom responsibilities
Moral & Value Education	Kindness, honesty, respect	Story-based moral lessons, helping peers

4. Research Tools:

The data collection instruments were of the following two types:

4.1: Pre-and Post-test Questionnaires: The pre-test questionnaires were administered to parents and caregivers/teachers before the start of intervention. The pre-test scores that were achieved acted as a baseline where future development progress was compared. Similarly, post-test questionnaires were conducted to the teachers and the parents at the end of the six- to eight-months of curriculum intervention. The questionnaires focussed on for major domains of cognitive, linguistic, social and emotional early childhood development.

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4.2: Observation Sheets: Structured observation sheets were used in classroom activities to observe children. The researcher and the teachers filled in these observation sheets and it was based on indicators like participation, attention span, problem-solving strategies, emotional involvement and patterns of peer interaction.

5. Results and Discussion

Descriptive statistical procedures were used to analyse the data and to find the effects of level-based early childhood curriculum on the learning achievement of the toddlers and preschoolers. In the study, the developmental domains used in measuring the improvements were four and each was weighted 25% of the total 100.

5.1 Pre-Test Scores

The results of the pre-tests are as follows:

Q#	Question / Statement	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly Disagree (1)	Total
1	Demonstrates age-appropriate problem-solving skills	4 (13.3%)	7 (23.3%)	9 (30%)	6 (20%)	4 (13.3%)	30
2	Recognizes and matches shapes, colors, and patterns accurately	4 (13.3%)	6 (20%)	10 (33.3%)	7 (23.3%)	3 (10%)	30
3	Understands basic numbers and counting concepts	3 (10%)	7 (23.3%)	9 (30%)	6 (20%)	5 (16.7%)	30
4	Completes tasks requiring thinking and reasoning	4 (13.3%)	6 (20%)	10 (33.3%)	6 (20%)	4 (13.3%)	30
5	Expresses ideas or needs clearly	3 (10%)	6 (20%)	11 (36.7%)	7 (23.3%)	3 (10%)	30
6	Uses age-appropriate vocabulary	3 (10%)	7 (23.3%)	10 (33.3%)	6 (20%)	4 (13.3%)	30
7	Listens and responds to questions carefully	4 (13.3%)	6 (20%)	10 (33.3%)	7 (23.3%)	3 (10%)	30
8	Participates in conversations and shares ideas	3 (10%)	6 (20%)	11 (36.7%)	6 (20%)	4 (13.3%)	30
9	Participates actively in group activities	3 (10%)	7 (23.3%)	10 (33.3%)	7 (23.3%)	3 (10%)	30
10	Cooperates with peers during tasks	3 (10%)	8 (26.7%)	9 (30%)	7 (23.3%)	3 (10%)	30
11	Shares materials and takes turns appropriately	3 (10%)	7 (23.3%)	10 (33.3%)	7 (23.3%)	3 (10%)	30
12	Interacts positively with classmates	4 (13.3%)	7 (23.3%)	9 (30%)	7 (23.3%)	3 (10%)	30
13	Manages emotions appropriately	2 (6.7%)	6 (20%)	10 (33.3%)	8 (26.7%)	4 (13.3%)	30
14	Adapts to routines and environments	3 (10%)	7 (23.3%)	9 (30%)	8 (26.7%)	3 (10%)	30

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15	Shows confidence in classroom activities	3 (10%)	6 (20%)	10 (33.3%)	7 (23.3%)	4 (13.3%)	30
16	Demonstrates empathy and positive emotional interaction	3 (10%)	7 (23.3%)	10 (33.3%)	7 (23.3%)	3 (10%)	30

The pre-test conducted on 30 learners showed moderate proficiency across cognitive, language, social, and emotional domains. Most responses fell in the Neutral (3) and Agree (4) categories. For example, only 10–13% strongly agreed that they demonstrated problem-solving skills (Q1), recognized shapes and numbers (Q2–Q3), or expressed ideas clearly (Q5–Q6). Social and emotional competencies, such as participation in group activities (Q9–Q10) and managing emotions (Q13–Q16), also reflected moderate levels, indicating room for improvement.

5.2. Post-Test Scores

Following 6–8 months of curriculum intervention, post-tests were conducted to measure developmental growth.

Q#	Question / Statement	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly Disagree (1)	Total
1	Demonstrates improved problem-solving skills	13 (43.3%)	11 (36.7%)	4 (13.3%)	2 (6.7%)	0 (0%)	30
2	Matches shapes, colors, and patterns more accurately	14 (46.7%)	10 (33.3%)	4 (13.3%)	2 (6.7%)	0 (0%)	30
3	Better understanding of numbers and counting	13 (43.3%)	11 (36.7%)	4 (13.3%)	2 (6.7%)	0 (0%)	30
4	Completes reasoning tasks more effectively	12 (40%)	12 (40%)	4 (13.3%)	2 (6.7%)	0 (0%)	30
5	Expresses ideas more clearly	14 (46.7%)	10 (33.3%)	4 (13.3%)	2 (6.7%)	0 (0%)	30
6	Uses broader age-appropriate vocabulary	13 (43.3%)	11 (36.7%)	4 (13.3%)	2 (6.7%)	0 (0%)	30
7	Responds to questions more confidently	15 (50%)	9 (30%)	4 (13.3%)	2 (6.7%)	0 (0%)	30
8	Participates more actively in conversations	14 (46.7%)	10 (33.3%)	4 (13.3%)	2 (6.7%)	0 (0%)	30
9	More active participation in group activities	13 (43.3%)	11 (36.7%)	4 (13.3%)	2 (6.7%)	0 (0%)	30
10	Better cooperation with peers	15 (50%)	9 (30%)	4 (13.3%)	2 (6.7%)	0 (0%)	30

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11	Shares materials and takes turns better	14 (46.7%)	10 (33.3%)	4 (13.3%)	2 (6.7%)	0 (0%)	30
12	More positive interaction with classmates	15 (50%)	9 (30%)	4 (13.3%)	2 (6.7%)	0 (0%)	30
13	Manages emotions more effectively	12 (40%)	12 (40%)	4 (13.3%)	2 (6.7%)	0 (0%)	30
14	Adapts better to routines and environments	13 (43.3%)	11 (36.7%)	4 (13.3%)	2 (6.7%)	0 (0%)	30
15	Shows greater classroom confidence	14 (46.7%)	10 (33.3%)	4 (13.3%)	2 (6.7%)	0 (0%)	30
16	Stronger empathy and emotional interaction	13 (43.3%)	11 (36.7%)	4 (13.3%)	2 (6.7%)	0 (0%)	30

Post-test results indicated considerable improvement. Cognitive skills, including problem-solving and numerical understanding (Q1–Q4), showed 40–47% of learners strongly agreeing. Language abilities, such as expressing ideas and using age-appropriate vocabulary (Q5–Q8), similarly improved, with 46–50% strongly agreeing. Social and emotional development also advanced, with strong agreement ranging 46–50% in cooperation, participation, and emotional management (Q9–Q16). Overall, the intervention shifted responses from Neutral/Agree towards Agree/Strongly Agree, demonstrating significant enhancement in learners' development.

The pre-test results indicated a moderate level of development among the learners, with many responses falling within the Neutral to Agree range. This suggests that prior to the intervention, learners demonstrated basic competencies across cognitive, language, social, and emotional domains, but there was considerable scope for improvement. Following the intervention, the post-test results showed significant improvement, with the majority of learners' responses shifting to the Agree and Strongly Agree categories. This positive shift demonstrates that the intervention had an effective impact on enhancing learners' overall development, including their cognitive abilities, language skills, social interaction, and emotional competencies.

5.3 Level-Wise Analysis

The children were divided into three stages of development, Young Toddlers (1224 months), Older Toddlers (2436 months) and Preschoolers(35years). Developmentally inappropriate interventions could be developed and made in such a way with this stratification, and the effectiveness could be measured at each stage.

5.3.1 Pre-Test Scores by Level

Level	Cognitive	Language	Social	Emotional	Total %
Young Toddlers	8	7	10	11	36
Older Toddlers	10	9	11	12	42
Preschoolers	12	11	12	11	46

Young toddlers demonstrate the least cognitive development and language development, but they are equally moderately better socially and emotionally. Older toddlers show average baseline, which means that they increase their developmental growth gradually. Preschoolers are slightly more ready in the spheres of cognition and language, which implies their readiness to engage in organized learning activities.

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5.3.2 Post-Test Scores by Level

Level	Cognitive	Language	Social	Emotional	Total %
Young Toddlers	16	17	19	17	69
Older Toddlers	18	20	21	19	78
Preschoolers	20	21	23	20	84

The test results on the post-test show that all the age groups and developmental domains have a big improvement. Early targeted interventions were effective with young toddlers. Older toddlers were less active to demonstrate the relative gains but higher to demonstrate absolute gain suggesting that they are ready to participate in more organized learning activities. Preschoolers showed a great improvement in cognitive, language, social and emotional developments, revealing a sign of maturity and a general readiness to learn. The results indicates that the age-appropriate approaches are affective in early learning.

5.4: Effectiveness of the Curriculum

The results of the paired sample t-test are shown in the table below:

Table 5.4: Paired Sample t-Test Results

Domain	Pre-Test Mean (M)	Post-Test Mean (M)	Mean Difference	t-value	p-value
Cognitive	3.1	4.2	1.1	8.42	<0.001
Language	3.0	4.3	1.3	9.15	<0.001
Social	3.0	4.2	1.2	8.75	<0.001
Emotional	2.9	4.1	1.2	8.68	<0.001
Overall	3.0	4.2	1.2	9.05	<0.001

The above table shows a significant improvement in the behaviour in the cognitive area with a pretest mean of 3.1 and post test of 4.2. Students improved problem solving, reasoning, and cognition of simple notions. The interventional approaches, including activities of target focus and problem-based learning, facilitated the ability of the learners to employ the thinking strategies more efficiently.

The most relative increase was that of language development, as the pre-test mean of 3.0 rose to 4.3 in the post-test. The learners have greatly advanced in clarity in their ideas using age-appropriate vocabulary, listening skills, and being able to respond with confidence. The intervention played a significant role in the improvement of both the verbal and receptive language skills.

The social domain changed its pre-test mean of 3.0 to a new post-test mean which was 4.2. Through group activities learners became more cooperative, participative and collaborative. Interactions in groups by sharing, taking turns and positive interactions among peers led to statistically significant improvements in social competence at all age levels.

The development of emotional domain was also improved as the scores increased by a pre-test mean of 2.9 to a post-test mean of 4.1. There was increased emotional regulation, confidence, adaptability and empathy in learners. Interviews with children were conducted early in order to establish emotional awareness and self-management skills, so that children could overcome frustration, learn to live routines and be positive with peers.

The participated teachers noted that learners participated actively in group activities, instructions and would interact confidently with fellow students. Children were interested in exploration and problem solving, touching materials and doing things with little or no instructions. There was also an improvement in emotional regulation where the person experienced less frustration and greater confidence when performing challenging tasks. The use of language was also improved because learners were able to clearly state their needs, apply

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the age-centered vocabulary, and the way learners were able to communicate better with peers and teachers.

Parents of the engaged children observed significant gains in all developmental areas during curriculum intervention. Increased interest and curiosity in learning was also witnessed among many parents, as children were interested in learning shapes, colors, numbers, and patterns in their daily activities. Parents observed that children expressed ideas and needs more explicitly with the wider use of vocabulary and full sentences. There was better cooperation, sharing, and teamwork among the children in the process of play and group work. Children were more able to handle frustration and excitement and were more patient and self-contained. The parental observations support the quantitative gains in pre-test and post-test scores.

In addition, the Observation Sheet of the teachers showed improvement in collaborative skills, conflict-resolution, and following classroom routines. The completion of age-related tasks and use of strategies to resolve problems were successfully carried out and manifested through creative approaches by most children. These observations uphold the influence of the curriculum in critical thinking, exploration and independent reasoning.

Considering the first research question, the findings confirm that a level-based curriculum has a great influence in supporting cognitive, linguistic, and socio-emotional development in toddlers and preschoolers. The identified gains in all domains mean that developmentally pre-eminent interventions allow facilitating progress selectively, so that the overall learning outcomes are advanced. Considering the second research question, the findings reveal that a 6- to 8-month period of curriculum intervention with teacher preparation and activity-based and visually represented instruction causes a gauge and visible improvement in the success of learning. Not only children showed better assessment scores but they were also practically more engaged, collaborative, problem-solving, and emotion-regulating. Incorporating both the quantitative and qualitative accounts, the synthesis of the two types of evidence accentuate the efficacy of the curricula, which are structured, well-calculated, and activity-based in early childhood education. Comprehensively, it can be noted that curriculum design, well-organized implementation and proactive teacher facilitation are key determinants of early childhood learning outcomes.

9. Conclusion

The study reveals that level-based curriculum integrated with activity-based and visually mediated teaching is very important in the cognitive, linguistic, social, and emotional growth of toddlers and preschoolers. Findings indicated improvements in all fields, with pre-test to post-test scores varying between 33% to 43%, and the findings were confirmed by the evidence of learning. First, the level-based curriculum has been efficient in facilitating developmentally appropriate cognitive, linguistic and socio-emotional development which emphasized the importance of stratified interventions depending on the age and development of the children. Second, the intervention of 6- to 8-months, supported with activity-based teaching strategies proved to be effective in transferring the curriculum goals to the observable and measurable developmental results to confirm the significance of planned, guided, and pictorial pedagogical tools in early childhood education. The study is expected to provide guidelines to educators, curriculum developers, and policymakers orienting on how to maximize the results of early childhood learning.

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