ISSN (Print): 2959-4391 ISSN (Online): 2959-4405

JOURNAL OF SOCIAL SCIENCES DEVELOPMENT

www.jssd.org.pk editor@jssd.org.pk

EXAMINING EARLY CHILDHOOD EDUCATORS' IMPLEMENTATION OF THE CONCRETE-PICTORIAL-ABSTRACT (CPA) MODE

Ambreen Siddique[1], Tanzeela Urooj[2] & Tasneem Kousar[3]

[1]Assistant Professor (IPFP Fellow) Education, GC Women University Sialkot, Punjab, Pakistan
[2]Assistant Professor, Department of Education, University of Loralai, Balochistan, Pakistan
[3]MPhil Scholar (Education), University of Education, Lahore, Punjab, Pakistan

KEYWORDS

Early Childhood Education, Early Childhood Teacher, CPA model, CPA approach

ARTICLE HISTORY

Date of Submission: 04-08-2024
Date of Acceptance: 13-09-2024
Date of Publication: 15-09-2024

ABSTRACT

The early childhood educators facilitate interactions to assist your child in improving his or her comprehension and reading skills. Reading regularly helps two-year-old expand their vocabulary. Educators tie stories to events in children's lives, teaching them that written material and pictures have value. The basic objective of particular study was to investigate the Early Childhood teacher's role in using the concrete, pictorial, and abstract CPA models at ECE Level in government primary schools. Quantitative research approach was used for current study by deploying a survey research design. The population of the study was all ECE teachers in districts Mianwali and Lodhran. Using the purposive sampling technique, study sample was based on 100 ECE teachers and 100 caregivers. The result of the study reveals that most respondents agreed about using CPA model at ECE level. They suggest that this model should be used at different levels of education because it increases students' interest in teaching and learning process. Based on data, it is suggested that ECE should be applied in all public schools nationwide to increase primary enrolment and, through this approach, make learning more effective.

Corresponding Author Ambreen Siddique
Email: dr.ambreen725@gmail.com
DOI https://doi.org/10.53664/JSSD/03-03-2024-09-107-115

INTRODUCTION

The Early Childhood Education (ECE) is the foundation of human personality. During this period, individuals develop a basis for their personality structure. Early childhood education establishes the foundation for lifelong skills and learning that has been focused on today (Maqsood, Malik & Jumani, 2022; Jamil, Ain & Chohan, 2024; Jamil, Jabeen & Moin, 2024). A healthy, supportive, safe environment and suitable cerebral stimulation offer solid foundation for child development.

Early interventions can prevent future learning issues, reduce dropout rates at the primary level, and improve literacy rates in countries. Parents, teachers, and administrators can impact a child's future by providing pleasant experiences during their early years. Early childhood education requires a child-friendly setting, qualified teachers, diverse learning tools, and age-appropriate approaches. The 2009 Education Policy prioritizes ECE, committing to providing at least one year of pre-primary education in all government schools. It includes specialized teacher training and significant funding allocations (Khan, Bhatti, Hussain & Bano, 2017). The education is to provide students with basic abilities such as language and arithmetic, enabling them to become productive citizens of country.

Students' knowledge, cognitive, and psychomotor abilities are enhanced through analysis tasks that involve the observation, questioning, obtaining information, associating, and communicating findings (Putri, 2018). Teachers' instructional materials focus on routine problems, causing students to struggle with non-routine enquiries, contributing to low reasoning abilities (Firdaus, 2016). Many students struggle, specially in mathematics, due to lack of logical reasoning when solving problems. Rather, different soft skills like critical thinking and life skills have been focused on science subjects in the literature for twenty-first-century learners (Jamil et al., 2024; Jamil, Bokhari, & Ahmad, 2024; Jamil, Bokhari, & Iqbal, 2024) that impact the teachers and students during the learning process (Mikrayanti, 2016). Research shows that physical and graphical representations are useful in the early education. The mastery approach's manipulatives and approaches proved the highly beneficial for struggling children with math (Bourtzinakou, 2023). The usefulness of this research is drawn from the fact that it gives a broad perspective of applying Concrete-Pictorial-Abstract (CPA) model effectively in the context of Early Childhood Education (ECE) in Pakistani primary government schools.

More than that, by comparing the results by teachers' gender, position, and district affiliation, the research offers insights into how the model is accepted and works across many educational settings. These findings emphasize the issue of differences in the implementation and perception between genders and between and within districts, which, in turn, can be useful for directing professional development initiatives. Moreover, the agreement between caregivers and teachers on the benefits provided by the model points to the model's ability to enhance the student learning outcomes and strengthen home-school partnerships. Some educators may not be fully trained in the CPA model, resulting in inconsistent application. The findings of this study are highly relevant for the Pakistani policymakers and educational administrators, providing them with the best practices in the ECE and the possibility of modifying teacher training to minimize inequality in the education across the regions. Finally, this study helps enrich the data pool on appropriate approaches to the organization of ECE. It creates prerequisites for further, more extensive empirical studies of the consequences of applying the CPA model to increase the students' outcomes and enhance the overall quality of the education in Pakistan.

Objective of Study

1. To compare the teachers' opinions about the utilization of the CPA approach at the ECE level on gender basis.

2. To compare the teachers' opinions about the utilization of CPA approach at ECE level and its impact on students' learning on position basis.
3. To compare the teachers' opinions about the utilization of the CPA approach at the ECE level on a district basis.

Hypothesis of Study

1. There is no significant difference between mean score of male and female teachers' opinions about using CPA approach at ECE level.
2. There is no significant difference amid mean score of caregivers and teachers' opinions that CPA model impacts student learning at ECE level.
3. There is no significant difference between mean scores of Lodhran and Mianwali teachers' opinions about using CPA approach at the ECE level.

LITERATURE REVIEW

The Concrete Pictorial Abstract (CPA) approach is a teaching method that employs physical and visual aids to help children understand abstract concepts. Pupils are exposed to new mathematical topic using concrete resources (for example, fruit Dienes blocks). When students are easy solving issues using physical aids, they are offered problems with pictures, typically visual reproductions of the tangible things they used. Then, students were asked to solve issues with only abstracts, such as numbers or other symbols. Building these phases into lesson can help students grasp relationship between numbers and actual world, thus ensuring their understanding of the mathematical subject they are learning (Johnson, 2024). Research has shown that teaching with CPA approach results in increased and improved student learning achievement and reduction of arithmetic anxiety amid learners in primary school. Other findings have pointed out that this system is efficient in attractive the execution of mathematical cognition compared to conventional learning approach. Enhancing learners' mathematical reasoning skills, are needed in primary schools, is a feasible way of coping with such issues.

This is done with the help of Concrete Pictorial-Abstract (CPA) approach. CPA technique fits the cognitive development of young kids in primary school. The CPA approach is also called concrete-representational-abstract approach, concrete-semi-concrete-abstract approach. CPA technique makes from Bruner learning theory & enactive-iconic-symbolic cognitive stages of development. However, they find it most helpful in children's low-level numeracy learning since they can relate the number space to real-life situations. In addition, research on approach has indicated positive effects on spatial skills, like movement, manipulation of objects, visualization and spatial problem-solving. There are three stages of Concrete-Pictorial-Abstract (CPA). The first is the concrete level, which involves pupils solving mathematical problems using tangible things. The second stage is the Pictorial stage, in which students manipulate objects using images. The third stage is the Abstract stage, in which students employ symbols or notations (abstract notation). According to Jean Piaget's theory of cognitive development, children in fifth grade are in concrete operational stage. Children can think and manage tangible items more effectively during this stage, which is preoperational level (Putri, 2017).

Cognitive patterns progress from tangible to abstract (Sumartini & Priatna, 2018). In the cognitive domain of learning, critical thinking has been focused on different national studies from different perspectives, as in policy documents (Jamil, Aslam & Ali, 2024; Jamil, Bokhari & Ahmad, 2024; Jamil, Muhammad & Aslam, 2024) teachers' perceptions (Jamil, Anwar & Ali, 2024; Jamil et al., 2023; Jamil et al., 2021), the teachers' practices (Jamil & Muhammad, 2019; Jamil, Muhammad & Qureshi, 2021) in the textbook analysis (Jamil et al., 2024; Jamil et al., 2024). Using an open-ended approach with a basic application of illustrations for PowerPoint leads to higher learning outcomes than traditional methods. Thus, the previous studies indicate a desire to conduct research using the Concrete-Pictorial-Abstract (CPA) method (Bernard & Chotimah, 2018). The CPA model has been applied to post-secondary, primary and secondary education systems and has had a positive outcome. Researchers have also revealed that problem-solving assists junior high school pupils in achieving a moderate level of reasoning compared to conventional learning, which has a negligible effect. While using this approach, teacher insists that students have manipulatives, even if they do not understand them.

This is important to guarantee that a greater number of students who may be slow to grasp abstract thinking have a chance to be taken through concrete and pictorial models before a shift to abstract thinking is done. The previous research shows that CPA can improve students' learning outcomes. The inferential data analysis indicates that implementing the Concrete-Pictorial-Abstract (CPA) significantly reduces pupils' arithmetic anxiety during the primary school (Putri, 2020). The CPA approach to spatial reasoning involves manipulating the items, visualizing, making, and designing objects, and solving mathematical problems by envisioning proportions (Ontario, 2014). Adapting the CPA model to suit children with the different learning abilities can be challenging. The CRA technique thus improved junior high school pupils' reasoning skills to moderate levels, while the conventional learning had a minimal impact (Rahmat, 2014). According to the CPA approach, all students should have access to manipulatives, whether exploring new learning or building on a previous topic. Even students who appear to have comprehended the material may struggle using manipulatives. Certain students may indeed need more availability of manipulatives for longer (Education, 2016).

RESEARCH METHODOLOGY

A quantitative research approach was used for the current study by deploying a survey research design. The current study's population was all ECE teachers in the districts Mianwali and Lodhran. The population and sample are key ideas in research that enable the credible and relevant results. Understanding the concepts behind the given group or phenomenon is vital for designing studies with accurate results (Ahmad et al., 2023). The study group of participants can be described as individuals who pique the researchers' interest in extending the investigation results. Population is entire number of units (individuals, organizations, events, things, or products) from which samples are assessed (Shukla, 2020). To obtain accurate outcomes, it is necessary to pay a lot of attention to choosing a representative sample (Shukla, 2016). A sample means selecting a set of people who represent characteristics of the whole population to make generalizations that will apply to the entire population since the population in question is too large and unwieldy to study as a whole (Andrade, 2020).

In the present study, purposive sampling was utilized, and therefore, the study sample comprised 100 ECE teachers and 100 caregivers. It is one of sampling techniques used to select a predetermined number of people or units for research. It is useful when an investigator simply wants to select a sample representation of what he or she aims to study, be it an entity's features or characteristics (Team, 2023). Reliability is important when determining the outcomes of education, meteorology, social sciences, and public health. It minimizes sample bias, enhances cost reduction and increases external validity (Lee & Landers, 2022). The questionnaire, that contained 25 items, was developed for the purpose, and information was gathered from the participants. Data analysis was conducted using Statistical Package for Social Science (SPSS), where descriptive statistics were analyzed in terms of mean and standard deviations. T-tests were also used to compare the difference in the mean scores of respondents.

Table 1 Cronbach's Alpha for Instrument

Cronbach's Alpha	No of Items	Means	Standard deviation
.768	25	.118	26.43

Table 1 indicates that there were 25 items, and range of scores on Likert-type scale was from 1-5, which means respondent could have a high score of 5 and a low score of 1 on each statement. The tool was reliable; alpha was .768, reliable and acceptable. Mean score of whole tool statements was (M=.118, SD=26.43).

FINDING OF STUDY

Table 2 Teachers' Opinions (CPA model at ECE level on Gender Basis)

Gender	N	Mean	SD	df	t	p
Male	55	56.10	11.57	98	1.82	.071
Female	45	61.31	13.64			

Table 2 shows that there was a significant difference between teacher opinion about the utilization of the CPA model at the ECE Level on gender bases as the mean score of female teachers (M=61.31, SD=13.64) was better than the mean score of male teachers (M=56.10, SD=11.57). The above value shows that the null hypothesis was rejected: "There was no significant difference between the mean score of male and female teachers' opinion about using the CPA model at the ECE level. So, it is concluded that female teachers' opinions about using concrete-pictorial and abstract models are better than males.

Table 3 Teachers' Opinions (CPA Model Impact on Learning on Position Basis)

Gender	N	Mean	SD	df	t	p
Care Giver	100	1.85	.438	198	.986	.328
Teacher	100	1.93	.361			

Table 3 shows that there was no significant difference amid teacher opinion about the CPA model has a positive impact on student learning at ECE Level on position bases as mean score of caregivers (M=1.85, SD=.438) and mean score of teachers (M=1.93, SD=361). Above p-value shows that the null

hypothesis was accepted: "There was no significant difference amid mean score of caregivers and teachers' opinion about CPA model impacting student learning at ECE level. So, it is concluded that caregivers & teachers have same opinion about positive impact of concrete-pictorial and abstract models on students.

Table 4 Teachers' Opinions (CPA Model at the ECE Level on a District Basis)

District	N	Mean	SD	df	t	p
Lodhran	50	2.12	569	98	2.23	.029
Mianwali	50	1.79	550			

Table 4 shows that there was a significant difference between teachers' opinions about utilization of CPA approach at ECE Level on a district basis, as mean score of Lodhran teachers (M=2.12, SD= .596) was better than the mean score of Mianwali teachers (M=1.79, SD=.550). The above value shows that the null hypothesis was rejected: "There was no significant difference between the mean score of Lodhran and Mianwali teachers' opinion IN using CPA approach at ECE level. So, it is concluded that Lodhran teachers' opinion about using concrete-pictorial and abstract approaches is better than Mianwali.

DISCUSSION

The Concrete, Pictorial, Abstract approach (CPA) is a highly effective teaching method that helps students gain profound and long-term understanding of mathematics. An American psychologist, Jerome Bruner, created the concrete, symbolic, and abstract framework, sometimes called CPA. The CPA technique tries to assist students in getting a comprehensive comprehension of mathematical subjects. The study established a statistically significant difference in teachers' perception of using the CPA model at ECE level based on gender and district. An interaction effect of gender revealed that female teachers had a more positive attitude towards the concrete, pictorial and abstraction approaches than male teachers. These gender differences could be since of teaching and learning accommodation and style, one's experience with model and or need to gauge the level of exposure of study participants to ECE methodologies. This indicates need for gender-sensitive professional development to promote coherence regarding understanding and implementing the CPA model at the school. This initiative utilized the CPA model to help the students acquire effective problem-solving methods.

The students were welcome to utilize any step of the CPA model (concrete, pictorial, or abstract), considering their past teaching techniques, deficiencies in the instruction, and misunderstandings (Bourtzinakou, 2023). The research did not reveal any breakdown of viewpoints of the caregivers and teachers as to how CPA model enhances learners' learning experience at the ECE level. Such consensus between the educators and caregivers is positive, for it suggests that both stakeholders understand the value of model in place. Such synchronization between the school and home views of model may increase the model's efficiency due to the coherence in the support and promotion of learning techniques amid two settings. This research highlighted the difference in perception held by teachers of Lodhran and Mianwali districts; teachers of Lodhran seemed to have better opinions about CPA approach. Such a difference from region to region shows need to consider the regional

differences and possible inequity regarding available resources, personnel, or practices around the developed strategies.

It increases concern for better harmony in the passage of higher quality teacher education and funding for fair implementation of happier teaching paradigms, including the CPA model. More investigation of the characteristics that make areas differ in terms of the model could be beneficial to advancing it to be implemented on a larger scale. The CPA methodology improves the students' abilities compared to traditional learning methods. any educators may lack access to adequate manipulatives or visual aids necessary for concrete and pictorial stages. Some educators may not be fully trained in CPA model, resulting in inconsistent application. CPA methodology can improve students' mathematical reasoning skills compared to the traditional learning methods (Yuliawaty, 2011). The CPA technique begins with manipulating physical objects to prepare pupils for abstract concepts. Interacting with concrete items improves conceptual understanding, memory retention, and application to real-world circumstances. Second stage of CPA learning, pictorial, demonstrates how pupils' competence transitions from physical items to abstract representations (Suwangsih & Tiurlina, 2006).

CONCLUSION

There was a significant difference between the mean score of male and female teachers' opinions about using the CPA approach at the ECE level. So, it is concluded that female teachers' opinions about using concrete-pictorial and abstract approaches are better than males. Likewise, there was a significant difference between the mean scores of Lodhran and Mianwali teachers' opinions about using the CPA approach at the ECE level. So, it is concluded that Lodhran teachers' opinion about using concrete-pictorial and abstract approaches is better than Mianwali's. On the other hand, there was no significant difference between the mean score of the Giver and the teacher's opinion that the CPA model positively impacts student learning at the ECE level. So, it is concluded that both caregivers and teachers have the same opinion about the positive impact of concrete-pictorial and abstract approaches on students. The CPA model significantly improved pupils' understanding and accuracy. The study significantly impacted students' reasoning, communication abilities, and drive confidence.

Recommendation

1. Conduct organized staff development activities that ensure that male and female teachers are given equal and proper training in using the CPA model.
2. Ensure greater uniformity of the CPA model implementation throughout the districts by providing standardized resources and training for all the districts.
3. Build on the corroborative facts of the mutual understanding of CPA model by caregivers and teachers and develop home-school partnership programmes by replicating CPA-based learning activities in the home setting.
4. Carry out studies with greater sample sizes and the wider variety of tools and methods to increase the validity and importance of conclusions on efficiency of CPA model in Pakistani ECE environments.

5. Overcome implementation concerns by dedicating enough time to CPA-related exercises in class and offering continuous support to teachers so they can always wade off challenges that may ensue when putting the model above into practice.

REFERENCES

Ahmad, N., Alias, F. A., & Razak, N. (2023). Understanding population and sample in research:key concepts for valid conclusions. Sig: E-Learning@CS, 19-24.

Andrade, C. (2020). Sample size and its importance in research. *Indian Journal of Psychological Medicine*, 102-103.

Bernard, M., & Chotimah, S. (2018). Improve Student Mathematical Reasoning Ability with Open-Ended Approach Using VBA for PowerPoint. International Conference on Scicence and Applied Science (ICSAS) 2018. [Proceeding]. Faculty of Mathematics & Sciences, Universitas Negeri Sebelas Maret, Surakarta.

Bourtzinakou, E. (2023). Developing Mathematical Reasoning: The role of CPA model in students' progress from standard to Reasoning Problem-Solving questions. Department of Education.

Education, H. (2016, May 28). Https://www.hfleducation.org/blog/cpa-approach. Retrieved September 14, 2024

Firdaus, F. M. (2016). Pengaruh Quantum Learning terhadap Penalaran Matematis Siswa Sekolah Dasar. *Journal of Education Humaniora*. 5(2). 95-97.

Jamil, M., Ain, Q. u., & Chohan, I. R. (2024). Integration of core life skills in Physics textbook grade X: A qualitative content analysis. *Pakistan Journal of Law, Analysis and Wisdom*, 3(6), 119-131.

Jamil, M., Jabeen, M., & Moin, M. (2024). Life skills in Biology textbook grade IX: A qualitative content analysis. *Journal of Policy Research*, 10(2), 429–434.

Jamil, M., Bokhari, T. B., & Ahmad, D. (2024). The Evaluation of critical thinking elements: A qualitative content analysis of physics textbook grade IX. *Qlantic Journal of Social Sciences*, 5(1), 344-350.

Jamil, M., Bokhari, T. B., & Zia, Q. (2024). Qualitative content analysis for critical thinking and skill development: A case of Chemistry curriculum. *Journal of Asian Development Studies*, 13(1), 147-155.

Jamil, M., Aslam, M., & Ali, S. (2024). Single National Curriculum (SNC) for Social Studies (2020): Document analysis for development of critical thinking skills at the primary level. *Pakistan Journal of Law, Analysis and Wisdom*, 3(2), 67-74.

Jamil, M., Muhammad, N., & Aslam, M. (2024). Critical thinking skills development: An analysis of mathematics curriculum 2006 (Grade-wise). *Global Social Sciences Review*, 9(1), 22-29.

Jamil, M., Anwar, M., & Ali, M. J. (2024). Developing critical thinking skills in English classrooms at the secondary level: Teachers' perspective. *Journal of Social Sciences Development*, 3(1), 76-85.

Jamil, M., Mahmood, A., & Masood, S. (2023). Fostering critical thinking in Pakistani secondary school science: A teacher's viewpoint. *Global Educational Studies Review*, 8(2), 645-659.

Jamil, M., Arif, F., & Shahzadi, U. (2024). Integration of core life skills in Pakistan Studies textbook grade IX. *International Journal of Social Science Archives*,7(2), 870-876.

Jamil, M., Muhammad, Y., & Qureshi, N. (2021). Critical thinking skills development: Secondary school science teachers' perceptions and practices. *Sir Syed Journal of Education & Social Research*, 4(2), 21-30.

Jamil, M., & Muhammad, Y. (2019). Teaching science students to think critically: Understanding secondary school teachers' practices. *Journal of Research & Reflections in Education*, 13(2), 256-272.

Jamil, M., Ain, Q. u., & Chohan, I. R. (2024). Integration of core life skills in Physics textbook grade X: *Pakistan Journal of Law, Analysis and Wisdom*, 3(6), 119-131.

Johnson, E. (2024, May 23). What is The Concrete Pictorial Abstract (CPA) Approach and How to use it in Maths?

Khan, N., Bhatti, M. A., Hussain, K. S., & Bano, S. S. (2017). Early Childhood Education In Pakistan. Islamabad: Academy of Educational Planning and Management Ministry of Federal Education and Professional Training.

Lee, V., & Landers, R. N. (2022). Sampling Strategies for Quantitative and Qualitative Business Research. In Oxford Research Encyclopedia of Business and Management.

Maqsood, F., Malik, S., & Jumani, N. B. (2022). Role of life skills education in empowering secondary school students: An explanatory study. *International Research Journal of Education and Innovation*, 3(1), 200-213.

Mikrayanti. (2016). Meningkatkan Kemampuan Penalaran Matematis melalui Pembelajaran berbasis Masalah. Jurnal Suska. J*ournal of Mathematics Education*, 2(2), 97-98.

Ontario, C. M. (2014). Paying Attention to Spatial Reasoning: Support Documents for Paying Attention to Mathematics Education. Ontario: Queen's Printer.

Putri, H. E. (2017). Pengaruh Pendekatan Concrete Pictorial-Abstract (CPA) terhadap Pencapaian Kemampuan Spatial Sense (KSS) Siswa SD. *Metodik Didaktik,* 13(1). 42-52.

Putri, H. E. (2018). Pendekatan Concrete-Pictorial-Abstract (CPA), Kemampuan Kemampuan Matematis, dan Rancangan Pembelajarannya. Subang: Royyan Press.

Putri, H. E. (2020). The effect of concrete-pictorial abstract CPA) approach on the decrease of mathematical anxiety in elementary school. *International Conference on Elementary Education*. 2(1). 80-93.

Rahmat, F. R. (2014). Penerapan pendekatan Concrete Representational Abstract (CRA) untuk meningkatkan kemampuan penalaran matematis siswa: penelitian eksperimen pada siswa kelas VIII – mts. N. Wanayasa. Department of Mathematics Education, Universitas Islam Negeri Sunan Gunung Djati, Bandung.

Shukla, S. (2016). Research – Methods (Gujarati). Ahmedabad: Kshiti Prakashan. Shukla, S. (2020). Research Methodology and Statistics. Ahmedabad: Rishit Publications.

Sumartini, T. S., & Priatna, N. (2018). Identify Student Mathematical Understanding Ability through Direct Learning Model. *Journal of Physics: Conference Series*, 1132, 1-8.

Suwangsih, E., & Tiurlina. (2006). Model Pembelajaran Matematika. Bandung: UPI Press. Team, D. E. (2023). What is purposive sampling? Dovetail.

Yuliawaty's, L. (2011). Pembelajaran Matematika dengan Pendekatan CRA untuk Meningkatkan Kemampuan Pemahaman dan Pemecahan Masalah Matematik Siswa SMP. [Thesis]. Post-graduate School, Universitas Pendidikan Indonesia, Bandung.