ORIGINAL ARTICLE

Effect of Play Based Learning on the Development of Logical Reasoning in Early Childhood Education

Fozia Fatima[1*], Saba Tariq[1], Maham Siddique[1], Sabir Ali[2], Nadia Shabnam[3], Rabbia Javed[3]

ABSTRACT

Objective: To determine the effect of play-based learning on developing logical reasoning in early childhood education in Islamabad.

Study Design: Quantitative quasi-experimental study and the pre-and post-experimental paradigm was used. **Place and Duration of Study:** The population of the current study included the students from Headstart School located in Islamabad from March 2020 to September 2020.

Materials and Methods: The population was selected through cluster sampling technique. Sample size of 80 students with 40 each of control and experimental group were considered le. Both the groups were taught a course 'classification of vertebrates' in Science either through play-based (experimental group) or conventional method (controlled group) in a 45 minutes session, 5 days for four weeks. A pictorial self-developed test consisted of 6 questions based on understanding by design (UbD was used. Descriptive (percentage and frequency) and inferential statistics were used for the analysis of data.

Results: The control condition (Pre & Post) for the logical development and experimental condition (Pre & Post) was positively correlated. No effect of gender by the play-based learning in developing logical reasoning among students was found in both the control and experimental group at early childhood education.

Conclusion: The relationship between experimental and control conditions for the logical development by using play-based learning was significant. The play-based activities based on the curriculum should be designed to ensure meaningful learning and long-term knowledge retention in children as it ensures a child's interest and fun factor.

Key Words: *Experimental Design, Logical Reasoning, Play-Based Learning.*

How to cite this: *Fatima F, Tariq S, Siddique M, Ali S, Shabnam N, Javed R. Effect of Play Based Learning on the Development of Logical Reasoning in Early Childhood Education. Life and Science. 2021; 2(4): 172-181. doi: http://doi.org/10.37185/LnS.1.1.181*

Introduction

Early childhood education is a wildly used term to describe an educational program that provides a learning environment for children in the pre-school years of early childhood, an age before they are ready to join the formal school.[1,2] Early childhood education consists of a carefully designed set of activities and experiences that assist young children's cognitive and social development.[3] Whereas logic is also termed as a discipline itself that investigates the structure of knowledge and distinguishes the type of reasons using the appropriate thinking tool.[4,5] Logical reasoning can be termed as a vital element to aid mental reservation and complex problem solving.[6] The human mind can solve ambiguous problems using logical reasoning and high order thinking capability.[7,8] One of the benefits of acquiring advanced mental skills is an application-level ability of a mind that depends upon a person's knowledge and comprehension level at

[1]*Department of Humanities, Education and Psychology*
Air University, Islamabad
[2]*Department of Educational Development*
University of Baltistan, Sakrdu
[3]*Department of Health Profession Education*
National University of Medical Sciences, Rawalpindi
Correspondence:
Dr. Fozia Fatima
Assistant Professor, Humanities, Education and Psychology
Air University, Islamabad
E-mail: foziafatima124@gmail.com

Funding Source: NIL; Conflict of Interest: NIL
Received: Jan 15, 2021; Revised: Jun 07, 2021
Accepted: Jun 07, 2021

the cognitive stage.[9]

Developing cognitive skills in a child directly influences his academic access that again depends upon the logical thinking ability of his mind. It relies on the capacity of the human mind and its basic ability to visualize and solve a problem, use mental/cognitive skills, or make specific abstractions and a generalization about the matter.[10,11] Logical thinking means getting the idea to solve problems, and generating a result of a problem. The idea to successfully arrange the sequence of a problem in the proper order of workable logical thinking adds to the cognitive development at any stage.[12] Similarly, the logical thinking ability of a child enables him to comprehend in a better fashion and to react to a problem on his own by thinking for a solution in a more thorough manner[13,14], utilizing the skill of logical thinking benefits both the community and the learner of course.[15]

Skill is gained through a process that is the core heart of education itself. Refining and upgrading thinking practice should be the priority goal of a teaching-learning process to develop logical thinking in children in early childhood because the learner should be trained as an effective and independent learner.[16,17] Activities in early childhood school should be designed appropriately to fulfil a young mind's cognitive needs to develop their logical thinking pattern.[18] Each child should be targeted to be able to master a wider range of cognitive skills. The irony is that this is one domain where somehow the education system doesn't support the child.[19]

Play-based learning, to a child, provides an opportunity to engage in purposeful and will further allow for the simulation and repetitive experiences that are likely to be encountered in the future.[20,21] This can also be referred to as having four features as follows: It is typically voluntary; motivating, implying that it is pleasurable for oneself and is the cause of intrinsic motivation and does not depend on factors of extrinsic motives (external rewards); it consists of some activity of some level, which is often physical and engaging; and it has a make-believe quality which makes it distinctive.[22,23] That is why each feature of the above discussed leaves room for developing and enhancing strong metacognitive skills in children and the ability to construct a logical understanding of concepts. Students often greatly benefit from their play experiences through innate learning; educators can successfully manipulate scenarios to make certain that curriculum goals are taught.[24,25]

It is acknowledged that playing is an individual propensity, in the viciousness of the fact that the act of playing is communicated as conduct, in a child's brain, when he's playing, he's experiencing the deepest form of learning through experiencing.[26] A child's ability to achieve different levels of learning during playing activities goes a lot deeper than the act of pulling out a worksheet and having him fill in some sort of bubble, quizzes or anything of the kind.[27,28] Young children learn through interaction, observation, and experience in play-based learning during their preliminary developmental stages.[29] They cultivate an understanding of the logic behind how and why things are done in a particular way. Play-based learning allows them to learn, observe, and explore while they are engaged in the activities.[30,31] The current study was aimed to investigate the influence of play-based pedagogical approach in learning the logical reasoning in early childhood. This will help in identifying the relationship between the play-based pedagogical approach in learning and logical reasoning development in young minds.

1.1 Statement of the Problem

Early childhood education consists of a carefully designed set of activities and experiences that assist young children's cognitive and social development. Playing is quite a natural activity that comes naturally to children. Children learn, discover, and rediscover via play activities using their creativity and deep imagination. Therefore, the current research was undertaken to identify effect of play-based education/learning on the development of logical reasoning in early childhood education

1.2 Objectives of the Study

The objectives were:

1. To determine the degree of logical reasoning among students in early childhood education at pre-and post-control conditions.
2. To determine the effectiveness of play-based learning in developing logical reasoning among students at early childhood education.

To determine the effect of gender on the effectiveness of play-based learning in developing

logical reasoning among students at early childhood education.

1.3 Hypothesis

The study was based on the following hypotheses:

H_{01} There is no significant effect of play-based learning in the development of logical reasoning among students at early childhood education belonging to experimental and control groups, respectively.

H_{02} There is no significant change in the logical development of children based on their gender at early years of education due to play-based learning in control group conditions during pre and post-tests.

H_{03} There is no significant change in the logical development of children based on their gender at early years of education due to play-based learning in experimental group conditions during pre and post-tests.

1.4 Theoretical Framework

The researchers used Understanding by Design (UbD's) Six Facets of Understanding as their theoretical framework. The reason for selecting this framework was that it is a comprehensive set for planning, executing, and assessing student learning that complements the age group of the children of the current study.[32,33] UbD stands for Understanding by Design Framework that is focused on the process of structure and planning that guides the practice of applying curriculum, conducting assessment, and giving instructions throughout. It has two fundamental concepts.[34,35] That is, focus on educating the students and then assessing to comprehend the transfer of knowledge/education; and "backwards" designed curriculum.[36] Two basic sources direct the convergence of evidence of the context; the modern research theoretical domain of cognitive psychology; and the outcomes of students' accomplishment in learning.[37,38] The framework can be divided into three stages of backward design; stage one is when the instructor can identify the anticipated results; stage two determines the assessment evidence, whereas stage three is when the desired learning experiences and instructions are planned.

UbD is based on the seven basic principles.[39,40] When teachers think purposefully about curricular planning, eventually, the student's learning is improved. UbD framework assists the teaching-learning process avoiding both the inflexible progression and an inflexible route.[42,43] It also aids to focus on the instructing process along with the curriculum for development and to expand student understanding, eventually making knowledge transfer successful (the ability to use skill and

Six Facets of UbD[41]	Description
Explanation	To ensure that the student comprehends the right approach to an answer, the student explains, justifies their responses and point of view along with reasoning.
Interpretation	To ensure the student avoids the hindrance in looking for the right answer, besides also demands a righteous logical explanation, numerous possible salient details and opinions can incorporated by the students.
Application	To ensure conscious and explicit reflection of student key performances, along with his assessment and adjustment and obvious reasoning. The purpose, real or simulated audience, setting, options for personalizing the work, realistic constraints, and "background noise" be any of the listed a reason, an authentic assessment is hence required.
Perspective	To ensure the student knows the in-depth value of holding an opinion to absorb its value in terms of importance or unimportance. Encourage the student to step forward to inquire, "what if it…?", "What value does this information hold?" "How important is this concept?" "What does this information aid us to do that's of some significance?"
Empathy	To ensure the student develops the insight to notice and observe the world from a different point of views while withstanding the diversity of thought and feeling that exists in the world.
Understanding/Self-Knowledge	To ensure that the student is deeply aware of his understanding and that of others. Possess integrity and can identify their predictions and preconceptions; to be able to act upon the basic level of understanding willingly.

content knowledge in the teaching-learning process efficiently).[44,45] Understanding of a concept learned by the student revealed when he autonomously takes charge of sharing his newly acquired concepts, then makes sense out of it and transfers his learning through independent and authentic performance through any of the Six Facets of Understanding that may be; the ability to explain, interpret, apply, hold a perspective, empathize, and self-assess.[46,47] For a teacher, all these facets either together or separately serve as a gauge of understanding of the students.[48]
An effective curriculum usually has a backward plan to achieve desired goals that are long-term following a three-staged design process.[18] This three staged process of design includes desired outcomes, substantial proof, and a smart plan for learning.[49,50]
The ordinary practices are something that this course supports to evade, like believing that the main hub of the curriculum is the textbook instead of being a mere source or part of the teaching process that is teacher-centered without any apparent priorities or purposes.[50,51] Teachers are considered to be the coaches and guides to the source of understanding, not mere narrators of bookish or content knowledge, an activity or skill.[52] Their primary focus is to ensure that real learning takes place, not just very teaching (assuming that the students will learn what was taught by being able to comprehend); they always look back and check for successful and meaningful teaching-learning opportunities.[53,54] Regularly reviewing teaching materials and the target curriculum against any design standards aids the curriculum's effectiveness and quality and is a constructive engagement and professional debate for teachers.[55,56] The model of UbD echoes a persistent methodology of accomplishing students, teachers' professional efficiency, and the craft.[57,58] The UbD model is a continual process that enhances student performance by providing information about the required adjustment in the curriculum and instruction to maximize student learning.[59,60]

Materials and Methods

The research was designed in a quantitative nature by using two groups, pre and post-experimental The selected sample was labelled as two groups; the experimental (or the treatment) and control groups for pre and post-tests.

Students of Playgroup, Montessori level 1, Montessori level 2, and Preparatory level of Headstart School Islamabad were the population of the study. A sample size of 80 students at the Montessori level was selected through a simple random sampling technique. The student participants were labelled as two groups (control= 40 students & experimental=40 students). The range of age of students was 5-7 years old.
A pictorial test was developed by the researchers for the convenience of the age of the sample. While developing the pictorial version of the test, the basic purpose was to ensure the child-friendly nature of questions. The test was based on UbD, which was developed by Grant Wiggins and Jay McTighe.[61] This test comprised six facets of UbD (Understanding by Design). It consisted of six questions that assessed the students' understanding/self-knowledge, empathy, perspective, application, interpretation, and explanation. Pre and post-tests were conducted through this self-developed test to measure the logical understanding of the students both before and after the play-based session.
Researchers were granted permission to conduct their study from heads of the school branches and the university.
The content validity of the instrument was tested by the experts of Social Sciences from Air University, Islamabad.
Experts of Social Sciences checked the phraseology and the configuration of questions in the researchers' questionnaire. The experts also analyzed the language, grammar, and pictorial content. By taking their suggestions, researchers finalized their tests for further administration. Cronbach Alpha method was used to check the reliability of the instrument, which was calculated to be 0.68. The pictorial self-developed test was administered twice with each group as pre-test and post-test. The pre-test was taken from the sample of both experimental and controlled group to evaluate the prior knowledge of children before giving them a certain treatment. After the treatment given to both the groups in experimental and controlled groups for 4 weeks by the researchers themselves, the same pictorial self-developed test was repeated in both the groups to compare and contrast the pre-test results and the post-tests.

A study plan was carried out in an experimental group based on hands-on activities (using plastic animal figures), story-telling (fables highlighting characteristics of animals) and role play in the class. During these activities, the students were prompted to categorize the animals based on similar physical feature and discuss them. The classroom environment was designed to complement the mode of study implemented. The experimental group had visuals around the class boards, activity corners where they were asked to group (toy) animals based on the similarities; solve jigsaw puzzles, and related non-fiction age-appropriate classification of animal books were placed in reading corners. On the other hand, in the controlled group, the students were taught using traditional books with no visuals or hands-on activities. There were no animal figures, jigsaw puzzle, story-telling session or opportunity hands-on activities for students. The plan was carried out for 45 minutes daily, five days a week and a period of four weeks. The researchers conducted the sessions with the children themselves. After taking pre and post-tests, results were compared to measure the students' logical reasoning in both the designed groups.

Results

In the current study, the following graphical representation shows percentages of levels of logical reasoning (understanding, empathy, perspective, application, interpretation, explanation) during pre and post conditions of the control group.

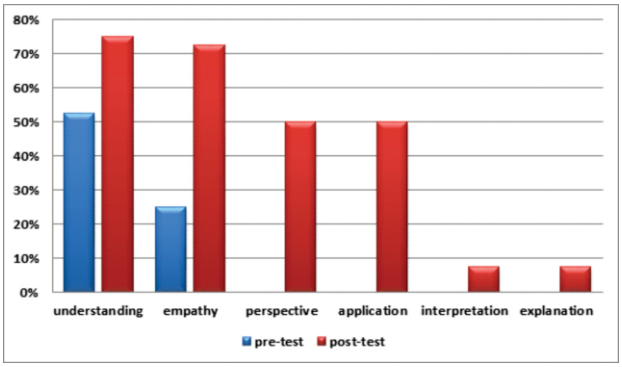

Fig 1: Representation of Percentage about Logical Reasoning in Control Group

The figure1 shows the control group's comparison of the pre and post-test. In the pre-test, four facets of the UbD perspective, application, interpretation, and explanation were found to have the least recorded percentage (0%) compared to the highest recorded percentage in the facet of understanding (52.5%). However, in the control group's post-test, the facets of interpretation and explanation had the least recorded percentage (7.5%) compared to the highest recorded percentage of understanding (75%).

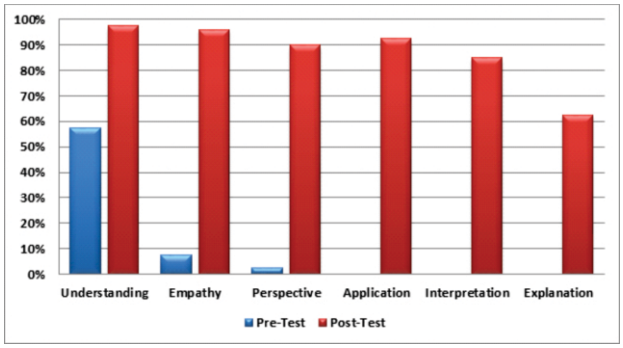

Fig 2: Representation of Percentage about Logical Reasoning and its respective levels in Experimental Group

In figure 3, the experimental group's pre-test, three facts of UbD; application, interpretation, and application have the least percentage (0%) compared to the highest percentage of the fact of understanding (57.5%). However, the experimental group's post-test explanation has the lowest rate of percentage (62.5%) as compared to the highest percentage of understanding (97.5%).

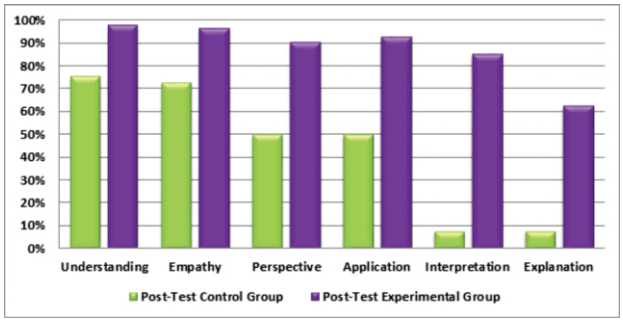

Fig 3: Graphical Representation of Percentage of comparison of Logical Reasoning and its levels during Control Group and Experimental Group

In figure 3, the outcomes of both the control and the experimental group's post-test were compared. The lowest percentage was noted to be in the control group's post-test in the facet of explanation and interpretation (7.5% each) in comparison to the maximum recorded percentage in the case of the experimental group's post-test was the facet of understanding (97.5%).

Table 1 shows the overall percentage of pre and post-test outcomes of the control group and the

Table 1: Percentages of UbD Logical Reasoning Scale during Control and Experimental Condition's Pre & Post results

UBD logical reasoning scale	Pre-Test % control group	Post-test % control group	Pre-test % experimental group	Post-test % experimental group
Understanding	52.5%	75%	57.5%	97.5%
Empathy	25%	72.5%	7.5%	96%
Perspective	0%	50%	2.5%	90%
Application	0%	50%	0%	92.5%
Interpretation	0%	7.5%	0%	85%
Explanation	0%	7.5%	0%	62.5%

experimental group, respectively. The experimental group's post-test percentage has the highest value in the facet of understanding (97%) as compared to the least recorded percentage of facet of explanation (62.5%). In the case of the control group's post-test, the percentage of understanding has the highest recorded value up (75%) in comparison to the least value in the facet of explanation and interpretation (7.5%).

In the current study, the following hypothesis was tested:

H_{01} There is no significant effect of play-based learning in developing logical reasoning among students at early childhood education belonging to experimental and control groups, respectively.

Table 2: Relationship between Control and Experimental condition's Pre & Post-test for the Logical Development

Spearman Rho Test		The difference in Pre & Post Control Group	The difference in Pre & Post-Result of Experimental Group
The difference in Pre & Post Control Group	Correlation Coefficient	1.000	.043
	Sig. (2-tailed)	.000	.890
The difference in Pre &Post-Result of Experimental Group	Correlation Coefficient	.043	1.000
	Sig. (2-tailed)	.890	.000

Table 2 shows that the control condition (Pre & Post) for the logical development and experimental condition (Pre & Post) are positively correlated with each other (α=0.043; *p*=0.890). The relationship between experimental and control conditions for the logical development by using play-based learning is hence significant. The study, therefore, proves that due to the play-based pedagogical approach in learning in the early years of education, there is a significant change in the logical development of children.

H_{02} There is no significant change in the logical development of children based on their gender at early years of education due to play-based learning in control group conditions during pre and post-tests.

Table 3: Mann-Whitney test for Control Group's Pre & Post-Test

Variable	Control group Gender	N	Mean Rank	Sum of Rank	U-Value	W-value	Z	Sig
Pre-Result of Control Group	Male	18	21.72	391.0	176.0	429.0	-.621	.535
	Female	22	19.50	429.0				
Post-Result of Control Group	Male	18	18.78	338.0	167.0	338.0	-.887	.375
	Female	22	21.91	482.0				

Table 3 indicates control group's pre-test of the value of the mean of male (21.72) is much greater in comparison to the control group's pre-test of the value of the mean of female (19.50). It further reveals the difference in pre results of the control group male and female is significant. The table above also indicates that the control group's female post-test value of mean (21.91) is greater as compared to the mean value of the control group's male post-test of (18.78). The significant value of the post outcome of the control group shows that the null hypothesis H_{02} is significant. Hence we fail to reject hypothesis $H_{02.}$

H_{03} There is no significant change in the logical development of children based on their gender at early years of education due to play-based learning in experimental group conditions during pre and post-tests.

Table 4: Mann Whitney test for Experimental Group's Pre & Post-Test

Variable	Experimental group Gender	N	Mean Rank	Sum of Rank	U-Value	W-value	Z	Sig
Pre-Result of Experimental Group	Male	15	17.70	265.50	145.500	265.500	-1.280	.201
	Female	25	22.18	554.50				
Post-Result of Experimental Group	Male	15	16.57	248.50	128.500	248.500	-1.789	.074
	Female	25	22.86	571.50				

Effect of Play Based Learning on the Development of Logical Reasoning Table 4 indicates that the value of the mean of the female pre-test of the experimental

group (22.18) is relatively higher than the value of the mean of the male pre-test of the experimental group (17.70). It was not significant (p=0.201), so we fail to reject the null hypothesis H_{03}. In the case of the pre result of the experimental group, gender does not affect the result of students. Similarly, in the experimental condition of the male post-test, the mean value (16.57) is less than the mean value of the female (22.86) and this difference shows (p=0.074). Therefore in the control and experimental group of pre and post-tests, we fail to reject hypothesis $H_{03.}$

Discussion

The findings show that the four facets of the UbD perspective, application, interpretation, and explanation were found to have the least mean value compared to the facet of understanding during the control group's pre-condition. However, in the post-test of the control group, facets such as interpretation and explanation had the least percentage compared to the facet of understanding. Similarly, in the experimental groups of the pre-test, three facts of UbD, namely application, interpretation, and explanation, had the least percentage compared to the facet of understanding. However, in the post-test of the experimental group, explanation has the least recorded percentage compared to the understanding. Therefore, the control condition (Pre & Post) for the logical development and experimental condition (Pre & Post) is positively correlated. The relationship between experimental and control conditions for the logical development by using play-based learning is hence significant. These findings were quite similar to the work of Johansson and Einarsdottir[47,48], Ali and Fatima[1,2,3], Diachanko and Olga[22] and Fatima[24,25,26] researchers in the past who proved that the facets of UbD were affected by play-based activities in early childhood settings.

Conclusion

1. During the control conditions, the four facets of UbD, such as perspective, application, interpretation, and explanation at the pre-test level, had the lowest score. In contrast, basic understanding had the highest score. Similarly, the same facet of understanding rose to much higher at the post level. In contrast, the explanation and interpretation facet of UbD was noted to be lowest in the control group's post-test. Therefore, it can be established that the degree of logical reasoning among students in early childhood education during traditional learning was just related to the facet of understanding. The interpretation and explanation facet had shown the maximum difference during the control and experimental groups the post-test. The difference demonstrated the effectiveness of the play-based pedagogical approach of learning in developing logical reasoning that was only observed at interpretation and explanation of UbD within the experimental group.
2. The control condition (Pre & Post) for the logical development and experimental condition (Pre & Post) is positively correlated. The relationship between experimental and control conditions for the logical development by using play-based learning is hence significant.
3. There was no effect of gender by play-based learning in developing logical reasoning among students who were belonging to both the control and experimental group at early childhood education.

Recommendation

The teachers and school administrators may use these findings of this research to implement the play-based learning pedagogical approach to the classroom, school, and system to make use of maximum efficiency of the students learning and logical thinking skill development in the early years of age. The play-based activities based on the curriculum should be designed to ensure meaningful learning and long-term knowledge retention in children as it ensures a child's interest and fun factor. New researchers can take the study forward and investigate the factors of play-based learning that particularly develop and improvise logical reasoning in young children.

REFERENCES

1. Ali S, Fatima F. Teachers' insights about the eminence of performance appraisal and its effect on the commitment and job skills of the teachers at university level. Journal of Socialomics. 2016; 5: 169-79.
2. Ali S, Fatima F. Comparative Analysis of Safety and Security Measures in Public and Private Schools at Secondary Level. Journal of Socialomics. 2016; 5: 159-69.
3. Ali S, Fatima F. Comparative Study of Public and Private

Educational Institutes towards the Recruitment, Retention and Reward of Their Teachers. Journal of literature, languages and linguistics. An international Peer-Reviewed journal. 2015; 14: 51-6.

4. Ali S, Zamir S, Fatima F, Fatima S. Comparative Analysis of Communication Climate and Self-Efficacy of Teachers at University Level. Journal of Management Sciences. 2018; 11: 186-212.
5. Ali A, Mahamod Z. Development of Play-Based Instruction Module for Teaching Preschoolers' Language Skills. Australian Journal of Basic and Applied Sciences. 2015; 9: 110-18.
6. Allen M. The sage encyclopedia of communication research methods. 2017; Thousand Oaks, Canada: SAGE Publications.
7. Almasaeid T. The impact of using understanding by Design (UbD) model on 8th-grade student's achievement in Science. European Scientific Journal. 2017; 13: 78-88.
8. Asiamah N, Mensah HK, Oteng-Abayie E. F. General, target, accessible population: Demystifying the concepts for effective sampling. The Qualitative Report. 2017; 22: 1607-22.
9. Barlett JE, Kotrlik J, Higgins C. Organizational research: Determining appropriate sample size in survey research. Information Technology, Learning, and Performance Journal. 2001; 19: 56-66
10. Becker A, Miao R, Duncan R, McClelland M. Behavioral self-regulation and executive function both predict visuomotor skills and early academic achievement. Early Childhood Research Quarterly Behavioral. 2014; 29: 411–24.
11. Bergen D. The role of pretend play in children's cognitive development. Early Childhood Research and Practice. 2002; 4: 2-15.
12. Bergen D. Does pretend play matter? Searching for evidence. Psychological Bulletin. 2013. 39: 45-8.
13. Berkowitz M, Stern E. Which cognitive abilities make the difference? Predicting academic achievements in advanced stem studies. Journal of Intelligence. 2018; 6: 48-58.
14. Bhroin M. A slice of life: The interrelationships among art, play, and the “real” life of the young child. International Journal of Education & the Arts. 2007; 8: 1–25.
15. Bredekamp S. Understanding and Building upon Children's Perceptions of Play Activities in Early Childhood Programs. Early Childhood Education Journal. 1997; 25: 107-12.
16. Chin LC, Zakaria E. Understanding of Number Concepts and Number Op-erations through Games in Early Mathematics Education. Creative Education. 2015; 6: 1306-15.
17. Cutter-Mackenzie A, Edwards S. Toward a model for early childhood environmental education: Foregrounding, developing, and connecting knowledge through play-based learning. The Journal of Environmental Education. 2013; 44:195-213.
18. Cutter-Mackenzie A, Edwards S. Varied perspectives on play and learning. Melbourne, Australia. Information Age Publishing. 2013; 44: 195-213.
19. Cutter-Mackenzie A, Edwards S, Moore D, Boyd W. Young children's play and environmental education in early childhood education. Springer Publisher; Switzerland. 2014.
20. David RK. A revision of Bloom's taxonomy: An overview, Theory Into Practice. 2002; 4: 212-8.
21. Davies & Martin. Critical thinking and the disciplines reconsidered. Higher Education Research and Development. 2002; 32: 529-44.
22. Diachenko & Olga. One major developments in preschoolers' imagination. International Journal of Early Years Education. 2011; 19: 19-25.
23. Drost E. Validity and reliability in social science research. Education Research and Perspectives. 2011; 38: 105-24.
24. Fatima F. Teachers' Attitude towards Brain Based Learning and Its Effect on Achievement Motivation of Students at University Level (PhD Dissertation). Department of Education, Faculty of Social Sciences, National University of Modern Languages, Islamabad. Retrieved from http://prr.hec.gov.pk/jspui/bitstream/123456789/11250/1/Fozia%20Fatim a_Edu_2019_NUML_PRR.pdf
25. Fatima F. Teachers' Attitude towards teamwork at university level. Governance and Management Review (GMR). 2019; 4: 56-75.
26. Fatima F. Teachers‟ attitude towards Brain based Learning and its effect on the achievement motivation of the students at university level. Sci.Int. (Lahore). 2017; 29: 315-24.
27. Fatima F. Comparative Analysis of National and International Approaches and Acuities of Child Labour Within UK, USA, India and Pakistan. American Journal of Educational Research. 2016; 4: 1271-80.
28. Fatima F. Teachers' Attitude towards Teamwork and its impact on research output at university level. Elixir International Journal. 2014; 75, 27292-310.
29. Fatima F, Ali S. Philosophical and Biological Foundation of Brain Based Learning: A Phenomenological Approach. International Journal of Innovation in Teaching and Learning (IJITL). 2020; 6: 1-19.
30. Fatima F, Ali S. Descriptive Analysis of Teachers‟ Perception

about supportive and defensive communication climate along with their self-efficacy at University level. Governance and Management Review (GMR). 2019; 4: 56-74.
31. Fatima F, Ali S. Attitude of prospective teachers towards the curriculum and teaching learning process of pre-service education programs in Islamabad, Journal of Contemporary Teacher Education (JCTE). 2017; 1: 48-64.
32. Fatima F, Ali S. The Impact of Teachers‟ Financial Compensation on their Job Satisfaction at Higher Secondary Level. Journal of Socialomics. 2016; 5: 164-74.
33. Fatima F, Zamir S. Teachers' perception about pre-service teacher education programs at higher secondary level. Journal of literature, languages and linguistics, An international Peer-Reviewed Journal. 2015; 12: 66-75.
34. Fatima F, Ali S, Fatima S. Prohibition of child labour leading to delinquent behaviour in the constitution of Islamic Republic of Pakistan 1973. Pakistan Administrative Review. 2018; 2: 383-96.
35. Fatima F, Zamir S, Ali S, Fatima S. Effect of Demographic Factors over the Achievement Motivation of Students at university level in Islamabad. Journal of Managerial Sciences. 2018; 11: 213-36.
36. Fisher KR, Hirsh-Pasek K, Newcombe N, Golinkoff RM. Taking shape: Supporting preschoolers' acquisition of geometric knowledge through guided play. Child Development. 2013; 84: 1872-8.
37. Fleer M. Conceptual play: Foregrounding imagination and cognition during concept formation in early year's education. Contemporary Issues in Early Childhood. 2011; 12: 224-40.
38. Garvey C. Play with Language. In Biology of Play, American Journal of Play, 1977; 7: 74–99.
39. Gliner Jeffrey A, George A, Harmon RJ. Pretest-Posttest Comparison Group Designs: Analysis and Interpretation, Journal of the American Academy of Child & Adolescent Psychiatry. 2003; 42: 500 -3.
40. Garvis S, Pendergast D. Thinking differently about infants and toddlers: Exploring the reflections of future Australian early childhood teachers in Australia. Australian Journal of Teacher Education. 2015; 40: 117-31.
41. Giugni M. Becoming worldly with, an encounter with the Early Years Learning Framework. Compulsory Issues in Early Childhood. 2011; 12: 11-27.
42. Goh A, Yamauchi KTR. Educators' perspectives on instructional conversations in pre-school settings. Early Childhood Education Journa. 2012; 40: 305–14.
43. Göncü A, Gaskins S. Play and Development: Evolutionary, Socio- cultural, and Functional Perspectives. 2007.
44. Gordon, Gwen. What is play? In search of a definition. In from children to red hatters. Diverse Images and Issues of Play, Play and Culture Studies. 2009; 8: 1–13.
45. Hewitt BL. Parental Perceptions of Pre-School Education in Malaysia. (Masters Thesis). 1998; Faculty of Education, Edith Cowan University, Malaysia. https://ro.ecu.edu.au/theses/974.
46. Hyder S, Bhamani S. Bloom's taxonomy (cognitive domain) in higher education settings: Reflection brief. Journal of Education and Educational Development. 2017; 3: 45-55.
47. Johansson E, Einarsdottir J, editors. Values in Early Childhood Education: Citizenship for Tomorrow. Routledge; 2017.
48. Kallery M, Psillos D. Pre-school teachers' content knowledge in Science: Their understanding of elementary science concepts and of issues raised by children's questions. International Journal of Early Years Education. 2001; 9: 165–79.
49. Kalliala M. Play culture in a changing world. Maidenhead, Berkshire, UK. Open University Press. 2007.
50. Kernan M. Play as a Context for Early Learning and Development. Dublin, Ireland. National Council for Curriculum and Assessment. 2007.
51. Keung C, Cheung A. Towards holistic supporting of play-based learning implementation in kindergartens: A mixed method study. Early Childhood Education Journal. 2019; 47: 1-14.
52. Kotsopoulos D, Makosz S, Zambrzycha J, McCarthy K. The effects of different pedagogical approaches on the learning of length measurement in kindergarten. Early Childhood Education Journal. 2015; 43: 531-9.
53. Lavrakas PJ. Encyclopedia of survey research methods. Thousand Oaks, Canada: Sage Publications. 2008.
54. Lillard AS, Lerner MD, Hopkins EJ. The impact of pretend play on children's development: A review of the evidence. Psychological Bulletin. 2013; 139: 1-34.
55. Maxwell L, Mitchell G. Effects of play equipment and loose parts on pre-school children's outdoor play behavior: An observational study and design intervention. Children, Youth and Environments. 2008; 18: 36-63.
56. McTighe J, Emberger M, Carber S. UbD and PYP: Complementary planning formats. International Schools Journal. 2008; 28: 25-32.
57. Moore D, Edwards S, Cutter-Mackenzie-Knowles A, Boyd W. Play-Based Learning in Early Childhood Education. 2014.
58. Nair Madhawa S, Yusof MN, Arumugam L. The Effects of Using the Play Method to Enhance the Mastery of

Vocabulary among Preschool Children. Procedia - Social and Behavioral Sciences. 2014.

59. Orhun N. Effects of some properties 5 grade students on the performance of mathematical problem solving. The Mathematics Education into the 21st Century Project Proceedings of the International Conference the Decidable and the Undecidable in Mathematics Education Brno, Czech Republic. Retrieved December 20, 2010 from http://math.unipa.it/~grim/21_project/21_brno03_Orhun.pdf.
60. Park Y, Yang Y. The Continuing Influence of Froebel's Kindergarten System in Current Early Childhood Education in the USA and South Korea. Asia-Pacific Journal of Research In Early Childhood Education. 2016; 10: 125-40.
61. Pezzuti L, Artistico D, Chirumbolo A, Picone L, Dowd SM. The relevance of logical thinking and cognitive style to everyday problem solving among older adults. Learning and Individual Differences. 2014; 36: 218–23.