

A COMPREHENSIVE STUDY ON THE IMPACT OF THE SCALE OF LEARNING SPACES ON HAPPINESS AND WELL-BEING OF PRESCHOOL CHILDREN *With reference to two selected cases from Colombo, Sri Lanka*

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Abstract: Childhood is concerned as the foundation of an adult. Therefore, providing of psychologically inspiring spaces for children is vital. The previous studies have been done related to happiness and well-being of preschool children, mostly focusing on the usage of colors, indoor environment quality, outdoor play spaces etc. But there is very limited evidence for studying the inter-connection between the scale of learning spaces and happiness and well-being of preschool children. Considering the research gap in the context of architectural design, this study was first of its kind to investigate the impact of scale of learning spaces, on the happiness and well-being (i.e., In related to PERMA profiler) of preschool children. Mosaic approach from Professor Allison Clerk was used to collect data for the research. Results revealed that large scale learning spaces generates high levels of PERMA profiler than small scale learning spaces. Large scale learning spaces support in generating engagement (79.3%), relationships (78.2%) and accomplished (74.3%) components in related to PERMA profiler. Small scale learning spaces aid in generating positive emotion (79.3%) and meaning (65.3%) components when considered in related to PERMA profiler. The recommendations provided based on the findings can be utilized to design future preschool learning spaces that promote high levels of happiness and well-being in preschool children.

Keywords: *Scale of learning spaces, scale, happiness and well-being, preschool children, preschool design.*

1.1 Introduction

Human health, happiness and their psychological functions are impacted by Architecture. There are research evidences to prove that, state of good health and happiness are influenced by the elements such as lighting, acoustics, color, texture and geometry of surrounding built environment. (St-Jean et al., 2022). "Childhood" is an important age where a built environment can impact positively or negatively on their development, psychological state, expression, or feeling. With periodical development of a child since the birth, the spatial recognition and perceptual abilities develop accordingly. Child perceives the built environment in a different way to how an adult would experience (Scott, 2010). This statement can be easily proved, due to the scale of their bodies are totally different when considering in related with the surrounding, as well as their eye levels. This study is to identify the perception of architectural scale of learning environments of preschool age children, and its impact on their happiness and well-being.

1.2 ISSUES AND JUSTIFICATION

In the current situation, spaces for children are designed and built by adults, which the perception of the children towards the built environment and their psychology is not much considered. Jean Piaget was a Swiss psychologist well known for his works on child development. He invented the "Theory of cognitive development" which describes how children adapt to their tangible and intangible environments where they live. But there cannot be seen a direct connection between child psychology and architecture. To fill this gap, architects like Christopher Day and Mark Dudek have studied how children perceive the built environment (Day & Midbjer, 2007). As further stated by Day and Midbjer (2007), adult's experiences are focused on 'how to use the space' and they know what they are for. For children, it is more about what places "say"; how they meet and especially, how they experience them.

1.3 AIMS AND OBJECTIVES OF THE STUDY

The main purpose of this study is to contribute to the understanding of the impact of scale of learning spaces on the happiness and well-being of preschool children, along with particular concerns on the elements related to PERMA model. The main focus on the factor 'scale' is considered as it is observed totally different by and adult and a child due to their eye levels as well as their differently developed psychological levels.

1.4 METHODOLOGY

In this study, child acts as an active participant in providing responses for data collection process. Children's responses can enrich adults' understanding of 'how children experience educational settings and their sense of well-being in these environments. (Lundqvist, 2014).

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The main methodological approach used in this research study is the mosaic approach from Professor Allison Clerk, which was introduced in 2011 (says, 2015) . The gathered data was then applied in the PERMA model to be analyzed with the intention of generating graphs and emerging to the conclusions.

1.5 SCOPES AND LIMITATIONS

When considering the independent variable, it is the scale. The study was done with reference to the scale without examining the effects generated due to the colors, form, textures etc. Ceiling heights, distances to several spaces from a selected point, sizes and positioning of openings, spaciousness, distance to the teacher and mutual visibility, accessible heights for the children, lengths and widths of room dimensions have been considered to study the scale of learning environments. Climatic and contextual conditions are appraised as non-varied as the two cases are from the same district.

When considering 'happiness and well-being of children', high attention is given to the results and investigations incorporated with the PERMA model, as it is a standard model of measuring happiness and well-being of people.

1.6 RESEARCH CONTRIBUTION

There are several previous research studies that have been done to investigate the impact on the child's psychology when considering the textures, colors, volumes, nature of play spaces etc. But such proper studies have not been done to identify the impact of scale of learning spaces on the happiness and well-being of preschool children. The study would fill this research gap.

2.1 Literature review

A child is the person under the age of 18 according to UNICEF (United Nations Children's Fund). Also, there are some other definitions given by psychologists like Sigmund Freud (1856-1939), Erick H. Erickson (1902-1994), and Jean Piaget (1896-1980). Piaget and others have clearly demonstrated that a child's development is directly linked to its ability to interact with its environment. Children develop an understanding of themselves through their interactions with events and materials outside themselves.

2.2 PARAMETERS OF AN ARCHITECTURAL SPACE

There are different parameters of any architectural spaces that can be studied as independent variables of a study. In general, the space enclosed by the built mass defines the respective function and form of any given building. (Maheshwari et al., 2019). According to the *figure 1*, it describes overall parameters that are engaged in generating sense of place in an architectural space. But specifically the 'scale' component would be studied in order to obtain final findings of this research study.

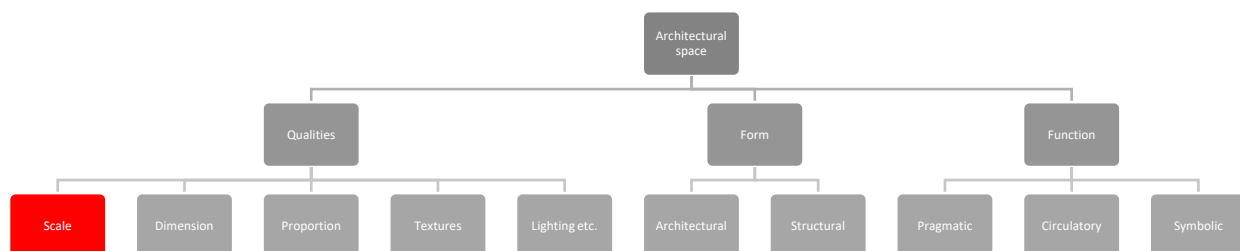


Figure 1: Diagram of parameters of architectural space
Source – (Maheshwari et al. (2019)

2.3 SCALE

Scale in architecture refers to dimensions or ratios that are in relation with architectural elements along with being in harmony with human body geometry (Kothari, 2021). As further stated by Kothari (2021), scale also can be considered as a natural tendency of humans to look at things in relation to their dimensions. There are explored methods in related to the change of behavior of people in different scales of architectural settings (Li & Lyu, 2015). Children and adults have many different interactions with their surrounding environment when considered of spatial knowledge acquisition, navigation, and decision-making (Bell, 2002).

2.4 CHILD'S PERCEPTION ON SCALE

There are findings with proven evidences that ceiling height or wall color has relation to higher levels of cooperative behavior among pre-school children; aligning with the experiments done with children (Abbas et al., 2012). Research has shown that both the size of the school and the size of the classroom has a significant impact on social interaction and academic outcomes (Altenmüller-Lewis, 2011). In the opinion of above explained studies and theoretical evidences, there is proven knowledge which supports that the child perceives the spaces in a rather different way how an adult would.

2.5 HAPPINESS AND WELL-BEING OF CHILDREN

The creation of a loving environment, which is conducive to good feelings and security, is essential in these early years. Preschoolers do best when they are in the company of caring adults, stimulating activities, and chances for socialization. Their well-being depends largely on play, exploration and discovery to support social, emotional or cognitive development as further explains in *figure 2*. (Shoshani & Slone, 2017)

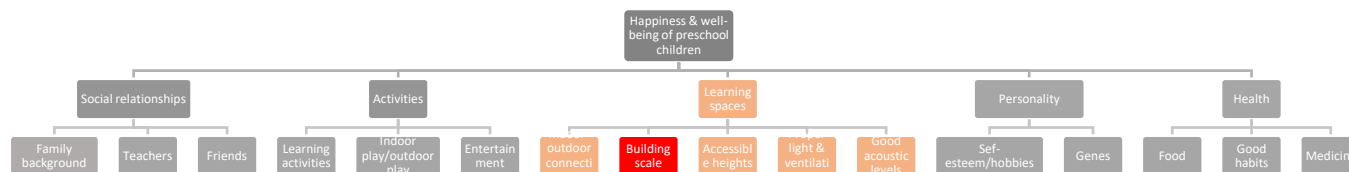


Figure 2: diagram of the factors of generating children's well-being

Source : Shoshani & Slone (2017)

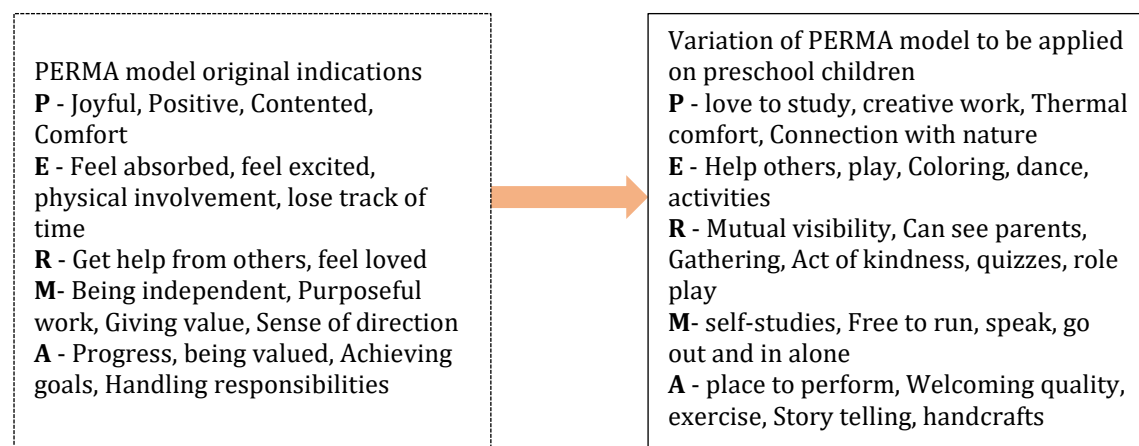
2.6 THE PERMA MODEL OF SELIGMAN

Dr. Seligman's PERMA theory of well-being is an attempt to define happiness and well-being of people. The five PERMA parameters (Kern, 2016) are: positive emotion, engagement, relationships, meaning, accomplishment. There are several research studies that have been conducted by applying the PERMA model for data analyzing. In such cases, variations of PERMA parameters have been considered according to the specific user types, building types etc.

Eg:

- PERMA Happiness Model and its Impact In Successful Interior Design of Jordanian Restaurants(Hussein & Ansari, 2019) – In this specific research, PERMA has been incorporated in enhancing the user experiences in Jordanian restaurants in related to the field of Architecture.
- Converting PERMA happiness theory into interior architectural design missions(Stevens et al., 2014)
- In this study, incorporation of PERMA model has been done to identify elders' needs and to emerge with solutions for interior architectural interventions.

By considering such previously done researches, the parameters of the PERMA profilers have been modified to suit with the special user category 'preschool children'



The Happy Face Scale, which is a tool that allows the assessment of children's emotional state by means of their face expressions, is commonly applied in research related to children(Kern, 2016). It allows young participants to express their emotions in a non-verbal way by means of different smiling and sad faces.

3.1 Research design

The selected two case studies are from Colombo District. The location of the case study one is Kaduwela. Though there were 44 students at the case study one, 30 of them were taken to do the research who were above 3 years of old in age. The location of case study two is Rathmalana, Colombo. There were 30 students above the age of 3 years and all of them participated in the research. Case study one preschool is conducted in a Buddhist cultural background while the case study two preschool is conducted in a Christianity cultural background. The main attention is given to the learning spaces or the classroom areas of each case studies to understand the happiness levels and well-being of children in the learning environment in related to its scale

3.2 VARIABLES OF STUDY

The dependent variable is 'happiness and well-being of children'. To identify this, mosaic approach was used. The Independent variable is 'scale of the learning spaces'. Measurements taken from the building, studying of plan and layout arrangements, photographic study and study of the virtual model of the building were done for the scale studies.

3.3 SELECTION OF SAMPLES AND ACTIVITIES TO BE EXECUTED

The selection of samples is based on the dependent variable. There are 2 to 5 years old children in these preschools. As the spatial cognition skills are gained at the age of 3, the selected sample of children are from 3 to 5 years old. There were 30 children considered in each case studies for the research data collection.

3.4 TYPES OF RESEARCH METHODS

There are two types of research methods used for the study. The first one is the research framework and investigator's methodology. The second one is the Mosaic approach. The research framework has been converted into a questionnaire to use it on the Mosaic approach. The study is a synthesized analysis. The program of the methodology is given below.

3.5 RESEARCH FRAMEWORK

Table 1: Research framework

Elements of PERMA model of happiness	Experiential aspects
P – Positive emotion - Joyful - Positive - Contented - Comfort	1. Children love to study here
	2. Tend to do more creative work
	3. Thermal comfort
	4. Can see outdoor trees and sky when seated/standing(connection with nature)
	5. Can display their creations
E – Engagement - Feel absorbed - Feel excited - Physical involvement - lose track of time	6. Help others/ push others
	7. Love to play
	8. Coloring is promoted
	9. Can dance here – space is enough
	10. Space can be converted to do sports activities, run, play, listen to music etc.
R – Relationships - Get help from others - Feel loved - Teachers, friends, parents	11. Mutual visibility among teachers and children
	12. Can see parents waiting for them
	13. Gathering areas
	14. Act of kindness – animals, plants
	15. Can arrange quizzes, role play
M – Meaning - Being independent - Purposeful work - Giving value - Sense of direction	16. Space to do self-studies and read
	17. Free to run & play alone
	18. Can speak with all the others
	19. Can use the utensils and equipment alone – are they at their reachable height
	20. Can go out and in alone – are the door knobs and handles at their heights
A – Accomplished - Progress - Being valued - Achieving goals - Handling responsibilities	21. There is a place to perform
	22. Welcoming quality
	23. Can do exercise
	24. Story telling is promoted
	25. Origami work/ handcrafts, using for & spoon etc. can be done easily without any help – easy accessibility of materials and utensils

Source - Butler & Kern (2016)

3.6 MOSAIC APPROACH

Mosaic approach is a multi-method model invented by Professor Alison Clark. The method includes a seven types of methodological pieces.

Table 2: Transformation of mosaic approach

Elements of mosaic approach	How to transform in gathering spatial scale related data
Photographic study	Photos were taken of the selected places. One set of photos in an adult's eye level. Other set of photos were taken from the child's eye level. Then those were compared to identify how differently a child would perceive a space in related to their scale. These analyzed data was incorporated with the questionnaire survey results.
Observation	Observation to identify how children do activities in the selected places and how happy they look like in those spaces.
Interviews with children	Directly giving a questionnaire that relates to the spatial scale and the happiness level of the child
Interviews with teachers	Directly giving a questionnaire that relates to the spatial scale and the happiness level of the child
Mind mapping	Child were asked to draw things what makes them happy in the selected places. (e.g.-: things make you happy in your class room etc.) The drawn features were analyzed according to the spatial scale.
Tours	Child was asked to take a tour in a selected place and stop in most favorite 3 places. So, the investigator asked what makes the selected spot a happier place and noted down to be analyzed later, in related to spatial scale.
Magic carpet	Children were shown 3D views of exact scale 3D views of the selected place and their responses were gathered. Then the same space with different scales were shown to the children as 3D views via Virtual reality box (<i>figure 3</i>) and gathered responses separately. (Smiley faces scale)



Figure 3: Children participating in the magic carpet session using the VR box

Source: Author

3.7 DATA COLLECTION PROCESS

Site visits were done to the two separate cases with the refinements added to the data collecting process, by the responses gained at the pilot study. On initial days capturing photographs, observation of the children, taking measurements of the building and talking with the teachers took place. Collecting data (*figure 4*) from children were done at the further visits.

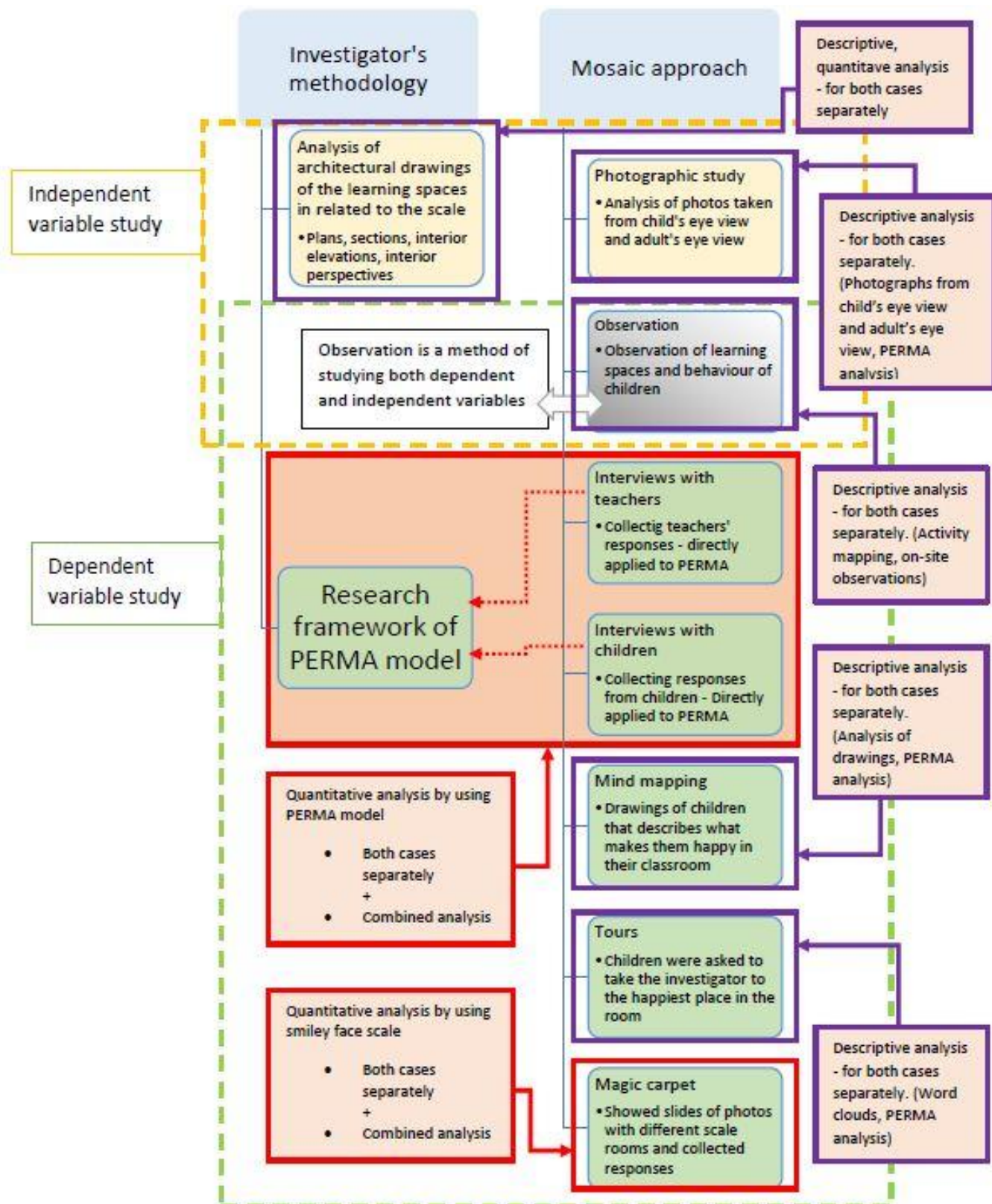


Figure 4: Descriptive diagram of data collection process
Source: Author

3.8 CASE STUDY 1

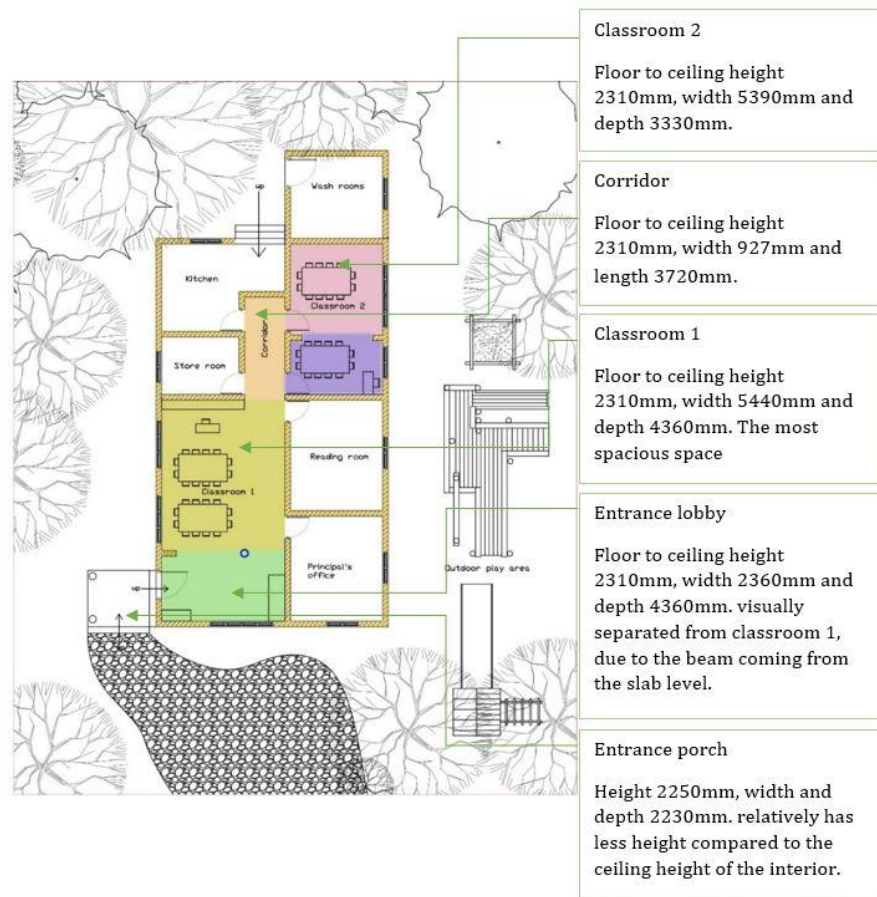


Figure 5: Floor plan of case study 1



Figures 6,7,8 & 9: Images of Case study 1

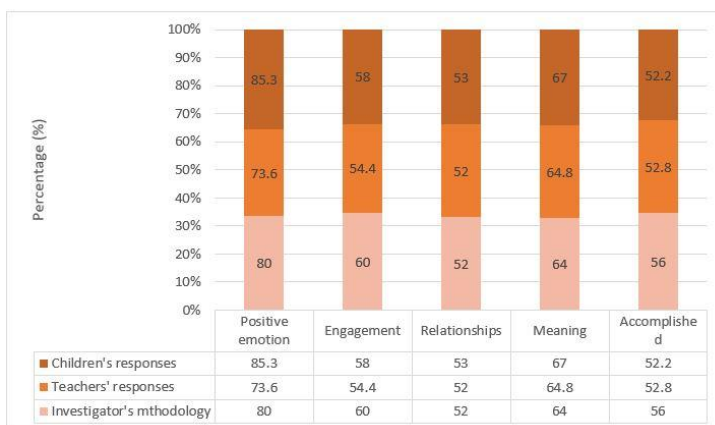


Figure 10: Analysis chart for case study 1

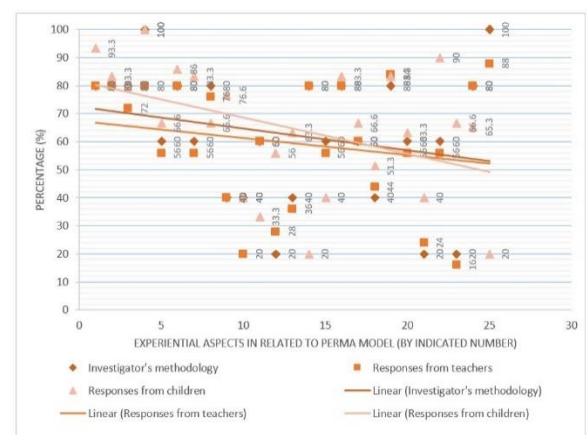


Figure 11: Scatter plot chart for case study 1

Discussion

- Positive emotion has been received the highest percentage rates in all three investigation types, which 80%, 73.6% and 85.3% by considering the investigator's methodology, teachers' responses and responses from children respectively. Overall mean percentage value for the positive emotion is, 79.6%.
- Least percentage values are gained from the relationships component in the PERMA model. The percentage values are 52%, 52% and 53% when considering the investigators methodology, responses from teachers and responses from children respectively. Overall mean percentage value for relationships component is, 52.3%.
- Hierarchy of the components of PERMA model according to the above analysis:
Positive emotion > meaning > engagement > accomplished > relationships
- When considering the scatter plots distribution (*Figure 11*) and the trend lines of the data gathered from case study one, the trend is towards the positive emotion component.
- Final conclusion from the above data analysis is, small scale learning spaces support in generating positive emotions and meaning, when considering the happiness and well-being of preschool children.

3.9 CASE STUDY 2

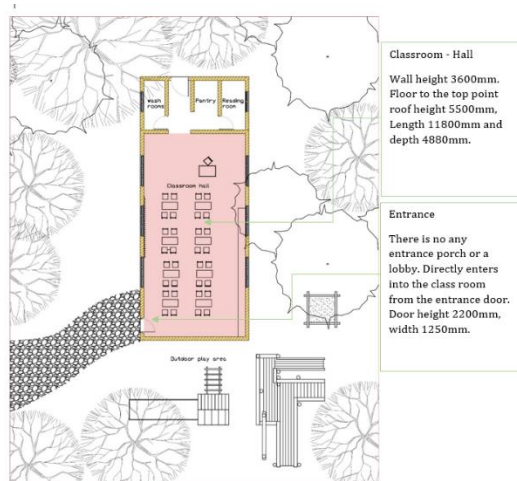
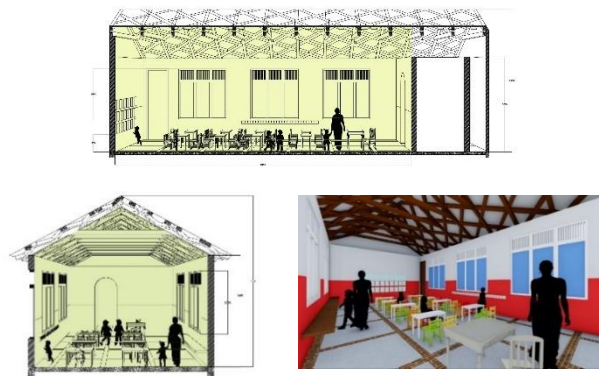


Figure 12: Floor plan for case study 2



Figures 13,14,15 & 16: Images of case study 2

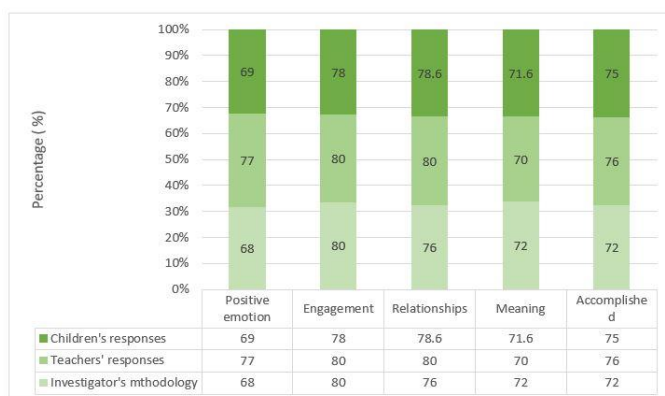


Figure 17: Analysis chart for case study 2

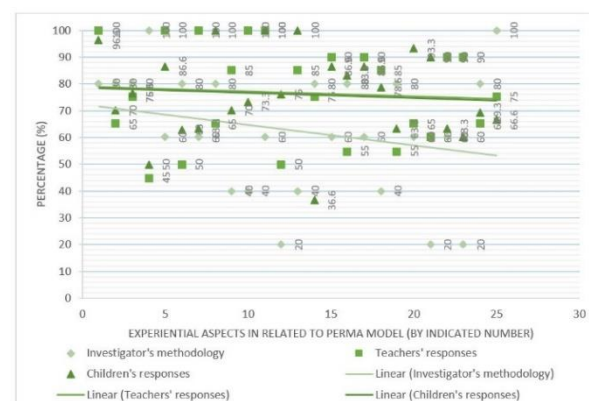


Figure 18: Scatter plot chart for case study 2

Discussion

- Engagement component has been received the highest percentage rates in all three investigation types, which 80%, 80% and 78% by considering the investigator's methodology, teachers' responses and responses from children respectively. Overall mean percentage value for the engagement is, 79.3%.
- Least percentage values are gained from the meaning component in the PERMA model. The percentage values are 72%, 70% and 71.6% when considering the investigators methodology, responses from teachers and responses from children respectively. Overall mean percentage value for meaning component is, 71.2%.
- The significance of the difference between the percentage values of meaning and positive emotion is very less, it is 0.1%, which means both meaning and positive emotions have been gained mostly the equal lowest percentage values.

- Hierarchy of the components of PERMA model according to the above analysis: Engagement > Relationships > Accomplished > Positive emotion > Meaning
- When considering the scatter plots distribution (*figure18*) and the trend lines of the data gathered from case study two, overall equally distribution can be seen. Trend lines of the responses from teachers' and children falls on to one on one.
- Final conclusion from the above data analysis is, large scale learning spaces support in engagement and enhancing relationships, when considering the happiness and well-being of preschool children.

3.10 COMBINED ANALYSIS FOR BOTH CASES



Figure 19: Combined analysis chart for both cases

Discussion

- When considering the responses gained from the both two cases, highest PERMA profiler values are generated at the case study two. Case study one has been received less PERMA profile when compared with each other.
- Comparatively highest amount of happiness and well-being levels are generated by the case study two, which represents large scale learning spaces.
- Large scale learning spaces are beneficial in enhancing engagement and relationships.
- Comparatively less amount of happiness and well-being levels are generated by the case study one, which represents small scale learning spaces.
- Small scale learning spaces are beneficial in generating positive emotions and meaning.

4.1 Conclusions and recommendations

This study was the first to investigate about the impact on the scale of learning spaces on the happiness and well-being of children by utilizing two different case studies in Colombo, by using the mosaic approach methodology and analyzing the received results with the PERMA model.

- This study demonstrated findings on how different types of elements extracted from the PERMA model are generated by different scales in the learning spaces of preschools.
- According to the research findings and further analysis, children tend to be happier in large scale learning spaces. In according to the PERMA model analysis, small scale spaces are beneficial in creating spaces that enhance positive emotion and meaning in terms of happiness. Larger scale learning spaces promotes engagement, relationships and accomplished components when considering happiness levels.

Significant findings:

- Large scale learning spaces intensify engagement, relationships and enhance accomplishment.
- Small scale learning spaces strengthen positive emotion and meaning.

Preschool children learn by active play (Neill, 1982), the reason large scale spaces are considered to be generating higher levels of happiness and well-being are aligned with this study as well. The necessity for having a large central zone in the kindergarten, which promotes relations and meetings development, group interaction, conversations and social relations, is identified and justified from the studies done by Jamal & Maria, (2016) are also aligns with the results gained from this study which elaborates along with large scale learning spaces. Importance of intimate spaces for doing crafting and reading has been elaborated in (Dudek, 2005), reflects the results gained from this study in related to small scale learning spaces.

Importantly at the moment, these guidelines are for preschools from Colombo district only, as the study has been implemented in Colombo district. The highest number on enrollment for preschool programs are recorded from Colombo

district, therefore these guidelines are to be beneficial for most of the preschool children in the country. There can be future studies done incorporating other districts as well to strengthen the recommendations to be applied nationwide.

Table 3: Recommendations

Space / building element	guidelines
Classroom space	Learning spaces need to have good volume. High ceiling levels are preferred. Promoted cross ventilation and enough lighting should be there. There should be much space around the desks that promotes child to walk around without any obstacles. Partitioning walls or panels are not recommended which blocks the mutual visibility among teachers and children. But partitioning panels used for reducing sounds or sound proofing can be recommended.
Windows	Window sill height should be below the eye level of children. Windows can be designed as seating spaces, that children can spend more time around them. Opening size should allow child to see outside, allowing enough light and ventilation into the learning space. Distance to the seating space of the child to the window should be reasonable and it is much better if the child can see outside even seated on a chair.
Art wall/ displaying crafts	Displayed crafts need to be seen at the eye level of the child. Arts placing at the top level of the wall is not recommended.
Bag hanging hooks/shelves	Need to be at the reachable heights of the children, without asking help from elders.
Performing space/gathering	The classroom itself should be able to use as a performing space or a gathering area, therefore enough space should be there.
Reading area	Kind of a 'reading corner' is recommended. Small scale intimate spaces are recommended.
Crafting area	Small scale, intimate, but well-lit spaces are recommended.

This study provides an initiation to the research area on the impact of scale of learning spaces on happiness and well-being of preschool children. However, future studies can investigate this further with proper sequences to find out comprehensive patterns and connections of variables, in order to achieve the best possible findings with the usage of statistical softwares etc.

5. References

- Abbas, M. Y., Othman, M., & Rahman, P. Z. M. A. (2012). Pre-school Classroom Environment: Significant upon Childrens' Play Behaviour? *Procedia - Social and Behavioral Sciences*, 49, 47–65. <https://doi.org/10.1016/j.sbspro.2012.07.005>
- Altenmüller-Lewis, U. (2011). Does size matter?"Considering the importance of size and scale in educational environments. *ARCC Conference Repository*. <https://doi.org/10.17831/rep:arcc%y315>
- [https://doi.org/10.1016/S0749-3797\(02\)00655-4](https://doi.org/10.1016/S0749-3797(02)00655-4)
- Bell, S. (2002). SPATIAL COGNITION AND SCALE: A CHILD'S PERSPECTIVE. *Journal of Environmental Psychology*, 22(1–2), 9–27. <https://doi.org/10.1006/jevp.2002.0250>
- Butler, J., & Kern, M. L. (2016). The PERMA-Profilier: A brief multidimensional measure of flourishing. *International Journal of Wellbeing*, 6(3), Article 3. <https://doi.org/10.5502/ijw.v6i3.526>
- https://www.academia.edu/83087306/An_Analysis_of_Primary_School_Aged_Children_s_Drawings_and_Their_Play_Area_Preferences
- Clark, A., & Moss, P. (2011). *Listening To Young Children: The Mosaic Approach (2nd ed.)*. National Children's Bureau. <http://resources.ncb.org.uk/resources/publications/view-publication?PubID=728>
- David, T. G., & Weinstein, C. S. (2013). *Spaces for Children: The Built Environment and Child Development*. Springer Science & Business Media.
- Day, C., & Midbjer, A. (2007). *Environment and Children*. Routledge.
- Dudek, M. (Ed.). (2005). *Children's spaces*. Architectural Press.
- Fuchs, E., Litvinova, N. P., Rittelmeyer, C., & Shepherd, R. (n.d.). *Beautiful Schools. The Role of Human Scale Architecture in Creating an Appropriate Learning Environment for Schools*.

- Hussein, M., & Ansari, M. (2019). *PERMA HAPPINESS MODEL AND ITS IMPACT IN SUCCESSFUL INTERIOR DESIGN PERMA Happiness Model and its Impact In Successful Interior Design of Jordanian Restaurants*.
- Jamal, M., & Maria, M. (2016). THE CONCEPT OF ARCHITECTURAL ENVIRONMENT IN EDUCATION OF PRESCHOOL CHILDREN. *Innovative Project*, 1(3), Article 3. <https://doi.org/10.17673/IP.2016.1.03.15>
- Kellett, D. (2017). *Perceptive Being*. <http://researcharchive.vuw.ac.nz/handle/10063/6786>
- Kern, P. (2016). *The PERMA-Profiler 101416*.
- Kothari, D. (2021, October 6). The psychology behind scale in architecture. *RTF | Rethinking The Future*. <https://www.re-thinkingthefuture.com/architectural-community/a5412-the-psychology-behind-scale-in-architecture/>
- Li, Z., & Lyu, D. (2015). *Study of the Architectural Spatial Scale based on Ergonomics*. 425–430. <https://doi.org/10.2991/emcs-15.2015.88>
- Lundqvist, J. (2014). A Review of Research in Educational Settings Involving Children's Responses. *Child Indicators Research*, 7(4), 751–768. <https://doi.org/10.1007/s12187-014-9253-7>
- Maheshwari, N., Srivastava, S., & Rajan, K. (2019). Development of an Indoor Space Semantic Model and Its Implementation as an IndoorGML Extension. *ISPRS International Journal of Geo-Information*, 8, 333. <https://doi.org/10.3390/ijgi8080333>
- Neill, S. R. St. J. (1982). Preschool Design and Child Behaviour. *Journal of Child Psychology and Psychiatry*, 23(3), 309–318. <https://doi.org/10.1111/j.1469-7610.1982.tb00075.x>
- Petermans, A., & Nuyts, E. (2016). (PDF) *Happiness in place and space: Exploring the contribution of architecture and interior architecture to happiness*. https://www.researchgate.net/publication/308793452_Happiness_in_place_and_space_Exploring_the_contribution_of_architecture_and_interior_architecture_to_happiness
- Ross, E. (2020). Journal of Human Behavior in the Social Environment ISSN: (Print) ("What we see and what we hear:" Combining children's drawings with child and educator interviews to assess child well-being in Child Support Grant (CSG) beneficiaries in South Africa. *Journal of Human Behavior in the Social Environment*. <https://doi.org/10.1080/10911359.2020.1822253>
- says, U.-T. P. R. P. (2015, November 14). The Mosaic approach according to Clark and Moss. *Dr Nicole Brown*. <https://www.nicole-brown.co.uk/the-mosaic-approach-according-to-clark-and-moss/>
- Scott, S. (2010). *Architecture for Children*. Aust Council for Ed Research.
- Shoshani, A., & Slone, M. (2017). Positive Education for Young Children: Effects of a Positive Psychology Intervention for Preschool Children on Subjective Well Being and Learning Behaviors. *Frontiers in Psychology*, 8. <https://www.frontiersin.org/articles/10.3389/fpsyg.2017.01866>
- Souza, E. (2020, October 15). *The Evolution in Understanding of Human Scales in Architecture*. ArchDaily. <https://www.archdaily.com/949316/the-evolution-in-understanding-of-human-scales-in-architecture>
- Stevens, R., Petermans, A., & Vanrie, J. (2014, October 25). *Converting happiness theory into (interior) architectural design missions Designing for subjective well---being in residential care centers*.
- St-Jean, P., Clark, O. G., & Jemtrud, M. (2022). A review of the effects of architectural stimuli on human psychology and physiology. *Building and Environment*, 219, 109182. <https://doi.org/10.1016/j.buildenv.2022.109182>
- Świt-Jankowska, B. (2017). Historia żółtej cizemki – architectural space seen through the child's eye. *Images. The International Journal of European Film, Performing Arts and Audiovisual Communication*, 22(31), Article 31. <https://doi.org/10.14746/i.2017.31.02>
- Tan, P. (2019). Listening to Young Children: A Mosaic approach. *SFU Educational Review*, 12, 64–78. <https://doi.org/10.21810/sfuer.v12i2.932>