Abstract

This paper presents an experiment that attempted to incorporate environment-behavior research into teaching architecture. The author was inspired by the ‘Moratuwa Experiment’; a design studio offered by Vidura Sri Nammuni at the University of Moratuwa, which employed ‘architecture as an art’ paradigm. The present experiment employs ‘architecture as place making paradigm’ and demonstrates how such an approach can incorporate environment-behavior research more meaningfully. The paper presents the salient aspects of the experiment and describes the design methodology adopted. It concludes that closer relations should be established between environment-behavior research and theories of architecture to enable social issues to become the generators of architecture.

1. Introduction

Environment behavior research emerged in response to the absence of research based humanistic data input in the practice of architecture. Despite becoming a recognized allied academic discipline, architectural practices have benefitted little from these developments (Horayankura, 2012; Fisher, 2004). Architectural education is partly responsible for this situation. Often, design studios inculcate more casual approaches to the conception of space and form. There are no officially recognized teaching practices that help students to learn to incorporate environment behavior research in architectural design. However, some educators are experimenting with possibilities. In Sri Lanka, for example, Vidura Sri Nammuni has
been advocating such a teaching practice for some time. The author, who was a student of this 'experiment' has extended this approach through an experiment in Bahrain. This paper presents the salient aspects of the design studio, the methods adopted, and the outcomes.

1.1. Environment-behavior research and teaching architecture

As is well-known, teaching architecture happens in design studios; a place far removed from the real world. Often, actual clients are not present to provide necessary information; people who would be affected by design interventions are not even known. Under these circumstances, architecture students assume, imagine, and casually interpret people's needs and expected behaviors. Although plans for architectural design interventions must arise in response to people's needs in addition to physical, environmental, contextual and functional requirements, social and cultural dimensions often lack tangible data and evidence to justify the assumptions made. Moreover, theory of architecture—the discipline expected to make the students to learn to think, generate ideas and provide theory—is dominated by articulations of celebrated architects which have often very little to do with people's behavior.

The architectural practices are not better either. There, despite claiming to deal with social issues through architecture, most practicing architects’ interpretations of social dimensions of space do not even acknowledge the need to relate to real people. For example, Bates, who is the Design Director for LAB Architecture Studio which won the international competition for the design of Federation Square in Melbourne writes “it is our belief as architects that the social dimension of space lies in its ability to be materialized and conceptualized by means of new and evermore speculative spatial orderings” (2013) (italics mine).

On the contrary, there is ample literature that articulates the relationships between architecture and human behavior (Lang, 1974; Proshansky, 1976). It was almost fifty years ago that Goffman (1963) Broady (1966) and Hall (1966) drew attention to the multi-faceted social dimensions of architecture. Canter (1974) wrote extensively to introduce psychology to architects. More importantly, Rapoport established the relations between house form and culture (1969) and has since been consistently showing how environment behavior research is so relevant to architecture. Alexander (1977, 1979) has articulated ways of producing architecture in response to social needs through pattern language. More recently, Hillier et.al. (1984), Shah et.al. (2007) and Lockton (2011) among many others have pointed out ways and means of producing research, and work-out methods that may be adopted in engaging environment behavior research into architecture. Among those who have addressed this issue, both theoretically and practically, Alexander (1977, 1979) Hertzberger (1991) and Nammuni (1991a) are noteworthy, as they represent three different approaches. Other practices such as Supports and Infill (Habraken, 1972), and Participatory Design (Hamdi, 1992) developed within the field of housing are useful but have less relevance to design studio approaches outside housing.

Alexander focused on the absence of human relations fostered through architecture resulting from a lack of emotions and feelings in modern developments. He argued that this has resulted from design approaches adopted in contemporary architectural practices. Alexander (1979) pointed out that there was a ‘Timeless Way of Building’ thousands of years old, which was able to infuse human emotions into architecture in the past. He interpreted this as an outcome of architecture arising from socio-spatial patterns rooted in a community. These, he argued, can be used as a language to recreate humane places. Pattern Language (1977) proposed to use spatial patterns evolved over time in communities to create places. Alexander (1985) went even further and advocated building with people in order to address the absence of ‘sense of home’ and attachment. He re-defined the role of the architect as an architect builder. However, these approaches do not employ environment behavior research. In contrast, Hertzberger (1991) outlined an approach that allows people to personalize and ‘possess’ spaces. He brought back a
number of socially charged ideas from the real world. They relate to public-private dualities; territoriality, in-between transition spaces, dwelling, habitation, personalization and ‘place’. Hertzberger taking a phenomenological approach (Schultz, 1971) proposed to create architecture as a framework with multivalence and opportunities for personalization.

The most recent contribution to these comes from the development of digital technologies and the development of the idea now known as ‘Evidence-Based-Design’ (EBD). InformedDesign is a design tool that transforms environment behavior research into an easy-to-read, easy-to-use digital format. It’s objective is to ‘facilitate designers’ use of current, research based information as a decision making tool in the design process, thereby integrating research and practice’ (Informedesign, 2013).

1.2. The Moratuwa experiment: Seeds of the present experiment

Although not well known internationally, a teaching experiment in Sri Lanka referred to as the “Moratuwa Experiment” articulates a theory, its author claims an “Eastern Approach” (Nammuni, 1991a; 1991b; 1991c; 1991d). According to Nammuni, Eastern approaches internalize and search for insights in the solitude of mind, while Western approaches externalize and depend on quantified data. Thus, Nammuni argues that while facts are fruitful starting points in seeking solutions in fields such as architecture, solutions can only be conceived and synthesized through ‘divine’ inspirations (interpreted by Nammuni as a selfless state of being, the designer becomes at the time of designing) and intellectual articulations within the designer’s own mind. This is in contrast to Alexander’s timeless way of building, Hertzberger’s observations of the real world, Habraken’s supports or Hamdi’s participatory design. Instead, Nammuni focuses on that part of the designer’s internalized process through which the social dimensions are to be fused into the conceptions of architecture. Nammuni’s arguments have similarities with those of Hertzberger, who accepts that “how one should go about processing all this facts…is a different story” (1991; 164). Hertzberger does not elaborate on this ‘different story’ but accedes that, “to bring this variegated assortment of data to the surface, the architect has only one means at his disposal; his imagination (my italics). He must use his imagination to the full to be able to identify himself with the users and thus to understand how his design will come across to them and what they will expect from it”. In a similar interpretation, Nammuni writes that “a design process must therefore take us beyond our ego and help us transcend the boundaries of the human condition - into divinity that exists within us and without us” (1991d: 18). According to Nammuni, architecture should primarily solve “architectural problems” defined as being “socio-spatial” in nature, rather than environmental or construction problems. Nammuni adopts an attitude of causality of human behavior where specific environments evoke specific human responses that the architect can manipulate through space. However, Nammuni remains aloof to employing ‘research data’ directly. Instead, he proposes developing an empathy with the user through internalization and imagination.

2. The research

2.1. The experiment

The author was a student of this experiment before becoming an educator himself. Inspired by its process, he has offered a number of mature level design studios at the University of Bahrain in order to engage social issues as a basis for creating architecture. These studios took the position that social issues must take a priori in the creation of forms and spaces in the contemporary architectural practices. For this, we must develop design processes and teach them through formalized architectural education. To illustrate the experiment, the paper presents the approach to design adopted by one of the students at the final graduation level in 2013. The project illustrated here is the design of an Elders Home in Kerala in
India. It demanded to consider the social and psychological well-being of the elderly as the most important issue. It challenged the student to explore user’s social and psychological traits and situations as the major determinants of architecture, and therefore use environment behavior research.

2.2. Theoretical basis and the teaching approach of the design studio

The design studios were based on the position that architecture possesses a degree of therapeutic capability, which is central to its practice as a social art. This contrasts with the often acknowledged communicative ability architecture possesses, which treats buildings as objects of representation and focuses more on the ‘things’. The design approach took the position that ‘architecture is an act of ‘enabling places’ and that the architect must focus upon place as well as space. The ‘creation and experience of place’ is an outcome of people space transactions. It creates profound psychological ambiances that in turn influence their actions. As Hertzberger (1991) argues, it should offer opportunities to personalize, possess and to dwell. Specific spaces must also produce possibilities for appropriate contextual conceptualizations that facilitate respective human actions. It was argued that affordances are not only tangible physical frameworks but also ‘atmospheres’ that either promote or hinder certain human actions. Alexander’s patterns in this sense, are physical frameworks which ensure culturally compatible, already tested spatial arrangements. They can be immediately employed; provided the necessary psychological conceptualizations can be also produced through them. However, neither Alexander nor Hertzberger deals with the specific situations of the people although Nammuni to some extent allows those situations to be part of the interpretations.

Thus in a given design project, the expected inhabitants should be provided with physical affordances, atmospheres and possibilities for psychological conceptualizations. That will enable them to engage in the actions that are expected. While the ‘things’ need to be organized, it is the qualities of ‘no-things’ or the spaces, the conceptualizations and atmospheres that are to be centrally articulated for a given situation posed by a project. Hence, the primary conceptual approach is to be generated more from an understanding of the psychological situation of the dwellers whose deep-seated profound and recurring psychological needs must be intervened though space. In order to do so, an understanding of the distinctions between space and place was developed. If spaces become places, then the process of ‘becoming’ must be well understood. Architects often consider space as their end-product, and do not recognize and articulate how they may or may not become places. The approach in this experiment argued that spaces must be conceptualized as potential places to facilitate such becoming. It is true that spaces become places through the involvement of the dwellers, but this transformation cannot happen unless, spaces themselves are created as potential places.

2.3. Architecture as enabling places

The design process was thus based on the idea that ‘architecture is a place-enabling act’. It posits that architects create spaces with the expectation that they become places once they are lived in and occupied. Becoming places requires people to inhabit, experience and absorb spaces (potential places) into the system of places they already have in their minds. Spaces and places generated produce emotions and feelings which prompt behaviors, which can therefore be pre imagined. Following theoretical assertions derived from research would help understand this framework.
Our behavior is emotion-driven and places influence those emotions (Russel and Snodgrass, 1987). Different sensory experiences of a place are intertwined and combine to create a common mood (Augustin, 2009). If a place provides psychologically contradictory experiences, the feelings of that space will be determined by the relative balance of the conflicting senses, more weight being given to an individual’s dominant sense (Augustine, 2009). Places have behavior rules and rituals associated with them. People follow them intuitively and architects can render them in space. People obtain behavioral cues from the other people in space and follow them. A systematic design approach can articulate these through design, and help conceptualize potential places. Following design approach which lists the specific steps followed, enables the identification of the quality of atmosphere and the way the places may be conceptualized.

![Diagram](https://via.placeholder.com/150)

Fig. 1. The design sequence

2.4. A student project: An illustration of the approach and its outcomes

The design of an Elders Home, it was conceptualized, requires that physical, social and psychological well being of the elderly be considered as the most important issue. In other words, the user’s social and psychological traits and situations were treated as the major determinants of architecture. Ramani Pedris
(not her real name but the first letters correspond to the real name), the student whose graduation project it was, (for convenience, this paper will refer to the student as RP hereinafter), and the author who was her supervisor, began the process by scanning the environment behavior research literature to compile available research data. This was made easier by the availability of the database informedesign among other sources. The research showed that data available were related to two different aspects; general character and conditions of an elder’s housing, and specific data that recommended place specific outcomes. Two tables were produced which initially listed these data, along with their sources. By analyzing the data subsequently, a list was prepared that suggested how the data could be translated into strategies to create potential places.

Table 1. Environment-Behaviour data to determine an appropriate surrounding

| Data                                                                 | Source                                                                                                                                  | Strategy to translate into Places                                                                 |
|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| While poor housing conditions increase cognitive decline, good housing conditions do not impair cognitive abilities in older adults. | Russell N. James, III and Anne L. Sweeney (2010) House Dissatisfaction and Cognitive Decline in Older Adults, Journal of Housing for the Elderly, Vol. 24-1 pp 93-106 | Create good physical characteristics. Design well-built, spacious houses, with pleasant rooms and outdoors to ensure good housing conditions. |
| The quality of Neighbourhood Open Spaces (NOS) was associated with subjects’ life satisfaction and time spent walking. Pleasantness, safety and distance to NOS influenced happiness. | Takemi Sugiyama, et.al. (2009) Associations Between Neighborhood Open Space Attributes and Quality of Life for Older People in Britain, Environment and Behavior, Sage publications. | Create a quality atmosphere outdoors with well-laid out gardens, trees and paths. Provide houses at close proximity with privacy to provide an impression of a quality surrounding. |
| Subjects who had a pleasant and safe NOS within walking distance were more likely to indicate life satisfaction than those who do not. | Takemi Sugiyama, et.al. (2009) Associations Between Neighborhood Open Space Attributes and Quality of Life for Older People in Britain, Environment and Behavior, Sage publications. | Create pleasant walkways and shaded places to sit around and linger in order to help appreciate the quality of the surrounding atmosphere. |
| All NOS attributes (pleasantness, nuisance, quality of paths, etc) were associated with health. Nuisance in NOS (e.g., annoyance from dogs, young people) also affected health. | Takemi Sugiyama, et.al. (2009) Associations Between Neighborhood Open Space Attributes and Quality of Life for Older People in Britain, Environment and Behavior, Sage publications. | Create places devoid of nuisance, such as dogs, young noisy crowds. Create quiet but interesting places where elderly can find safety and peacefulness. |
| People with access to good paths to NOS were high-level walkers indicating the quality of the walking paths may influence walking among older adults more than their presence alone. | Takemi Sugiyama, et.al. (2009) Associations Between Neighborhood Open Space Attributes and Quality of Life for Older People in Britain, Environment and Behavior, Sage publications. | Create interesting walkways with visual vistas, and visually exciting views to encourage walking. Bring pleasantness to the entire elders setting. Introduce a joyful landscape. |
| Public spaces were occupied during the day, but residents in one facility sometimes sat outside their rooms when others had gone. Social relationships are important for the health and well-being of the elderly | Gill Hubbard, Susan Tester, and Murna G. Downs (2003) Meaningful Social Interactions Between Older People in Institutional Care Settings, Ageing & Society, Cambridge University Press, Volume 23, Issue 1, PP 99-114 | Create possibilities for the elderly different days at different places at least in the outdoors, so that a variety and diversity of places can be encountered. |
The data provided greater understanding of the elder’s situation, and how to direct architecture to assist their specific life situation. For example, growing old involves a general decline of sensory abilities. However, while poor housing conditions can negatively impact on decline of sensory abilities, articulating building components and spaces can help engage sensorial experiences purposely, whereby some of them could be reawakened. This suggested that strategies must be worked out in the design of spaces to engage sensory abilities, so they can be sharpened. The second table provided information on specific data related to places as perceived by the elderly. For example, research pointed out that one of the most traumatic experiences of old people was their separation from, and continued longing to, return to the places where they had lived. They also had an inability to construct attachments to new places. It also showed that, creating intimate and smaller places was more desirable. This suggested that opportunities must be made available to personalize places; particularly the private rooms. Interestingly, research showed that the residents would even personalize and claim ownership of places defined by chairs often used by them in a public dining room.

Table 2. Environment-Behaviour data to determine specific places for the elderly

| Data                                                                 | Source                                                                                           | Strategy to translate into Places                                                                 |
|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| The impact of person-environment relationships on place attachment and the meaning of home should be more fully considered | Denise Cloutier-Fisher and Jennifer Harvey (2009) Home Beyond the House: Experiences of Place in an Evolving Retirement Community | Create opportunities to facilitate and enhance attachment to the new. Create places that substitute the previous places in which they lived. |
| Most elders preferred views of natural environment. Declared ‘ownership’ of things such as a personal computer, in-room refrigerator, company of a pet, double bed, personal telephone and television, chair for self or visitors. | Lois J. et.al. (2006) Assessing and Comparing Physical Environments for Nursing Home Residents: Using New Tools for Greater Research Specificity, The Gerontologist, Gerontological Society of America, Volume: 46, Issue 1, PP 42-51. | Make large windows wherever possible and create verandas so that the elderly can relate to the Nature. |
| Innovations in renovating nursing home environments (e.g., dividing larger facilities into smaller units, each equipped with its own facilities) improved living conditions for residents (more personal space in common areas). | Lois J. et.al. (2006) Assessing and Comparing Physical Environments for Nursing Home Residents: Using New Tools for Greater Research Specificity, The Gerontologist, Gerontological Society of America, Volume: 46, Issue 1, PP 42-51. | Create personalisable places, especially in the housing units and bedrooms. Also make possibilities to personalise places in often used public areas. Create more intimate-scale personal places instead of public scale. |
| A strong sense of neighborhood may lead to improved physical and mental health, higher activity levels, and better social networks among older women. | Anne F. et.al. (2004) The Sense of Belonging to A Neighbourhood: Can It Be Measured and Is It Related to Health and Well Being in Older Women?, Social Science and Medicine, Elsevier Science Vol. 59, Issue 12 pp. 2627-2637 | Create places in the outdoors with opportunities for children to play, and opportunities for elderly to be engaged in activities or socialization. Create interactive places surrounding each house unit. Generate a sense of neighbourhood. |
| Participation in leisure activities may improve quality of life for retired and near-retired individuals | Robert O. Weagley and Eunjeong Huh (2004) Leisure Expenditures of Retired and Near-Retired Households, Journal of Leisure Research, Volume 36, Issue 1, PP 101-127. | Create as many places as possible for leisure; specially catering to the leisure the selected elders engaged in. Create smaller personal areas. |
2.5. A student's (RP) conceptual approach

RP conceptualized that in order to construct a general ambience of pleasantness, and an enchanting atmosphere, a central place must be created which will have the ability to arouse pleasant feelings. This was to be a place where the residents would have an enjoyable time, either socializing or in solitary contemplation. It was also conceptualized that this place must be accessible from all residential facilities by walking, and be a ‘place to walk-about’ as well. RP therefore imagined a small shallow pond bounded by a gently elevated earth embankment covered in grass to be in the centre of the site. Places could be defined for sitting around this place. The pond was to be created as natural as possible with a surrounding walkway from which a variety of views across the water could be created. It was imagined that the elderly residents will spend their evenings, walking or sitting down around the pond. The area was landscaped sparsely, so that it would provide adequate greenery but will not become a thick jungle. Bird nests were to be located there, together with opportunities to breed small pets in order to bring life to the place. RP then located all residential facilities around this pond in small clusters, each unit providing accommodation for four elders who could share the places and begin a new ‘family’ group (Fig 2).

The Design Outcomes

- Creating a general atmosphere; a neighbourhood of pleasantness
  - Creating a central social place
  - Creating a series of personalisable places outdoors

Fig. 2. A Conceptual sketch of the central place: a pond surrounded by a walkway
The Design Outcomes

Creating a personal places indoors, with opportunities for personalisation
Creating continuous connections with the pleasant outside.

The design program requirements were imagined as ‘potential places’ wherever possible in order to further develop this embryonic framework of places. A new program ranked the significance of their ability to create the psychological ambiences and therapeutic capabilities. Afterwards, the spaces were organized around the centre, articulating shapes and relationships as required by both the program and behavioral frameworks. The design process ascertained and refined cultural and associational meanings of the forms and their elements. For example, the design provided each room of the residential area with designed opportunities so that they could become personal places. Research showed that the residents could build emotional attachment towards such personal places. To facilitate that, the walls around the bed spaces had small niches and frames, so that the elderly could display their personal belongings. Four residents living in one house unit could come out into a small verandah which was an intimate place, which overlooked a central courtyard. It was then connected to the walkway around the central pond.

3. Conclusions

These examples show that environment behavior research could greatly facilitate the design of places for people. It also shows that such a design approach can be taught to students. However, it requires that the process of conceptualizing and detailing architectural design is perceived as a process of enabling places. RP created a variety of places specific to elders, and defended the project with specific references to their psychological needs. The design approach therefore was successful in engaging environment
behaviour research in creating architectural design. The project showed that, it had been anchored on the cultural specificities of elders in Kerala, by bringing in agricultural plots located adjacent to residences, and places for pets such as cows as part of the system of places. There were numerous small details introducing personal belongings, colours, sounds, and visual frames along with opportunities for spending a pleasant time. These contributed to enhance the declining sensorial and cognitive skills, while creating a safe and pleasant environment. The opportunities for walking and the places created for sitting around the pond encouraged physical and social activities. Overall, they contributed to increase the general well-being.

The experiment showed that the act of enabling places could be made clearer and the students can be directed easily to acquire an architecturally rich conceptual approach based on scientifically discovered research data. Despite the fact that the social and psychological aspects were taken as the determinant of architecture, RP was able to produce a project that comprised of interesting spaces and places, which every architecture student wants to be proud of as having created. In fact, it demonstrated that an architect’s creativity is not hindered in pursuing a research based approach; a common misconception that deter many architects to employ research.

The paper acknowledges that the projects needed more rigorous testing of the ideas of co-relations assumed in creating individual places. It requires more refinement about how they generate the dynamic and assuaging qualities claimed to be present in the spaces. The latter however is beyond the scope of the design studio. It requires independent research to establish relations between forms and spaces. Such information is sometimes available but the architecture students need guidance to locate such information. When located, they can apply them in design more consciously, deliberately and skillfully to address social issues. For example Lee (1976) demonstrates through an experiment, that sloping ceilings produce a more intimate spatial quality. Such information must be more widely availed to the architecture students. They need to be also taught socially conscious design approaches, if we are to pursue architecture as a meaningful social art. Such practices should satisfy architects’ creative impulses and also engage social issues to create form.

One of the most important insights gained during this experiment is that there is very little relationship between theories of architecture and environment behavior research. Phenomenology advocated by Norberg Schultz (1971) is an exception. The students could have benefitted more if the environment behavior research were linked to the phenomenological approaches to architecture which also employs place as a central idea of inquiry. This paper proposes that further research in this direction is needed, if environment behavior research is to become a guiding basis of architectural practice.

References

Alexander, C. et al. (1977). *A pattern language*. Oxford University Press.
Alexander, C. et al. (1979). *The timeless way of building*. Oxford University Press.
Alexander, C. et al. (1985). *The production of houses*. Oxford: Oxford University Press.
Augustin, S. (2009). *Place advantage, applied psychology for interior architecture*, New Jersey: Wiley.
Bates, D. (2013). *Lab architecture studio*, at http://en.wikipedia.org/wiki/Lab_Architecture_Studio accessed on 19th April 2013.
Broady, M. (1966). Social theory in architectural design in Gutman, R. (ed.), *People and buildings*. Basic Books.
Canter, D. V. (1974). *Psychology for architects*, The University of California: Applied Science.
Goffman, E. (1963). *Behavior in public places*. The Free Press.
Fisher, T. (2004). Architects behaving badly: Ignoring environmental behavior research, *Harvard Design Magazine*, 21.
Hall, E. T. (1966). *The hidden dimension*. Doubleday.
Habraken, J. (1972). *Supports: An alternative to mass housing*. London: Architectural Press.
Hamdi, N. (1992) *Housing without houses*. New York: Van Nostrand Reinhold.
Hertzberger, H. (1991). *Lessons for students in architecture*: Uitgeverij 010, Rotterdam.
Hillier, W. R. G. & Hanson, J. (1984). *The social logic of space*. Cambridge University Press.
Horayangkura, Vimolsiddhi (2012). Incorporating environment-behavior knowledge into the design process: An Elusive Challenge for Architects in the 21st Century, Proceedings of the AcE-Bs 2012 Conference on Environment-Behaviour Studies, 30-41

Informedesign (2013. The mission, in Informedesign, http://www.informedesign.org/Page.aspx?cId=179 accessed on 10th May 2013.

Lee, T. (1976). Psychology and the Environment. Britain: The Chaucer Press.

Lang, J. (1974). Designing for Human Behaviour: Architecture and the behavioural sciences. Stroudsberg: Community Development Series.

Lang, J. (1987). Creating Architectural Theory: The Role of Behavioural Sciences in Environmental Research. New York: Van Nostrand Reinhold.

Lockton, D. (2012). Design with Intent: A design pattern toolkit for environmental & social behaviour change, unpublished PhD Thesis, Brunel University, London.

Proshansky et. al. (1976). Eds. Environmental psychology. New York: Holt Reinhart and Winston.

Rapoport, A. (1969). House form and culture, Englewood cliff: Prentice Hall.

Russell, J.A. & Snodgrass, J. (1987). Emotion and the environment. In D. Stokols & I. Altman (Eds) Handbook of Environmental Psychology, 1. New York: Wiley.

Shah, R.C. & Kesan, J.P. (2007). How architecture regulates. Journal of Architectural and Planning Research, 24(4), 350-359

Sri Nammuni, V. (1991). Teaching of architectural design: A moratuwa experiment part 1 in The Sri Lanka Architect. 1007.

Sri Nammuni, V. (1991). Christopher Jones and design methodology. Teaching of architectural design: A Moratuwa experiment part 2, in The Sri Lanka Architect. 1008.

Sri Nammuni, V. (1991c). From learning to teaching architecture. Teaching of architectural design: A Moratuwa experiment part 3, in The Sri Lanka Architect. 1009.

Sri Nammuni, V. (1991d). Design teaching at moratuwa. Teaching of architectural design: A Moratuwa experiment part 4, in The Sri Lanka Architect, 100 10.

Shultz, C. (1971). Existence, space and architecture. Praeger Publishers, London.