



Typologies of Design Thinking: The Constructive Perspective

Sucharita Srirangam^{1*}, Ng Veronica¹, TamilSalvi Mari¹,
Sujatavani Gunasagaran¹ and Sivaraman Kuppusamy²

¹ School of Architecture, Building and Design, Taylor's University, Selangor, MALAYSIA.

² School of Built Environment, University of Reading Malaysia, Johor, MALAYSIA.

*Corresponding Author (Tel: +60-163683754, Email: sucharita.srirangam@taylors.edu.my).

Paper ID: 12A13E

Volume 12 Issue 13

Received 29 June 2020

Received in revised form 26
September 2021

Accepted 01 October 2021

Available online 09 October
2021

Keywords:

Architectural education;
Design thinking
learning; Student-
centred learning; Design
thinking typologies;
Critical typologies; Soft
typologies; Hard
typologies; Positivistic
typologies; In-studio
observation; Learner-led
teaching pedagogy;
Studio-based teaching;
studio process.

Abstract

Architectural design is subjective. The generic structure and content of studio-based learning are so rigid and could be boring for a creative and original learner. The research aims to offer clarity for a design studio pedagogy on various subjectivities on design thinking. First, the research explores theoretical discourses formulating a thematic summary of contemporary publications pertinent to design studio teaching and its determinants. Next was a procedure for data collection to venture an understanding of the subjectivity of designers. Case Study was the methodology, and in-studio observations and interviews were the methods employed. The final year studios of University Malaya and Taylor's have been the case studies. The findings suggested nine design thinking typologies that will be grouped, pertinent to the domain of the constructs, such as a) Positivistic or Hard typologies: b) Critical or Soft typologies: and c) Interpretative or the hard/soft typologies. The research concludes by stressing the importance of learner-led teaching pedagogy for studio-based teaching in architecture through formulating a diversified set of design thinking typologies.

Disciplinary: Architectural Education.

©2021 INT TRANS J ENG MANAG SCI TECH.

Cite This Article:

Srirangam, S., Ng, V., Mari, TS., Gunasagaran, S. and Kuppusamy, S. (2021). Typologies of Design Thinking: The Constructive Perspective. *International Transaction Journal of Engineering, Management, & Applied Sciences & Technologies*, 12(13), 12A13E, 1-11. <http://TUENGR.COM/V12/12A13E.pdf> DOI: 10.14456/ITJEMAST.2021.257

1 Introduction

Architectural design is subjective. The generic structure and content of studio-based learning are so rigid and could be boring for a creative and original learner. The research aims to offer clarity for a design studio pedagogy on various subjectivities on design thinking. The research

explores theoretical references formulating a thematic summary of contemporary publications pertinent to design studio teaching and its determinants. By prioritizing the learners at the core, the subjectivity of design thinking is brought to focus here. This research takes an explorative approach to typologies of design thinking through a couple of case studies of design studios of the final year, in University Malaya and Taylor's University. The significance of such research area) to advocate subjectivity of a designer in the studio, b) to develop a flexible teaching pedagogy that empowers the inner strength of the diversified set of learners, and c) to contribute to the idea of learner-centered teaching. The key study question is, "What is the typology of a student's thought processes in a studio environment?". The sub-research questions are as follows:

- a) What are the different viewpoints on design thinking that may be found in the current literature?
- b) Are there any design thinking typologies in a studio setting?
- c) Are there any parallels between design thinking typologies and designer constructs?

To explain, a theoretical exploration attempts to answer the first sub-research question above and then the data-collection via observations and interviews to offer light to the second and the third sub-research-questions, respectively.

2 Literature Review

Rowe's (1986) book *Design process as "episodes"* analyses the design process through an episodic framework, concentrating on a collection of characterisations of various circumstances by a designer. Furthermore, the author investigates the limits of numerous procedural models that suggest design as a linear process, as well as how normative attitudes influence design study. Two perspectives are discussed: a) a "naturalistic" view of the environment and mankind, and b) an understanding of architecture as a self-referential activity. At the risk of generalising, interpretation in the first domain tends to follow the social sciences' hypothetical-deductive method of theory development and empirical observation. The critique in the second domain of research is oriented on rhetorical realms of design composing elements and principles. As a result, when educating the aspiring architects in the studio, the concept of self and subjectivity must be brought to a conscious process. The design thinking inside a studio setting is critical in terms of the learners' subjectivity. Existing studies, research, and literature tend to understand design thinking from three perspectives, as follows:

- a) Exploration tools, which is sketches, digital media, and models
- b) The studio's teachers beliefs and personalities
- c) Studio procedures, such as curricular structure, design process, discourses, and circumstances.

2.1 Tools of Exploration

Unwin (2007) highlighted the link between illustration and acquiring insights and knowledge of possibilities through precedent analysis. The outcome concludes that the drawing role extends

over constitutes a tool of architectural production but as a powerful connector of both architecture and building. Thus, it engages an indispensable role in the processes of exploration and becoming knowledgeable about designing and producing a building when the process is inverted. Finally, Pallasmaa (2009) established the hand's nature and fundamental significance in the formation of human abilities, intellect, and conceptual capacity in his book titled the hand.

It investigates the function of hand sketching as a design tool in architecture with existential and embodied wisdom. He argued that the adaptability and affection artists have differed from physical tools to digital ones. He explained that the physical tools become an extension of hands which is seldom in digital modeling perse. Nevertheless, Pallasmaa acknowledges the importance of digital technology but stresses the importance of hand sketches and being aware of the possible impacts of the digital medium on the design process. Simon (1969), analyses the "artificial" phenomena and the role of hierarchy in understanding complexity in his studies. Simon purported that the idea of hierarchy plays a vital role through the interweaving of themes of design and psychological activity.

2.2 Teachers in the Studio

Ochsner (2000) examined studio teaching regarding psychoanalysis literature for clues to understand the creative process in a design studio and the type of interaction between the students and tutors. In his review, the author used an analogy of interaction between the analyst-patient and the student-teacher in a design studio to share some important characteristics. The author hypothesised that the studio processes that Schön emphasises the significance of a teacher's skill in a "shared play" as narrating and showing for a student's listening and imitation activities.

Teachers have a crucial role. Attoe and Mugerauer (1991) investigated the elements that contribute to good studio instruction in field research with 20 studio professors from Texas institutions. In addition, the authors extend the interviews to teachers who do not involve in studios. The study identified 14 factors for the curriculum design and that excellence in teaching is clustered three considerations: 1) the teacher as self, 2) personal style, and finally the 3) implementation of the course format. The study also reported that teachers postulated that although other factors influence the learning experience, the chemistry in any group of students was the key determinant for a satisfying semester.

2.3 Procedures by the Studio

Tepavevi (2017) conducted a critical review of current educational experiments in Architecture Schools of Australasia as a pedagogical framework for educational strategies focusing on two design thinking methods (model-based and representation-based). Rethinking paradigms for design-led research, according to the author, provides a new framework for design pedagogy that reacts to technology developments and new design thinking. Furthermore, the research noted that real-world experience in real-world projects provides a new platform for collaborative learning that emphasises maker-centered learning processes in architecture. Carmona (2016) did

exploratory research on the typologies of 'tools' of 'design governance.' This work contributes to formal and informal categories of governance tools in design. On a formal note, it focuses on guidance, incentive, and control, and introduces five categories of 'informal' design governance tools; evidence, knowledge, promotion, evaluation, and assistance. The study stressed the importance of inter-relationship of the tools rather than focusing on the utility of a single tool which has been the current trend, it revealed.

Rodgers and Winton (2010) studied three case studies utilising a mixed-method approach. Design thinking is said to be a system of three overlapping areas, namely 1; the issue or opportunity that inspires the quest for answers is referred to as an inspiration. 2) ideation - the process of coming up with, creating, and testing new ideas 3) Implementation - the journey from the design studio, lab, and factory to industry. The study suggested that the collaborative discussion drives the design outcome that cooperates towards a common set of objectives. This study also highlighted the similarities across all three of the design cases studies at various design stages and final delivery of design outcome. Brown (2009) offered assessments of design thinking concepts and methods with challenges confronting business and society today in his book titled design thinking in business and society. The author's colleagues' and other firms' and organisations' direct experiences were utilised to support his thesis. The author argues that "Design" is no longer a discrete stylistic gesture in a project perceived as a product for marketing. He criticises backward (conceptions) and forward (construction) approaches but misses the key approach in the middle where the actual design developed. The author rather offered focus to the human-centred design process and techniques such as field observations that originated to move out of the studio. It can help improve the future and the present.

In conclusion, the author concludes that the design process can be discovered mainly through practice. It is very challenging to teach well and understand design by doing it. Snodgrass & Coyne (2006), in the Design thinking as "interpreting" book, explored the nature of design concerning the advantages and role of computers in architectural education, particularly in design studios. The book explores various aspects of design and design learning. For instance, designing, design learning, conceptualising, creative nature, integration to history, assessment, ethical practice and contemporary technology. The authors explain that designing demonstrates a designer's comprehension, ability to cope with real-world situations. Thus explained, designing is disclosing the designed project and solving the designer's self-understanding (p. 257).

In summary, the literature on 'design exploration medium' highlights the options and power of a designer's investigation in the design process. The literature on 'teachers in the studio' demonstrates design thinking as an outsider's perspective and position. Finally, the literature on the 'studio methods offered the designer's environment of/in/. It may thus be argued that the literature analyses a designer's subjectivity through 'context' rather than a designer's self constructions and observation. This study aims to clarify the typologies of design thinking and the patterns of those typologies to constructions.

3 Method

The method used for this research is based on the field survey and case study, which included semi-structured interviews and observation. First, the data from all sources were analysed to achieve an exhaustive comprehension of the results. The findings are based on semi-structured interviews, observation, and mapping, used in data collection. The data from all sources were then analysed to achieve an exhaustive comprehension of the results. Furthermore, to better understand the typologies of design thinking, semi-structured interviews were used to verify data, and respondents included the experienced lecturer and educator with architectural knowledge about the research. The data collected from interviews and semi-structured questions were later screened and analysed. Finally, the data collected from the semi-structured interview were later screened and analysed.

4 Result and Discussion

Two case studies were done in the final year studios of two Malaysian universities, University University Malaya and Taylor's. Observations were gathered throughout studio operations such as lessons, internal crit, and final review sessions. Furthermore, typologies were discovered to be as stated in Figures 1 & 2 below in another article of the authors of this work on 'Typologies of design thinking - the learner-led perspectives' (Srirangam et al., 2019).

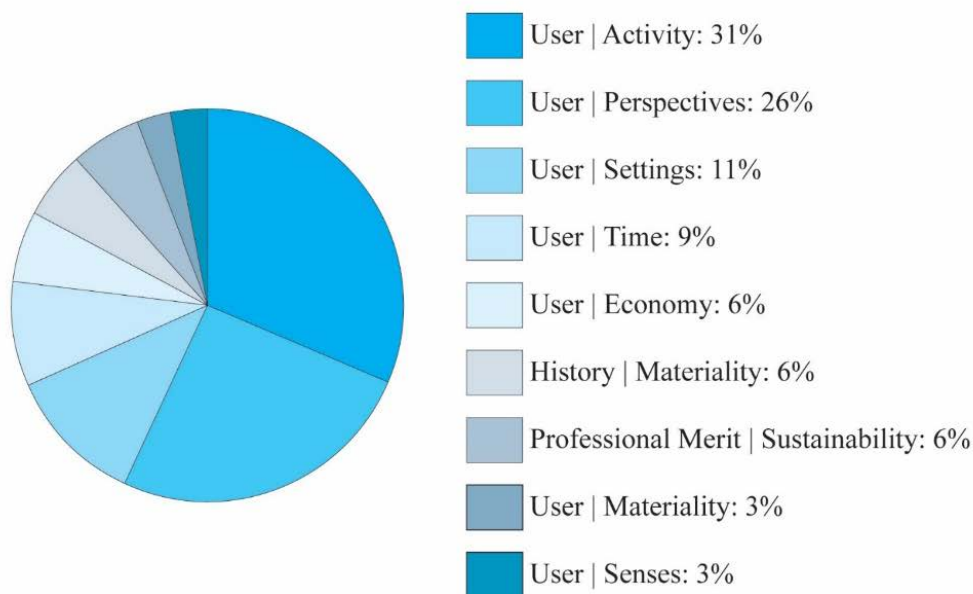
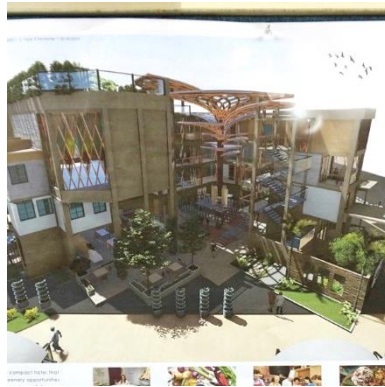


Figure 1: Limit of design thinking typologies from respondents sample

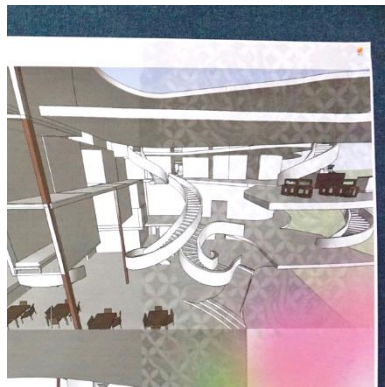
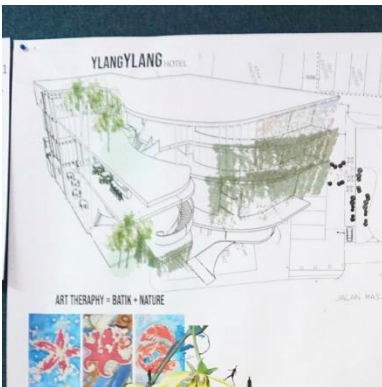
Seconded to the observation method, there was a set of interviews with students from both universities. The goal was to discover patterns between the aforementioned design thinking typologies and designer constructions.



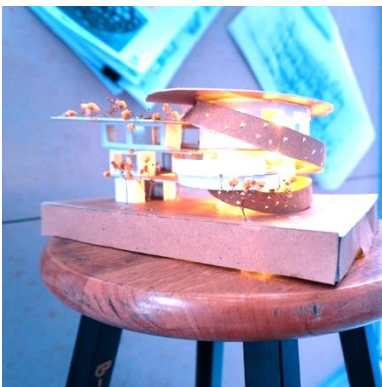
Student ID: P 11-5
Theme: User | Activity



Student ID: KB 1-2
Theme: User | Senses



Student ID: MM 1-1
Theme: Radical | Nature



Student ID: MJ 2-2
Theme: Merit | Sustainability

Figure 2: Samples of typologies of design thinking

4.1 Design Studio - Students from Both Case Study Universities

A series of interviews were performed in order to discover deeper structures in a designer's mind and to use a certain typology of design thinking. The interview was semi-structured with students from both universities and the questions were left open-ended for the respondents.

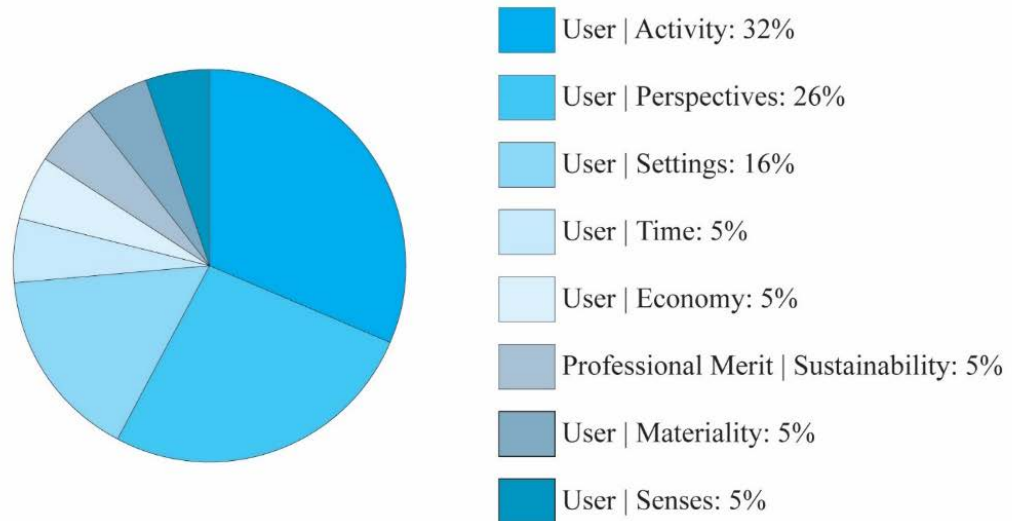


Figure 3: Design thinking typologies from 19 female sample responses

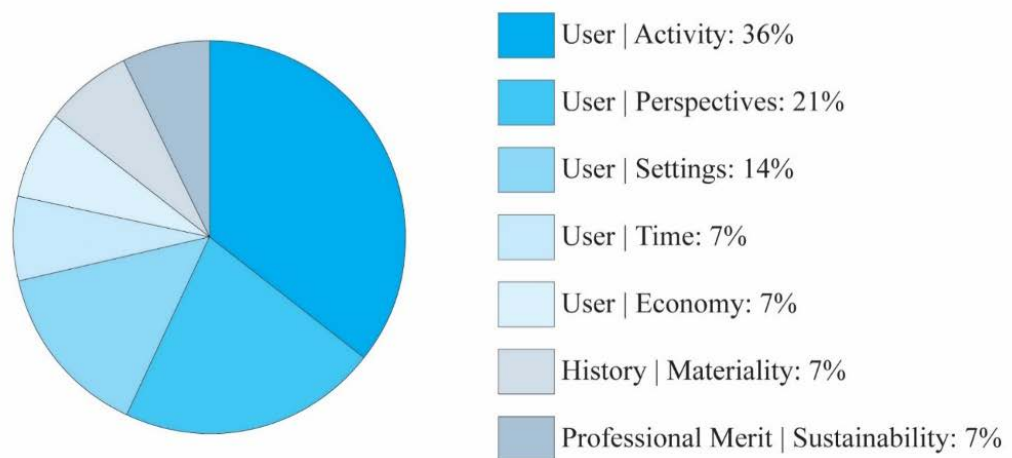


Figure 4: Design thinking typologies from 14 female sample responses

The findings were so startling that the students' majority believed and investigated the user-relevant typologies, such as activities and viewpoints (see Figures 3 & 4). The typologies of time, economics, materiality, and sustainability were all true, but they were brief. It should also be emphasised that there is no discernible variation in the articulation and distribution of the typologies relevant to a designer's gender. We also looked at the ideals and beliefs of an architectural student designer. The majority of students believed in the following concepts: user, function, context, circulation, space, and technology. The students' constructive thoughts for such

views were classified as follows (see Figures 5–7): Activity, Events, Concept, Individual, and Objects.

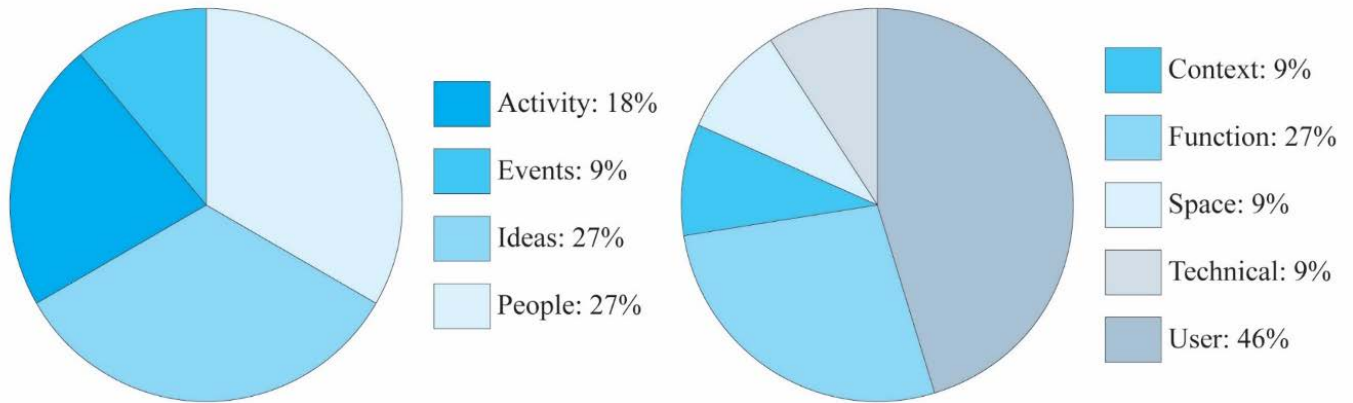


Figure 5: The constructs limit (left) and convictions (right) from eleven respondents in the User | Activity typology

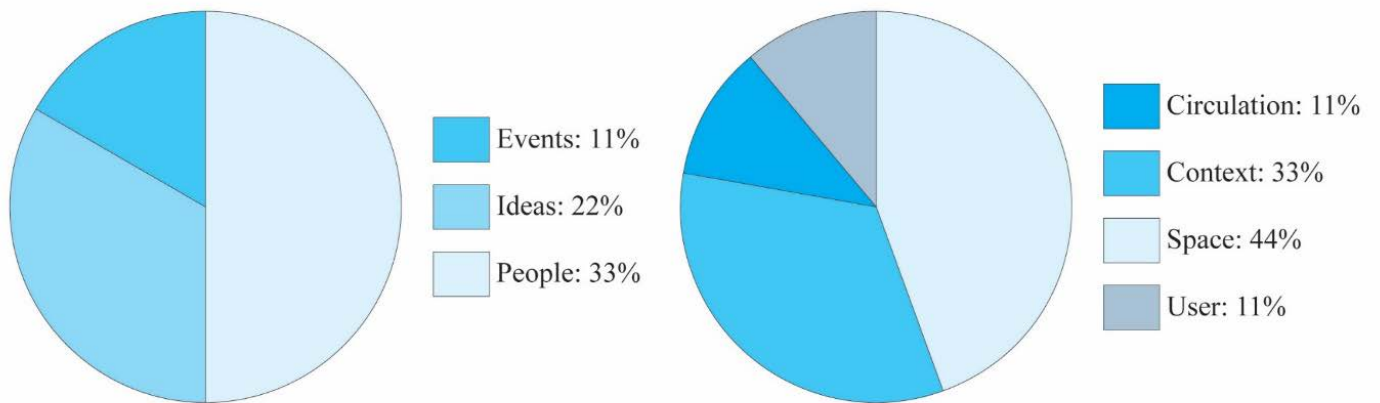


Figure 6: The constructions limit (left) and convictions (right) from nine respondents from the User | Perspectives typology

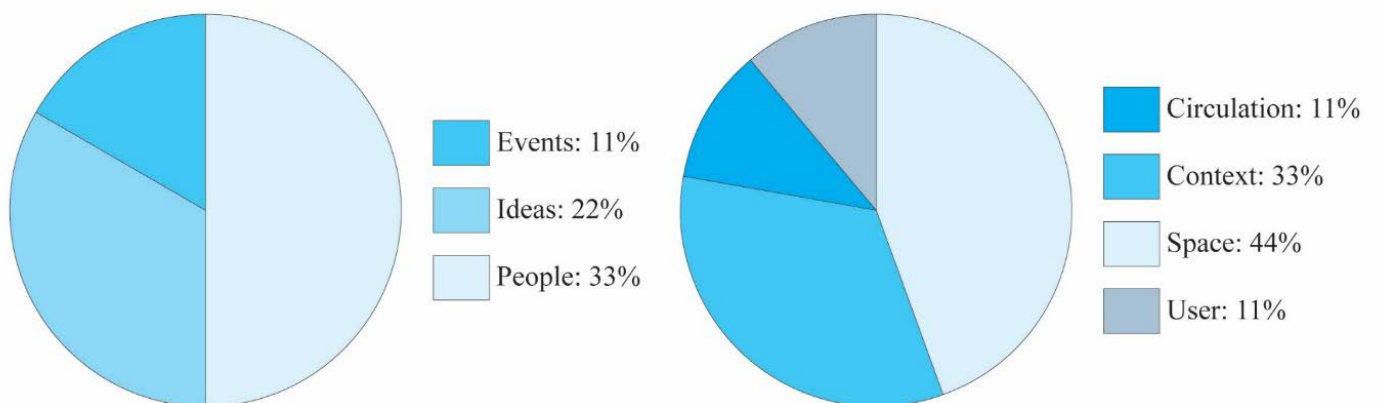


Figure 7: Four respondents provided a constructions limit (left) and convictions (right) from the User | Settings typology.

User Activity designers consider a variety of structures, including individuals, things, events, and concepts. Materiality thinkers in design have focused only on a single construct, namely things. Designers throughout time have made reference to two constructs: activity and events. The economy's design theorists have identified two constructs: objects and individuals. Finally, designers of various typologies have emphasised three primary components, namely events, concept, and individual.

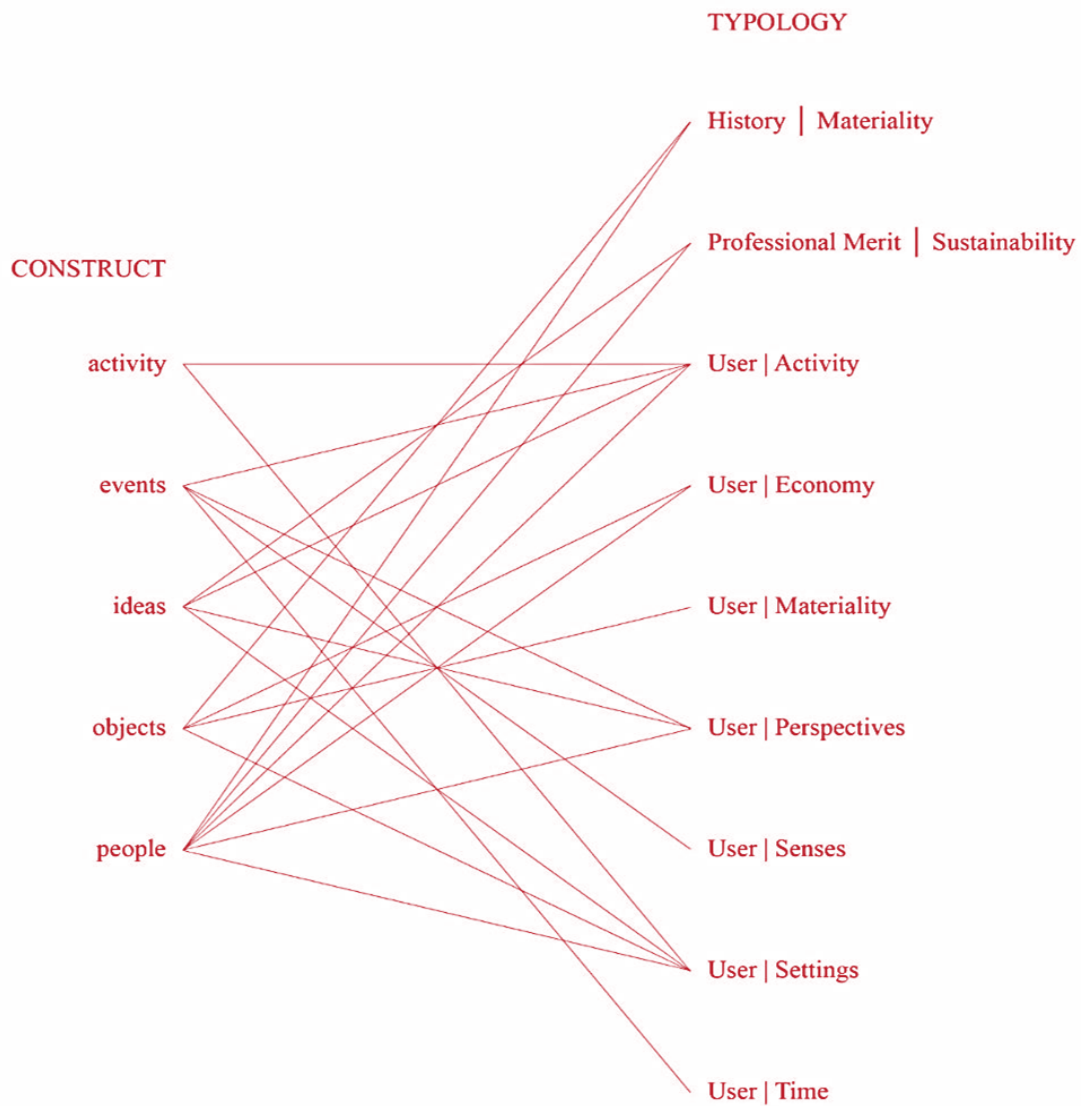


Figure 8: Constructs and typologies mapping

Interestingly, the typologies have emerging patterns with the constructs or the values mentioned by the respondents via interviews/discussions (see Figure 8). The typologies pertinent to the user experience (activities, settings, and perspectives) had the highest occurrence of constructs. The typologies pertinent to economic, sustainability, and senses aspects had the next highest constructs. The remaining typologies, such as the urban economy and temporal, stand at the lower level of repeated constructs and tend to be rhetoric responses by design.

5 Conclusion

From the above findings, the typologies can be categorised into typologies pertinent to form, space, function, circulation – the elementary thought process. Typically, the constructions are about things and concepts; b) Critical typologies pertinent to concepts, principles, and qualities - the intangible aspects of the design process. The constructions are about individuals; and c) Interpretative, in-between typologies, and typologies types, are applicable to the areas in between the two extremes, which is the objects articulation that create an experience. Typically, the constructions are about the activity.

The major intention of the research is to offer a learning platform that allows flexibility to the learners and the architectural students. This discovery sheds fresh light on learner-centered studio teaching through the use of online resources organised according to typologies. We have developed an online resource, especially during this pandemic time, that gives access to references, reading materials, and precedents in a, particularly given typology. This has proven to be very effective at a later design development with succinct passion and desire expressed through the design process and product.

6 Availability of Data and Material

Data can be made available by contacting the corresponding author.

7 References

- Ardington, A., & Drury, H. (2017). Design studio discourse in architecture in Australia: The role of formative feedback in assessment. *Art, Design & Communication in Higher Education*, 16(2), 157-170. Atelier Project, 2011, 'Design things', Chapter 6: Designing as performing, MIT Press
- Attoe, W., & Mugerauer, R. (1991). Excellent studio teaching in architecture. *Studies in Higher Education*, 16(1), 41-50.
- Brown, T. (2009). *Change by Design*, Harper Business.
- Carmona, M. (2017). The formal and informal tools of design governance. *Journal of Urban Design*, 22(1), 1-36.
- Lawson, Bryan (2005). *How Designers Think – the design process demystified*. Architectural Press, Oxford.
- Ochsner, J. K. (2000). Behind the mask: a psychoanalytic perspective on interaction in the design studio. *Journal of Architectural Education*, 53(4), 194-206.
- Pallasmaa, J. (2009). *The thinking hand: existential and embodied wisdom in architecture*, Hoboken: Wiley.
- Rodgers, P. & Winton, E. (2010). *Design Thinking, Conference proceedings on Engineering and Product Design*, Norwegian University, Norway
- Rowe, P. (1986). *Design Thinking*. MIT Press
- Schön, D., (1983). *The Reflective Practitioner*. Basic Books, New York
- Schön, D., (1984). The Architectural Studio as an Exemplar of education for Reflection-in-action. *Journal of Architectural Education*, 38(1), 2-9

Schon, D. A. & Wiggins, G., 1992. Kinds of seeing and their functions in designing. *Design Studies*, 13(2) 135-156.

Schon, D., Sanyal B., and Mitchell, W. (eds.) (1998). *High Technology and Low Income Community: Prospects for the Positive Use of Advanced Information Technology*. MIT Press Cambridge, MASS, USA, ii-iii.

Snodgrass, A., & Coyne, R. (2013). *Interpretation in architecture: design as a way of thinking*. Routledge.

Srirangam, S et al. (2019), Typologies of Design Thinking – the learner-led perspectives, *Conference paper, ICACE*, Kuala Lumpur, 2019

Tepavčević, B. (2017). Design thinking models for architectural education. *The Journal of Public Space*, 2(3), 67-72.

Unwin, S. (2007), Analysing architecture through drawing. *Building Research & Information*, 35(1), 101-110.



Dr. Sucharita Srirangam is a Senior Lecturer at Taylor's University. She received a PhD in Architecture from Edinburgh College of Art, UK and a Master of Architecture from Anna University, India. Her teaching focuses on Architecture and Urban Design Methods and Theories, with projects involving Urban Conditions, Open Spaces, Walkability, and Architectural Design Approaches.



Dr. M. Tamil Salvi Mari is a Senior Lecturer at Taylor's University. Salvi's research revolves around People, Place/Environment, and Design, particularly focusing on Current Societal and Environmental Issues and Needs for the Complex Decision-making, Design Values of Place and Space (Environmental, Social, and Economy) in Community Housing, High Rise Residential, Educational Facilities and Neighbourhood Business Districts and Design Strategies to Reduce Energy Demand and Carbon Footprint.



Dr. Sujatavani Gunasagaran is a Senior Lecturer, School of Architecture, Building and Design, Taylor's University. She received a BSc (Architecture) from University of Malaya and an MSc in Building Technology from University Science of Malaysia. She obtained a Doctor of Education from the University of Selangor. Her research interests involve Sustainability, BIM, Digital Simulation, Building Technology and Design Approaches.



Dr. Veronica is an Associate Professor of Architecture. She is interested in Contemporary Malaysian Architecture, and Cultural Heritage and Small Places in Malaysia through The Sense of Place Project.



Dr. Sivaraman Kuppusamy is a Lecturer at the University of Reading, Malaysia. He got a Bachelor's degree in Housing, Building & Planning (Hons) in 1993, Master's in Environment (Built Environment) and Doctorate of Education (Construction). He is a Certified Green Building Index Facilitator and an Active Member in the Association of Project Management (APM-UK). His research interests involve Environmental Architecture, Sustainability in Built Environment, BIM, and Building Technology and Design Approaches.