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ASSIMILATING HISTORICAL CONTEXTS AS LEARNING LABS
Introducing design thinking in the foundation level of design education

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Abstract

Design Thinking is the practice of including and empathizing with people, their cultures, traditions and especially their emotions throughout the problem-solving process of design. In the Bachelor of Design course at the Department of Integrated Design, University of Moratuwa, Sri Lanka, this practice begins by the realization of one's self. While the individual self is realized in varied perspectives in succession, the use of historical contexts as the introductory atmosphere is highly beneficial. Using inherent qualities of the physical context, culturally valued reminiscent structures or ideological attributes given to contexts, students begin the process of questioning the norm for the progression of empathized betterment through history. Empirical data of ten (10) projects spanning from 2001 to 2015 is used to derive the methods of experimentation and evolution of historical contexts as learning labs. The gathered analytical data is used to synthesize necessary inclusions of a historical learning lab and future possibilities. The research has been funded by the Senate Research Committee of the University of Moratuwa under the grant number SRC/ST/05/2015.

Keywords: *Contexts, Learning labs, Design Thinking, Historical contexts, Design Education*

1. Introduction

Design-based Research (DBR) is responsive to inherent natures of contexts yet is structured and systematic as well (Wang & Hannafin, 2005). DBR as a methodology for educational research is highly promising (The Design Based Resrach Collective, 2003). Therefore the research paper begins with the description of the analysis and synthesis methods used for the purpose of 'assimilating historical contexts as learning labs'. The conducted research is compared with the five mandatory characteristics of DBR as characterised by Wang & Hannafin (2005) to define the framework of this research.

With the gained knowledge, empirical data of ten (10) learning labs conducted throughout the years of 2001 to 2015 at the Bachelor of Design course of the Department of Integrated Design, University of Moratuwa, Sri Lanka is used to obtain solutions to the core problem of the research, how and in what ways can varied contexts of history be utilized as an introductory platform for Design Thinking in the foundation level of design education? The hypothesis was developed with the initiation of the first project in 2001. As mentioned below in Table.1 HLL01|DM consisted of using the context of a machinery system that is embedded in historical legendries of Sri Lanka without relating to a particular context. This particular beginning for the introduction for Design Thinking comes with its inherent nature.

Furthermore the paper discusses the research question of; what particular processes or methodologies of design does the foundation student explore and practice upon the introductory platform of history? Finally the future possibilities for the conducted DBR is discussed, developments are inferred and evolution of historical learning labs and the nature of design processes that can be followed by the foundation level students within historical learning labs is realized. Table 1 introduces the prior mentioned ten learning labs with project names, briefly, the nature of the learning lab and the assigned code which will be used in the research paper.

Table 12 - Brief introduction to discussed historical learning labs

No.	**Name of learning lab**	**Nature of learning lab (based on final design output)**	**Code**
01.	*Dandu Monara*	Particular machine without a specific context	HLL01|DM
02.	*Karkataka Yanthra 01*	Particular machine in specific context	HLL02|KY1
03.	*Yaathra*	Connecting system (technical/ structural) in a specific context	HLL03|YTR
04.	*Karkataka Yanthra 02*	Particular machine in specific context	HLL04|KY2
05.	*Yaapahuwa*	System (defence – social/ political/ economic) in a specific context	HLL05|YPW
06.	*Sakwala Chakra*	Design based on physical contextual detail; undefined context of origin	HLL06|RMU1

07.	*Sethu Samudram*	Connecting system (structural/ ideological) in a specific context	HLL07|SS
08.	*Koneshwaram* (Remembrance Rock)	Expression (structural detail) referring to collective contexts in a specific context	HLL08|RR
09.	*Karkataka Yanthra 03*	Particular machine in specific context	HLL09|KY3
10.	*Ranmasu Uyana* (Water celebration)	System for an element in a specific context	HLL10|RMU2

2. Practices of design based research in the progression of historical contexts based learning labs

While Design-Based Research (DBR) is relatively novel than other methodologies of research it provides a sound basis for educational research which has unique situations due to contextual forces. Wang & Hannafin (2005) identifies five qualities that is possessed in DBR; DBR is pragmatic, it is grounded, it is interactive, iterative and flexible, it is integrative and it is contextual. Following the research question of, what are the developed methods of analyzing and synthesizing used for the design based research of utilizing historical contexts as an introductory platform for Design Thinking in the foundation level of design education?, is answered and a structure is developed for the necessary progression of the research.

2.1. APPLICABILITY AND ATTRIBUTES OF DESIGN BASED RESEARCH

Hoadley (2004) identifies that with a simultaneous and comparative progression between designing and the study of it in naturalistic settings can result in a "methodological alignment". Furthermore, as recognized by Sandoval & Bell (2004) the importance of DBR can be extended and reified through the explicit and conjuncted mapping of research studies. While recignizing the relevance of DBR in such a sence The Design Based Resrach Collective (2003) recognizes particular areas of research that can be funded by DBR to its full pontential. They are;

- Exploring possibilities for creating novel learning and teaching environments.
- Developing theories of learning and instruction that are contextually based.
- Advancing and consolidating design knowledge.

- Increasing our capacity for educational innovation.

With the recognition of the suitability of DBR for the study of how to assimilate historical contexts as learning labs, following is the identification of the prior mentioned characteristics of DBR; as explained by Wang & Hannafin (2005), within the scope of the research.

1. DBR is pragmatic – Pragmatism is identified as the refining of both theory and practice. The value of theory is proportional to the improvement in practice. The preliminary hypothesis for the research was developed at the initiation of the first learning lab in 2001; HLL01|DM. While it began with the broad idea of self-realization for empathy, the nature of the study developed with the years to a precise structure which allowed the relating to contemporary professional practices while having the prior mentioned broad understanding as an underlying layer.

2. DBR is grounded – Gaps in existing theories and or practices are identified to ensure the value of the research. Theses gaps are considered as problems or issues which are continuously revised and refined. This leads to the understanding of "which interventions should (or should not) be introduced and which should be eliminated". Design Thinking has many perspectives of understanding. It is an integrative approach to problem solving (Buchanan, 1992). It is the use of the methodology of problem solving within the practice of design in other fields (Brown & Wyatt, 2010). These continuously developing ideas about the profession of design is integrated in the structure of practice. As it can be seen in Table 1 the change from not relating to a physical context for designing to choosing a physical context to comprehend and use in the design process can be understood as an example.

3. DBR is interactive, iterative and flexible – Interaction occurs with the working together with relevant participants. Iteration occurs with continuous re-evaluation and resultant redesigning. Flexibility occurs with the "insufficiently detailed" beginning to the process. While the initial learning labs were funded by knowledge and practice of direct experts such as architects and archaeologists, the latter learning labs were funded by the knowledge of a broad range of experts including musicians and dancers. While all labs are continuous iterative developments an example of particularized

iteration is the learning lab of *Karkataka Yanthra* which occurred as HLL02|KY1, HLL04|KY2 and HLL09|KY3. The broad understanding used in the HLL01|DM allowed the nurturing through flexibility for all the successive learning labs.

4. DBR is integrative – Methods of research are mixed and changed with iterations to suit the necessities of the existing phase. The learning labs of HLL06|RMU1 and HLL10|RMU2 being located in the same physical context shows the changing of approach to the learning lab while relating to contemporary professional practices.

5. DBR is contextual – Derivations from the initial plan is recorded and results are connected to the context of conduct. For the generalization of and adaptation of the ultimately realized principles, guidance is required. The effectiveness of historical learning labs exists with the relationship to the rich history of the country and its value in the society. When a practicing context differs from similar societal norms the nature of the learning lab may have to be changed.

2.2. METHODOLOGIES OF ANALYZING

As per the requisitions of DBR the research analysis is grounded and uses an analytical inductive approach. The used pre-defined population is the foundation level design students of the Bachelor of Design degree. As sample selection, the selected students to the degree as a result of an aptitude test can be identified. Due to their similar societal practices, the value for history, resultant cultural and traditional practices are used as foundations of the learning labs, thus the foundations of the hypothesis. The progression of learning labs with both similar and adjusted practices serves as key to finalizing statements of the research.

3. History as an introductory platform

In a country with one of the longest written histories in the world and pre-histories nourished with legends and folklore, history plays a far greater role than being a set of past events that affects the present as an underlying layer. Using this contextual force, of Sri Lanka, historical contexts are employed as learning labs to introduce Design Thinking. It begins with the identification of a problem which has a solving process of successive progression as well as lateral progression. Devoid of industrial restraints students explore and develop the ability to realize multiple possibilities using logical imagination and use it for design development. Furthermore in the process of relating to

history, students realize the potential of contextual forces such as the in depth knowledge of varied subject matter within the Island (Wickramanayake, 2015).

3.1. POTENTIAL OF HISTORICAL CONTEXTS AS LEARNING LABS

History can be understood as the knowing and acknowledging of events of the past. Thus making the fuel for the existence of history; the present. For Sri Lanka, harbouring millennia of ancient history, it is not merely a cultural attribute but the way of life of contemporary times (Liyanage, 2015). Through notions of collective identity, it is what individuals use to define themselves. Therefore, it can be understood that questioning history would create a platform where the individual self can be questioned.

The necessity of developing a platform where the individual self can be questioned comes with the need of developing a sense of empathy towards the wider society beginning with one's self. Dissecting history means, the dissecting of the integral belief system of all members of the society as a whole. Hence looking into histories as far as possible stands to mean seeing contemporary times in a different and novel perspective. The knowledge of the possibility of seeing fundamentals of the society anew provides a positive 'shock' to the foundation level undergraduate, who has been moulded by didactic education methods of primary and secondary education.

A historical context can be any given scenario of the past, any given reminiscent built environment of antiquarian value or even of more recent historical value. To convert a historical context to a learning lab, activities done in accordance with the curriculum must be based upon a specific context from the above mentioned possibilities. In this conversion of a historical context into a learning lab, positive limitations are induced. The notion of a learning lab suggests that procedures must have the capacity of being reproduced. In these attempts of reproduction students obtain the possibility of scrutinizing the process of design development which fuels successive learning labs. The term 'lab' further suggests restrictions, which funds the idea of graspable units of study. In the process of design development all students generate designs within the context of the lab which proves highly beneficial in the process of assessment.

3.2. DESIGN THINKING IN HISTORICAL CONTEXTS

The idea of Design Thinking emerged in the 20th century as a mode of integrative thinking to connect the knowledge of arts and the sciences so that it may better suit the solving of problems and purposes of contemporary times (Buchanan, 1992). In that idea of better understanding the problems

and purposes of the present it is mandatory that the professional who follows this ideology has an in-depth understanding of himself (Liyanage, 2015). Thus, creating a learning environment where the student is provided with the space to look deeper in to the roots of the present times whilst questioning and reinterpreting provides the ideal beginning to develop Design Thinking.

Differing from the times of its inception, Design Thinking is currently used as a methodology for sectors of a non-design origin to resolve complex problems in varied fields such as health care, banking and finance, education, etc. by adhering to methods used in the profession of design. While Design Thinking continues to evolve in that manner it also reaches precision as a design methodology which can be used by designers as well.

Design Thinking looks into design problems and seek a solution in five steps.

1. Discovery – a context is converted into a dialogue so that it may present new facets of exploration.
2. Interpretation – the discovered facets are seen in the light of many varied possibilities by the means of relating to people of the context.
3. Ideation – the explored facet and the new interpretation is used to provide a solution for the contextual problem.
4. Experimentation – the solution is put to test and the responses are recorded.
5. Evolution – the responses are taken as feedback for evolving context based iterations.

This procedure can be identified as the method of practice that is used in the historical context based learning lab. While all characteristics of DBR can be identified in the five steps of Design thinking as mentioned above, Figure 1 illustrates distinctively identifiable similarities between the practices of DBR and Design Thinking.

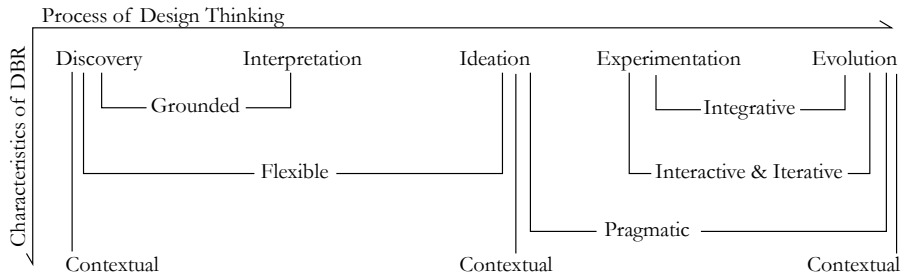

Figure 1, Characteristics of DBR vs. Process of Design Thinking

3.3. IDENTIFYING A PROBLEM-SOLVING PROCESS

Identification of the problem-solving process begins with step one in Design Thinking; 'discovery'. Prior to converging into a particular context, 'discovery' begins by discussing about history in new perspectives. Terminology such as 'past', 'history', 'his-story' is brought forth for discussion to even ultimately discuss broad topics such as time and space. In due-process, basing on facts, discrepancies in chronological data, gaps in historical commentaries are identified as possibilities for reinterpretation. A physical context is introduced at this stage. This creates the necessary convergence to initiate a dialogue which will allow to see the believed norm in different perspectives.

The on-site work begins with the exploration of its physical nature. Following, insights to the context is provided by varied experts allowing the students to gain exposure regarding the context and its histories in varied facets. According to Design Thinking people must be included in the step of 'interpretation'. Befits of the use of a historical context as the introductory platform can be identified at this stage. Since students explore historical data and design development is devoid of industrial restrictions, foundation level students have the benefit of self-reflection as a source of information for empathic practices.

With gained consciousness of history in varied perspectives with gaps in existent sources of information – both as reminiscent built environments and literature sources – and seeing them through self-reflective empathy, students convert the gaps into problems to which require solutions. The problem is then further dissected so that it may be resolved in a strategic manner. This results in the step of 'ideation'.

3.4. LOGICAL IMAGINATION AND DESIGN DEVELOPMENT

Logical imagination funds the 'experimentation' stage that follows 'ideation'. Relating to all the previously discussed matter students develop a coherent storyline. As a result of this storyline, a problem is realized according to the nature of the contextual learning lab.

Design development which is fuelled by the logical imagination process begins as team work and gradually shifted on to an individual designing process so that the necessary data for the progression of the coaching process throughout the foundation level maybe properly informed. It is only at this latter stage that the historical learning lab may differ from the precise methodology of Design Thinking due to the inability of an academic process to fund iterations in the stage of 'evolution'. Figure 2 shows the connection between the progression of the learning lab and Design Thinking.

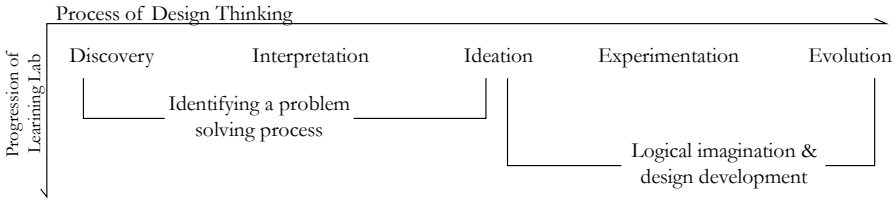

Figure 22, Progression of Learning Lab vs. Process of Design Thinking

4. Curriculum and curricular content of historical learning labs

Design Thinking is a methodology that can be used for developing answers to both the questions of 'what to be taught?' and 'how to teach?' The answer to the former question lies within the curriculum, which is the development of aims and objectives that encompasses aspects to be taught so that students may begin their learning and exploration process of Design Thinking. The matter of 'how to teach?' has its answer in the curricular content, which devices changing content primarily based upon the variations of the physical context of the learning lab. As it can be observed in Table 1 (1.Introduction) a wide spectrum of curricular content can be developed relating to different contexts. Student progression is continuously observed and assessed comparing to the achieved percentage of the objectives of the curriculum.

4.1. CURRICULUM AND DESIGN THINKING

For the purpose of this research paper curriculum is understood as the aims and objectives of the learning lab. Based upon the prior said stages of Design

Thinking the following curriculum was developed through the experimentation of continuous learning labs.

Aim – Gaining the knowledge of the importance in understanding a historical backdrop of a chosen designing context

Table 13. Curricular Objectives and relationship to Design Thinking

Objective	**Relative step in Design Thinking**
Recapturing the epoch of history and establishing awareness	Discovery
Recognition and understanding of built environment etc. by studying and comprehending the unique language and characteristics of a location.	Interpretation
Formulate a creative brief acknowledging the physical context through a process of identification and analysis.	Ideation
Generating a logical conception linking appropriate resources to evaluate and strengthen a conceived abstraction	Experimentation
Execute and refine design ideas using both 2D and 3D methods of rendering in a creative presentable manner.	Experimentation. The stage of 'evolution' can be identified in the development of designs through the individual tutoring process.

4.2. EXPLORATIONS OF CURRICLUAR CONTENT

Curricular content begins with the HLL01|DM where the students developed the famous *"Dandu Monara Yanthra"*; a machine that has been used to fly by King Raavana, a legendary figure in local pre-history. HLL02|KY1 explored the creation of a "*Karkataka Yanthraya*", a machine, with the function of a lift that has being used in the rock fortress of Sigiriya. Sigiriya while being one of the most famous locations of ancient value in Sri Lanka has many derivations with the time period it belongs to. This key factor of derivation, allows a platform for questioning by the context itself. Thus the learning lab is repeated with variations as HLL05|KY2 and HLL09|KY3.

HLL03|YTR was a learning lab created upon the believed ancient sea port of Godawaaya. The intriguing level change in the context was used to create the core of the learning lab where the students developed a connecting system – be it a bridge or a vehicle for transporting vehicles – from sea to inland high ground. "*Yaapahuwa"* is a kingdom in the Sri Lankan royal lineage which was constructed due to foreign attempts of conquering. HLL04|YPW learning lab had as its core, a creation of a defence system relating to social, political and economic aspects. HLL06|RMU1 was based in a location which is popularly known to be a pleasure garden of the kingdom of Anuradhapura. Yet a rock mural with unidentified origins within pleasure garden allows the questioning of the entire context. This evident gap was understood as a design problem and was solved through reinterpreted holistic environments upon the evident physical context of present times.

HLL07|SS, was a learning lab developed in the Northern district of Mannar in the west coast, which is said to have an ancient bridge linking India and Sri Lanka. The learning lab taking into account the ideological value of a bridge – linking – produced either structural or conceptual connections between India and Sri Lanka. The idea of the bridge was socially, politically and culturally made sound with the ruins of a pathway leading from the ancient sea port of *Mahathiththa* in Mannar leading up to the kingdom of Anuradhapura. The learning lab of HLL08|RR, similarly to the prior project used multiple locations to base the output of the learning lab. Namely, the sea port of Mannar in the Northern west coast; *Mahathiththa,* the ancient sea port of Trincomalee in the Northern east coast, *Gokanna*¸ and the adjoining inland location of Sigiriya. The learning lab produced a structural emblem for identity expression upon the Kovil of Koneshwaram in Trincomalee.

HLL10|RMU10, reused the context of *Ranmasu Uyana* yet in a different aspect by focusing on developing a system for the element of water that surrounds the area and the evident water pools in within the context.

5. Future possibilities

Any devised methodology of DBR proves to be successive with the iterations done with changes based upon pragmatic use of prior formulated theories. Thus constructing possibilities of future advancements is of importance. With developed DBR it can be discussed whether novel dimensions for the advancement of the curriculum can be discovered. With an elevated curriculum – aims and objectives – differed methods for students to experience the design process can be realized.

5.1 ITERATING THE DESIGN-BASED RESEARCH AND ADVANCEMENTS OF THE CURRICULUM

A following iteration of DBR can seek to devise a precise methodology of comparing design methodologies in practice and characteristics of DBR. The current method of assessing in the curriculum begins with the assessing of produced work of the group work conducted on-site. The shown work is compared with the degree of success with the related objective. And the individually produced work undergoes continuous assessment with a guiding coaching process.

This process as in the suggested issues of assessing curricular activities such as "what is assessed, what can be assessed, what is the purpose of assessment, who assess and how students experience assessment" by Trede & Smith (2012) can be further developed in iterative processes of DBR. The advancement of the curriculm can be conjuncted to this by creating sub-sections in the practiced design process. As an suggestive example the stage of 'evolution' in design thinking can be further understood in segments and used for the purposes of assessment for iterative DBR.

For curricular advancements while Design Thinking as methodlogy proves highly beneficial it can be further improved to cater the modern notions of learning such as constructiveness, self-directedness, collaboration and contextuality (Dolmans, et al., 2005).

6. Conclusion

In conclusion it can be identified that historical contexts with architectural ruins can spark an extensive process of practicing Design Thinking in the foundation level. This explorative learning lab devoid from conventional methods of learning continues to fund the development of empathy in students to become professionals with a focus on social betterment with a deeper realization of self. The notions of educational practices in the present day can be followed and researched using Design-Based Research. Both DBR and the followed method of design practice can be further developed through the further precise detailing of characteristics and design development stages. Figure 3 shows the combination of DBR, progression of learning labs and objectives compared to the stages of Design Thinking.

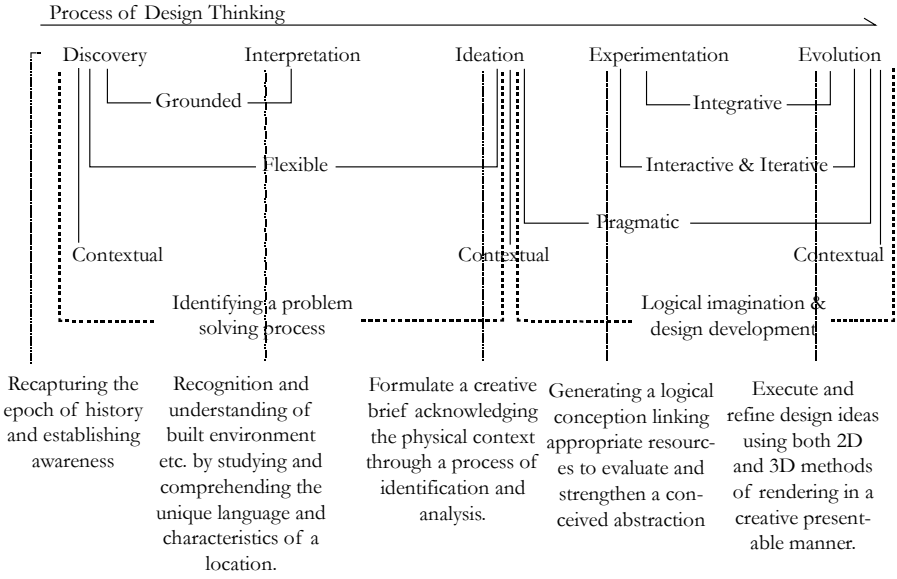

Figure 3, DBR, progression of learning lab, objectives vs. Process of Design Thinking

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