

# Insight into a Personalized Procedure of Design in Concept Generation by the Students in Architecture Thesis Projects

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**Abstract:** This paper analyses the predominant trend between the students to follow, frame, and develop a concept in the architectural thesis design. The research targets to question how the students derive their inspiration from diverse sources and influencers into the architectural design concept. The research methodology was based on semi-structured questionnaires with Likert scale questions to analyse and interpret data through the Chi-Square test in SPSS software. The findings revealed that first, the students preferred to employ more symbolic and poetic elements for the design than real projects, second, to create their concepts under influences of supervisors and juries than research, third, to follow personal procedure than the structured process of the course. In conclusion, the results revealed that the students adopted a personal procedure under the influences of the supervisors to design a concept that is closely aligned with a subjective approach, rather than a structured research process.

**Keywords:** Concept Generation, Personal Procedure, Research Process, Students, Supervisors, Architecture Thesis Design Studio.

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## Introduction

An architectural thesis design project takes into consideration as an essential module to be passed by students in all level of the architecture program in universities although some departments call this course as a final year project, graduation project, or capstone project (Ghonim & Eweda, 2019). It is supposed that the final architectural project presents general knowledge, skill, and ability of students to design an architectural thesis project through research and problem-solving process. It means the thesis project includes specific qualities to demonstrate the capability of design decisions made by students in the architectural design process (Borden & Ray, 2006; Mauch & Park, 2003).

From another point of view, architectural thesis projects might observe as a collective knowledge through a wide range of collaboration with supervisors, instructors, juries, and peer students (Borden & Ray, 2006). The students are inspired by some or specific sources of inspiration to generate a conceptual idea for the architectural thesis project, which is modified by comments from supervisors, instructors, and juries.

## Problem Statement:

The students present a project-based thesis in the fifth year of the architecture bachelor program, which is regarded as the essential criterion for both graduation and accreditation. The learning outcomes of the program have designed to lead the students to multilayer of

thesis activities including studies, analysis, conceptualization, design, and details for the site and building due to the curriculum and the syllabus (DoF, 2014).

According to the curriculum, it is expected that the students carry out the research and survey, programming and conceptualization in the first semester, and in the following semester, they do the schematic design, architectural design development, and detailed design in the department of architecture at the University of Rwanda, (DoF, 2014). It means the students are involved in the problem-based-learning for the first time in the thesis studio. However, in other years, the structure of the design studios was more adapted based on precedents-studies to design the project, which is more adapted to the project-based-learning (UR, 2017).

In fact, the curriculum emphasised the research activities, critical thinking, and problem-solving in terms of the expected outcomes of thesis projects. For this reason, Groat and Wang critiqued the trends to finalize the design projects without research activities in term of the final output (Groat & Wang, 2002) although a new generation of technology and sustainability have created a significant requirement for research (RIBA, 2014).

According to the structure of the curriculum, it is supposed that the students present an architectural concept for the architectural thesis project through a process of research including precedents, context, and site analyses. However, the trend demonstrates that the students have a concept to develop in the first session of the thesis studio in terms of pre-concept, which was discussed profoundly by Lawson (2005). This trend could refer to a personal presupposition about a particular concept for design to fit the final thesis project. In this perspective, Dutton remarked that the education structure creates a specific state, which students resist following the formal curriculum and so, a hidden curriculum leads and guides the students toward the design (Dutton, 1991).

In this contradiction, the assumption of the research is drawn to investigate if there is an association between the thesis process and conceptualization in the architectural thesis project as the following hypothesis:

H0: there is no association between the architectural thesis process due to the curriculum and the architectural thesis inspirations.

H1: there is an association between the architectural thesis process due to the curriculum and the architectural thesis inspirations.

### **Studies about the Conceptualization**

The terminology of the concept implies both concrete object and abstract idea for the design (Ching F. D., 1996; 2015). Lawson argued that the design term indicates both production and process although the discovery of the design process has been a difficult task (Lawson, 2005). A comparative study on concept creation highlighted a specific stage in both engineering and architecture, which is called in term of concept (Taura & Nagai, 2013).

However, the designers revealed the confusion on the term of the concept. For example, Cikis and Ek criticized that although drawing is a system of thinking and communicating for designers and architects (Laseau, 2001), graphical products could less be transformable into words, and some of poetics could not transform into graphical images (Cikis & Ek, 2010).

The studies highlighted a variety of concept typology in architecture. For example, Van Bakel (1995) advocated the concept as three styles between architects including personal design behaving, situational design behaving, and international design behaving. Ching categorized the concept generation with five patterns, namely linear, central, radial, cluster, and gird or mixed (Ching F. D., 1996). In another point of view, Lawson applied the word 'schema' to explain interpreting the perceptions and experience in the past (Mugerauer, 1995) to

support the mind to solve the problem in the future (Lawson, 2005).

The studies confirmed a strong relationship between the concept, drawing skill, and design in architecture education. For example, Laseau proposed a linear process of drawing, abstraction, and presentation as the architectural thinking process (Laseau, 2001). Furthermore, Goldschmidt argued that the drawing represents a continuous process of developing of an idea from the primitive stage to the final product (Goldschmidt, 2004). Although Ciki and Ek emphasized the drawing as a final product for the communication (Cikis & Ek, 2010), Ullman recommended a process of conceptualization, functional decomposition, and a new functional concept generation (Ullman, 1994). This process also advocated in terms of the divergent and convergent stages in the creation of an architectural design concept (Lang, 1987). Based on this evidence, the idea of the Galle in terms of the drawing as a personal journey is considerably underpinned (Galle, 1999). Therefore, the meaning of the new form of the design represents a personal way of obtaining knowledge through personal interpretation (Cikis & Ek, 2010).

From a methodological lens, a wide range of the methods, techniques, and process applies in concept generation and development. The researchers defined this process in terms of application of the design objective, strategy, and tactic (Groat & Wang, 2002) by designers, architects, and artists to apply a mixed-method (Groat & Wang, 2002) or a personalized technique (Niezabitowska, 2018). In another example, the study theorized the design activities in terms of the research 'in design, by design, and for design' (Frayling, 1993, p. 5). There are multiple studies that highlighted the method of concept generation into two approaches including the problem-driven (Taura & Nagai, 2013) and inner-sense-driven approaches (Nichols & Stich, 2003), which the problem-driven applies for the decomposition approach based on the analysis process, however, the inner-sense-driven for the compositional phenomenon (Taura & Nagai, 2013) grounded on a combination. In other

words, the decomposition refers to the analytical activities by the designer in the early stages of the design; however, the composition implies to the accumulation of the personal perception of the designer in the design stage.

Taura and Nagai (2013) highlighted two general methods for the concept presentation including visual and linguistic. The visual method refers to an imaginary cognition process; however, the linguistic implies the lexicon and semantic expression. Nevertheless, a number of studies have introduced some criteria in terms of conceptualization process such as practically and novelty (Sternberg & Lubart, 1999), quality and novelty (Vargas-Hernandez, Shar, & Smith, 2010), usefulness and novelty (Sarkar & Chakrabarti, 2011), and values (Weisberg, 1993). Apparently, the level of the association of those elements with the conceptualization may differ according to the type of projects.

Lawson interpreted that the meaning of the design implies the process of figuring an anticipated action such as designing a structure, producing a piece of art, or a process in problem-solving (Lawson, 2005). Undoubtedly, the creation of a concept mentions as an inseparable part of the design process that may start from the personal perception about a certain topic and then to construct the foundation for the final product as a problem solving efficiently (Crowe & Laseau, 2011).

In the opposite point of view, another critical perspective believes that architectural design is a praxis based on social context than just a conceptualization (Anderson, 2014). The theory of social space supports this idea in terms of architecture as a social production through the reflection of politics in social life (Simone, 2004). From this perspective, the method and process facilitate both conceptualization and design to represent the social, cultural, and political trends in the context of design based on the perceptual aspect of the presentation.

The evidence revealed that either the subjective or objective point of view of the designers is represented through the concept of the design. For example, Palmer theorized that the

definition of phenomena is related to a certain level of awareness of the men as the subject to understand an object through perception (Palmer, 1969). In addition, Mugerauer interpreted that all architectural productions compose meanings beyond the objectives of the designers, which emerge in the architectural discourse through interpretation (Mugerauer, 1995). Furthermore, Lawson (2005) highlighted that the mind of the designer selects and archives the information in an active way based on the individual interests, in the interaction between the inner-sense and the external conditions. In the complex interaction between the inner-driven and external-driven factors, the differences between the individual perceptions appear. Perhaps, for this reason, Goldman concluded that the simulation technique could not fully represent the mind of the designer based on sense, feeling, and perception (Goldman, 2006).

Nichols and Stich on the analysing object-subject relations addressed two groups of the knowledge in the mind of the men including self-knowledge and other-knowledge. Self-knowledge refers to the awareness of the individual about self-requirement and ability, and other-knowledge implies the external environment conditions (Nichols & Stich, 2003), which Goldman mentioned that both aspects develop simultaneously (Goldman, 2006). Perhaps, it could question the differentiation between a known-knowledge and a presented-knowledge in any architectural production and presentation based on perceptual-representation and conceptual-representation (Carey, 2000).

In other words, the perceptual representation refers to the first contact of the men with environmental features to understand the specifications although the conceptual representation relates to the categorized items in the mind based on the causality, relationship, and rationale to recall for representation as a new idea in an interpretative approach (Mugerauer, 1995; 2014; Carey, 2000; Gardner, Kleiner, & Mamiya, 2004).

However, the studies present critics on the concept and design process in architecture education. In fact, despite the architectural design has changed widely, the tradition of the studio remained as a conventional approach in architecture schools. In this case, D'Souza and Madanovic argued that architectural design studios as a traditional style of the apprenticeship and based on the significant role of the instructors than research activities, which represented the architectural design as ability, intelligence, and personality (D'Souza, 2007; Madanovic, 2018). Moreover, Lawson claimed that the background of the theorizing of the design process has started less than half a decade in the architectural domain, and in this case, architects have done more prescriptive than a descriptive explanation about the design (Lawson, 2004), which made a gap for problem-solving in design (Lawson, 2005).

In a summary, seemingly, scholars believed in a process from concept generation to design, which differs between designers, architects, and artists based on the inner-sense driven or the problem solving driven. In detail, the inner-sense relates more to the subjective approach into the design with compositional methods although the problem solving indicates the objective approach in the design process with decomposition grounded on the analysis, which Figure one illustrates the relationship and reflects the contradictive issues for sufficient discourse as below:

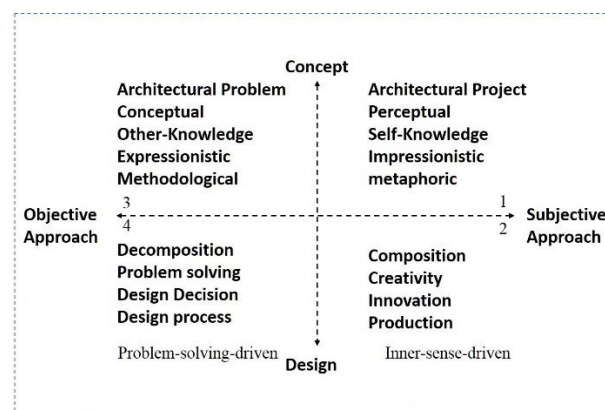


Figure 1: Overlaying of the Effective Factors on the Conceptualization

Figure one includes four parts. In detail, part one of Figure one demonstrates that the concept including some symbolic elements based on the subjective approach and personal perception. Those metaphors primarily reflect the inner-sense representation that could lead the designer toward innovation and creativity (part two). In the opposite part, the concept represents the architectural problem and real site condition based on the objective approach through the problem-solving-driven (part three and four). The diagram leads the methodology to discover the importance of those factors through data analysis.

### **Methodology**

The studies have highlighted some common techniques to study the students' activities in the context such as structured observation (Neuman, 2006; Lawson, 2005; Tafahomi & Nadi, Derivation of a Design Solution for the Conservation of a Historical Payab in the Redevelopment of Doloei, Gonabad, 2020), interview and questionnaire (Groat & Wang, 2002; Neuman, 2006; Alerby, 2000; Ezzy, 2002; Frankfort-Nachmias, Nachmias, & DeWaard, 2014), and simulation and graphical techniques (Laseau, 2001; Crowe & Laseau, 2011; Ching F. D., 2015; Tafahomi & Nadi, 2016). The questionnaire was applied to discover viewpoint, perception, and the expression of the students in the conceptualization processes (Lee, 2005; Yang, Becerik-Gerber, & Mino, 2013; Xi, Yuan, YunQui, & Chiang, 2017). This technique applied in other research in terms of research in architecture (Frayling, 1993), and aimed to explore the perception of students based on the learning activities, environmental effects (Bakare, 2012; Hemyari, et al., 2013; Frankfort-Nachmias, Nachmias, & DeWaard, 2014), and conceptualization process (Cikis & Ek, 2010).

Krippendorff recommended the interpretation as part of the content analysis to analyse the answers of respondents in the questionnaires (Krippendorff, 2003). For example, Moretti recommended analysing the meaning of the answers in the questionnaire (Moretti, et al., 2011; Elo, et al., 2014), in psychology, education, and sociology (Mayring, 2000) as an

unobtrusive method (Cho & Lee, 2014). The interpretation technique was advocated by Mugerauer as a technique in the built environment particularly architecture as an effective approach to explore the meaning (Mugerauer, 1995; Mugerauer, 2014).

According to the precedents studies, a semi-structured questionnaire with Likert scale questions was designed to discover the conceptualization process of the architecture students in the thesis studio. Some critical research targeted the reliability of the Likert scale (Joshi, Kale, Chandel, & Pal, 2015). However, the precedents on the Likert scale questions (De Campos, Pitombo, Delhomme, & Quintanilha, 2020; Huertas-Delgado, Garcia, Van Dyck, & Chillon, 2019; Li, 2013; Hartley, 2014) led the research to apply this technique to discover the correlation of the effective factors in concept generation to discover most effective factors on the conceptualisation process by the students.

To discover the process of the conceptualization in architecture thesis, the questionnaire was comprised of four critical component-questions as below in detail:

First, the source of the inspiration between the students was investigated such as architectural project, photos, site, natural elements, supervisor, symbolic items, poetic idea, cultural elements, and other items to discover the level of effectiveness of the subjective and objective factors on the inspiration.

Second, the effect of the thesis process due to the curriculum was discovered including before the research, the problem statement, studies, precedent analysis, context analysis, site analysis, data analysis, out of the process, and other items to discover the level of the problem-based driven factors and the inner-sense driven factors.

Third, the effective methods and techniques for illustration and communication were ascertained such as sketching, making a collage, physical model, tracing, notetaking, and other

items to discover the level of the methodological approach among them.

Fourth, the effective factors on the concept development were sorted including self-studying, self-sketching, self-digitizing, supervisors, juries, instructors, peer students, and other items to discover the effects of the external and internal factors on the conceptualization.

The questionnaire was grounded on five levels of association from the least score (1) to the highest score (5). The target group was comprised of 25 architecture last-year students in the thesis studio, the architecture department of the University of Rwanda. It was supposed that through comparison of the answers identify the trends between the students.

A small group of thesis students was asked to fill in the prepared questionnaires (pilot survey) to test and ensure the reliability after the validity check, carried out by group discussions with lecturers in the department. The outcome of these organized and in-depth discussions was constructive comments centred on integration, clarification, and configuration of questions. Following this, the questionnaire was uploaded on Dropbox for the response of the thesis students. The SPSS software version 20 was applied to analyse data collected, especially descriptive analysis and Chi-square test.

## **Results**

The results were explained in two parts including the frequencies of the answers and the Chi-square outputs based on the comparison of the answer to find the association.

### **Frequencies of the Answerers**

The students selected the 'potential site, architectural project, and supervisors', as the effective items as the sources of concept inspiration respectively. The students did not highlight other items such as 'photographs, natural element, symbolic item, the poetic idea, cultural elements, and others' as a source of inspiration.

The students expressed that they were inspired by many stages of the architectural thesis process including the 'site analysis', 'precedents analyses', 'studies stages', and the 'architectural problem statement' respectively due to the thesis module process. The students selected fewer other research stages such as the 'before the research', 'context' analysis', 'data analysis', the 'out of the research process', and 'others'.

The students applied 'sketching', 'physical model making', and 'note-taking' as the effective methods for 'illustrating and communicating the concept'. Other options such as 'collage making', 'tracing', and 'others' were selected less by them.

In addition, the students believed that 'the effective factors to develop the architectural concept' were 'supervisor', 'instructor', 'digitizing', 'sketching', and 'Juries'. Other factors took the position in the lower part in the list of the effective factors such as 'self-study', 'peer-students', and 'others'.

### **Summary of the Results: Frequencies**

The results of the analysis highlighted that the students took into consideration the real objects as the source of the concept than the subjective, abstract, and metaphoric items. In addition, they cited that they were inspired by the analytical stages particularly site and precedents analysis although they did not point out the context and data analysis. In fact, they followed the process of the thesis studio as recommended by the curriculum. The students applied sketches, physical model, and note-taking than other techniques to communicate the concept with the supervisors and the jury. Finally, they believed that their supervisors, instructor, and jury had the most significant role to develop and change the concept than self-studies and peer-students, which emphasized the importance of the studio authority than a personal journey.

Correlation between questions 1-2 including the source of the concept inspiration and effects of the research process on the conceptualization:

The Chi-square analysis identified that some items statistically were associated including the 'before the research' with the 'photos' ( $X^2=22.087$ ,  $df=12$ ,  $p<0.037$ ), the 'before the research' with the 'symbols' ( $X^2=24.239$ ,  $df=12$ ,  $p<0.00$ ), the 'out of the research process' with the 'symbols' ( $X^2=18.410$ ,  $df=9$ ,  $p<0.031$ ), the 'out of the research process' with the 'cultural elements' ( $X^2=21.638$ ,  $df=12$ ,  $p<0.042$ ), and the 'other' with the 'photos' ( $X^2=12.204$ ,  $df=4$ ,  $p<0.016$ ).

The Chi-square addressed the significant correlation between the 'before the research' and the 'out of the research' with some abstract items such as the photos, symbolic and cultural items in the process of the concept generation. In other words, the thesis process statistically associated with the concept generation although in the opposite way. It meant the students contradicted to follow the thesis process based on the interests of some abstract items. Therefore, it was observed statistical association and so the H1 approved.

Correlation between questions 1-3 including the source of the concept inspiration and the effective methods and techniques for the concept of illustration and communication

The Chi-square analysis identified a statistical association between some items including the 'sketching' and the 'photos' ( $X^2=25.008$ ,  $df=12$ ,  $p<0.015$ ), the 'making collage' and the 'photos' ( $X^2=32.689$ ,  $df=16$ ,  $p<0.008$ ), the 'sketching and the 'symbols' ( $X^2=17.376$ ,  $df=9$ ,  $p<0.043$ ), the 'tracing and the 'symbols' ( $X^2=21.290$ ,  $df=12$ ,  $p<0.046$ ). Other items statistically were not associated. According to the results, the students applied the sketching techniques as an effective method to illustrate those abstract items to bring them into an architectural concept for communication. Therefore, the sketching process was the part of the course, which emphasized the correlation between elements, so the H1 accepted and H0 rejected.

Correlation between questions 1-4 including the sources of the concept inspiration and the effective factors on the concept development

The Chi-square analysis identified a statistical association between some items including the 'photos' with the 'supervisors' ( $X^2=36.816$ ,  $df=12$ ,  $p<0.000$ ), 'symbols' with the 'supervisors' ( $X^2=19.264$ ,  $df=9$ ,  $p<0.023$ ), the 'poetic' with the 'studying' ( $X^2=29.058$ ,  $df=12$ ,  $p<0.004$ ), the 'cultural aspects' with the 'supervisor' ( $X^2=21.857$ ,  $df=12$ ,  $p<0.039$ ), the 'cultural aspects' with the 'Juries' ( $X^2=31.829$ ,  $df=16$ ,  $p<0.011$ ). Other items were not statistically associated. In other words, the supervisors were effective factors, which statistically associated with the photos, symbols, and cultural items. In the light of the statistical evidence, the H1 approved and H0 reject those items.

Correlation between questions 2-3 including the process of the research effect on the conceptualization and the effective methods and techniques for the concept illustration and communication

The Chi-square analysis identified a statistical association between some items including the 'sketching' with the 'out of the research process' ( $X^2=23.000$ ,  $df=9$ ,  $p<0.006$ ), the 'making collage' with the 'out of the research process' ( $X^2=34.889$ ,  $df=12$ ,  $p<0.000$ ), the 'tracing' and the 'out of the research process' ( $X^2=24.417$ ,  $df=12$ ,  $p<0.007$ ), the 'sketching with the 'other' ( $X^2=12.204$ ,  $df=3$ ,  $p<0.007$ ), and the 'making collage' and the 'other' ( $X^2=11.304$ ,  $df=4$ ,  $p<0.023$ ). The results of the analysis presented a statistical association between the research process and the methods of communication except for the aforementioned items, which also emphasized the deviation from the research process. Therefore, the H0 accepted and H1 rejected.

Correlation between questions 2-4 including the effects of the research process on the conceptualization and the effective factors on the concept development

The crosstab demonstrated a significant statistical correlation between those two questions. The results demonstrated a statistical correlation between factors including the 'sketching' with the 'before the architectural

research' ( $X^2=21.198$ ,  $df=12$ ,  $p<0.048$ ), the 'supervisors' and the 'before architectural research' ( $X^2=22.396$ ,  $df=9$ ,  $p<0.008$ ), 'supervisors' with the 'site analysis' ( $X^2=29.927$ ,  $df=12$ ,  $p<0.003$ ), the 'supervisors' and the 'other stage of the architectural research' ( $X^2=11.550$ ,  $df=3$ ,  $p<0.009$ ), the 'instructors' with the 'before the architectural research' ( $X^2=28.954$ ,  $df=12$ ,  $p<0.004$ ), the 'instructors' with the 'site analysis' ( $X^2=31.990$ ,  $df=16$ ,  $p<0.010$ ), the 'studying' with the 'data analysis' ( $X^2=26.360$ ,  $df=16$ ,  $p<0.049$ ). It meant that the supervisors and the instructors had an effective role to direct the students not only in the conceptualization and in the concept development processes, but also they led the students in both architectural thesis process and out of the process as the main effective factor. Therefore, the H1 approved and H0 rejected.

Correlation between questions 3-4 including the effective methods and techniques for the concept illustration and communication and the effective factors on the concept development Chi-square analysis demonstrated a significant statistical correlation between the 'comment of the supervisors' with the 'sketching' ( $X^2=23.741$ ,  $df=9$ ,  $p<0.005$ ) and the 'Comment of the supervisors' with the 'making collage' ( $X^2=27.827$ ,  $df=12$ ,  $p<0.006$ ). In this regard, despite other factors were not associated with the concept development, the results of the analysis revealed the importance of the role of the supervisors in the concept development process. Therefore, the H1 accepted and H0 Rejected.

### **Analysis of the Results**

The results identified a significant contradiction between the frequencies of answers and the chi-square outputs. In fact, the students highlighted physical elements as the source of inspiration for the concept generation. In the opposite result, the outputs of the Chi-square test addressed the significant correlation between the abstract items as the source of the concept generation in both 'before the research' and 'out of the research' process, which both items referred to a procedure out of the thesis process in the studio. Therefore, the contradiction of the

results could reveal a personalized procedure between the students to apply some abstract ideas in the conceptualization process such as photographs, symbolic items, and cultural elements in conceptualization process. Apparently, the abstract elements influenced the students either before the research or out of the research in terms of the architectural thesis process.

In addition, the sketching technique was the most effective methods for the students to represent, communicate, and develop the concept. Particularly, this correlation was appeared from one hand between the sketching and tracing and on another hand between the photos and symbols. It shows that the students were inspired by some abstract elements and ideas to vitalize them as the architectural concept. In fact, sketching was a communicative tool to interact between the students and the supervisors to develop the concept.

Furthermore, the research identified that the students followed the personal and perceptual process in the concept generation for in the architectural thesis project than a systematic process, which was proposed as the thesis module according to the syllabus and curriculum. In detail, the students started the concept generation for the architectural thesis project, before the starting of the academic year. It could highlight two important aspects; first, the students had a presupposition to develop for the thesis year, second, a subjective process of the conceptualization than the problem-solving approach. In other words, the students did not create the concept for the architectural thesis project through a definition of the problem, deep studies, and analysis. While the students preferred to follow the directions of the supervisors as the effective sources for concept generation and development. Perhaps this point could refer to a high level of effects the academic staff in a mastery attitude in terms of master of atelier than a systematic process for self-actualization.

From an interpretative lens, the results demonstrate another aspect of correlation,



which could slightly make transparent the relation between the contradictive results. In fact, despite the fact that the conceptualization activity was specific for each student in each case, the statistical analysis presented a detailed picture of the inspiration, methods, and development processes. Seemingly, there were some contradictory factors, which the architectural concept took the place among those criteria such as between the recommended process and the personal procedure or those analytical steps recommended as the analysing the data although the students followed their creativity. This gap was highlighted when the students did not refer to the contextual analysis as an effective factor. In the absence of the contextual observation, the students decontextualized the concept from the social and environmental factors but just based on their innovation, assumption, or presupposition. Apparently, the process of concept generation was affected by the prescriptive approach of the supervisors.

Nonetheless, the generated concept by the students took the position between those contradictive items to some extent, which some of the items recommended as instruction. In fact, the viewpoint of both students and supervisors about the thesis project determined the position of the concept between those dualistic aspects. Rearrangement of those contradictory aspects in the frame of the concept-design production and objective-subjective approaches resulted in the conceptual interaction as Figure two shows.

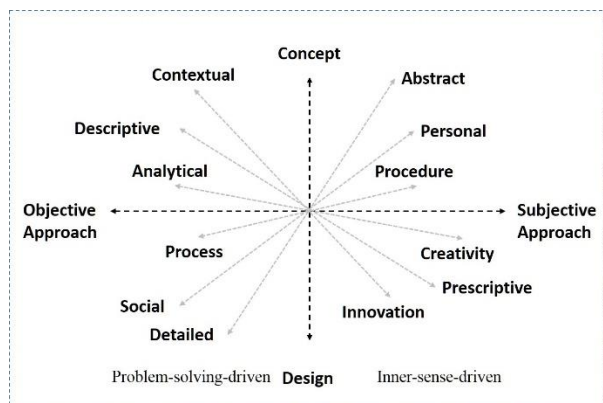


Figure 2: Interplaying the binary aspects of the concept generation

According to Figure two, concept generation takes the position between certain levels of the abstracted or detailed, which this level of precision is determined by the relativity between the thesis research process or individual procedure, personal interests, or social production. In addition, the contextual and analytical approaches led the students for depth achievement through a research process with a descriptive and communicative style. Moreover, the results could demonstrate three processes of the concept generation for the architectural thesis studio, first the proposed process through the architectural problem, analysis, and design decision; the second based on the observed attitude of the students through the abstraction, innovation, and personalization. Third, a mixed and flexible process was also observed. Nonetheless, neither proposed nor observed could be considered as a rigid process for concept generation and concept developments. In other words, those processes could overlay and overlap with an invisible similarity and apparently could observe some kinds of shifting between those two processes. Seemingly, the students found their way in the journey from concept generation to concept development and then design. Figure three attempts to illustrate processes.

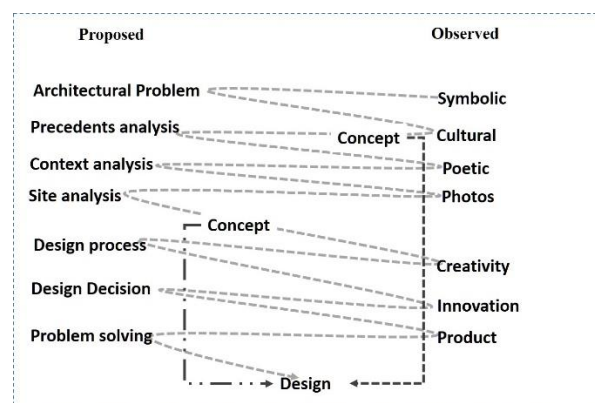


Figure 3: the Concept generation, Development and Design Movement

### Discussion

The architecture students applied some abstract sources for the concept generation, which revealed the depth influences of the symbolic and visual elements in the thesis

conceptualization. This achievement supported the findings of Lawson (2005) based on the theory of the selective mind of designers. Additionally, the students interpreted those cultural and symbolic elements to recall as the source of inspiration using the inner-sense approach. Thus, the students reinterpreted those abstract items to generate the architectural thesis concept similar to the theory of Mugerauer (1995; 2014) in terms of different levels of the interpretation. In this regard, the students used the subjective approach to generate the concept slightly similar to the finding of Nichols and Stich (2003), also with the composition (Taura & Nagai, 2013) form to integrate with the previous knowledge. Therefore, the findings of the research were in the same alignment to the theory of Van Bakel (1995) as the personal design behaving that in the research paraphrased in terms of the personal procedure in the design process.

The students utilised a wide range of the elements to understand and applied as a source to generate concept in the thesis that it approved the theory of Carey (2000) in terms of the perceptual representation. In fact, the students applied both perceptual representation and conceptual representation to represent the individual understanding (Mugerauer, 1995) about those metaphors. It meant that the students represented their perceptions about those inspired elements in the thesis studio according to the archiving process of the mind (Lawson, 2005). However, the students required simulation technique to communicate the idea based on the theory of Goldman (2006). For this reason, the students applied the sketching technique as the main tool for concept generation, development, and presentation. In detail, the students presented the concept for the architectural thesis through interpretative sketches (Mugerauer, 1995; 2014) to visualize the thinking process (Laseau, 2001), and transforming the idea to an image (Cikis & Ek, 2010). Nonetheless, the students formed those generated concepts primarily based on their own perceptions (Lawson, 2005) as a schema in a prescriptive way, which this process differed from the problem solving grounded on the critical thinking and social responding (Simone,

2004). It also could demonstrate that the students influenced by the cultural, symbolic and poetic items in the context even before systematic architectural studies.

The results highlighted some contradictive key attributes in the thesis process, which highlighted by other studies in terms of a binary way of thinking. For example, studies underlined the hypothetical items such as impressionistic-expressionistic (Gardner, Kleiner, & Mamiya, 2004), perceptual-conceptual representation (Carey, 2000), process-procedure (Lang, 1987; Groat & Wang, 2002), inner sense-problem solving driven (Nichols & Stich, 2003; Taura & Nagai, 2013; Lawson, 2005), design strategy-design creativity (Groat & Wang, 2002), verbal-graphical (Laseau, 2001), process-product (Goldschmidt, 2004), personal-social production (Simone, 2004; D'Souza, 2007), descriptive-prescriptive (Madanipour, 1996; Lawson, 2004).

Moreover, the research recognized a personalized procedure between the students to design their thesis research process. It meant they moved forward-backwards in the concept generation process to personalize the thesis process selective, adaptive, and flexible. In other words, despite the fact that the students were introduced to the research methodology, they designed their own research process based on the topics, interests, and challenges. This personalization of the research design was discussed with other studies such as the innovation (Ezzy, 2002), research strategy and tactic (Groat & Wang, 2002), the specifications of the research in art and design (Frayling, 1993), interpretation approach (Mugerauer, 1995; Mugerauer, 2014), practice in research (Silverman, 2004), and architectural research process (Niezabitowska, 2018).

### **Conclusion**

Application of the abstract sources as an inspiration for concept generation is the common trend among the students in architecture thesis in the department of architecture. The symbolic, cultural, poetic elements influence the students deeply even

before the starting of the thesis studio. Despite the fact that the students are introduced to the research methodology, techniques, and precedents analysis before the final year of the studies, the inspiration of the architectural concept is apparently dependent on the wider context than the department. Certainly, those metaphoric aspects have a deep root in the contextual aspects of the students, which the systematic thesis process influences less.

Despite the students expressed that they follow the thesis process to reach the source of inspiration for the concept generation based on the architectural problem, the results of the study revealed that they are influenced strongly by the contextual factors. The conceptualization' outputs revealed that the students are led by the cultural values through a strong belief, which those personal perceptions based on social and cultural context inspired them in the conceptualization process.

The students are influenced by different factors in the thesis process in terms of some paradoxical aspects of the concept generation, development, and design, which the concept took the position between those aspects. In fact, the activities of the students in the architectural thesis project identify that they present certain levels of either research process or research procedure. In detail, either the students apply various methods in the proposed process, or in the individual perceptual procedure, in which both process and procedure influence the concept as either an abstraction of a notion or a detailed concept for the project.

It is remarkable results to discover that the supervisors are the important factor in the modification, development, and changing of the concept. The supervisors are the most effective factor on the students in the conceptualisation and thesis processes. Therefore, the deviation of the students from the proposed structure of the architectural thesis interlocks with the approach of the supervisors to perceive the thesis process as a final year project with the apprenticeship approach than a thesis design with full of creativity and innovation, in which in the struggling between the thesis structure and push factors to modify the project, the students create

their own personal procedure to design the thesis project in the architectural thesis design studio.

### References

Alerby, E. (2000). A Way of Visualising Children's and Young People's Thoughts about the Environment: a study of drawings. *Environmental Education Research*, 6(3), 205-222.

Anderson, N. M. (2014). Public Interest Design as Praxis. *Journal of Architectural Education*, 68(1),16-27.  
doi:10.1080/10464883.2014.864896

Bakare, T. V. (2012). Effect of seating arrangement on methodology in adult education classes in Lagos, Nigeria: implication for knowledge creation and capacity building. *Journal of Educational Review*, 5(3), 307-314.

Borden, I., & Ray, K. R. (2006). *The Dissertation: An Architecture Student's Handbook*. (Second, Ed.) New York: Architectural Press, Elsevier.

Carey, S. (2000). The Origin of Concepts. *Journal of Cognition and Development*, 1, 37-41.

Ching, F. D. (1996). *Architecture, Form, Space, Order*. New York: Architectural Press.

Ching, F. D. (2015). *Architectural Graphic* (6 ed.). New York: Willy.

Cho, J. Y., & Lee, E.-H. (2014). Reducing Confusion about Grounded Theory and Qualitative Content Analysis: Similarities and Differences. *The Qualitative Report* 2014 Volume 19, Article 64, 1-20, 64, 1-20.

Cikis, S., & Ek, F. I. (2010). Conceptualization by Visual and Verbal Representations: An Experience in an Architectural Design Studio. *The Design Journal*, 13(3), 329-354.  
doi:10.2752/146069210X12766130824975

- Crowe, N., & Laseau, P. (2011). *Visual Notes for Architects and Designers* (2 ed.). New York: John & Sons Publisher.
- D'Souza, N. (2007). Design Intelligences: A Case for Multiple Intelligences in Architectural Design. *International Journal of Architectural Research*, 1(2), 15-43.
- De Campos, C. I., Pitombo, C. S., Delhomme, P., & Quintanilha, J. A. (2020). Comparative Analysis of Data Reduction Techniques for Questionnaire Validation Using Self-reported Driver Behaviors. *Journal of Safety Research*, 73, 133-142.
- DoF. (2014). *Architecture Program Specification*. Kigali : the University of Rwanda .
- Dutton, T. A. (1991). *Voices in architectural education: Cultural politics and pedagogy*. New York, London: Bergin and Garvey.
- Elo, S., Kääriäinen, M., Kanste, O., Pölkki, T., Utriainen, K., & Kyngäs, H. (2014). Qualitative Content Analysis: A Focus on Trustworthiness. *SAGE Open*, 2(1), 1-10.
- Ezzy, D. (2002). *Qualitative Analysis: Practice and Innovation*. Sydney: Allen & Unwin.
- Frankfort-Nachmias, C., Nachmias, D., & DeWaard, J. (2014). *Research Methods in the Social Sciences* (8 ed.). New York: SAGE Publisher Ink.
- Frayling, C. (1993). *Research in Art and Design*. Royal College of Art Research Paper, 1(1), 1-5.
- Galle, P. (1999). Design as intentional action: A conceptual analysis. *Design Studies*, 20(1), 63–64.
- Gardner, H., Kleiner, F., & Mamiya, C. J. (2004). *Art through the Ages* (17 ed.). Wadsworth Publishing.
- Ghonim, M., & Eweda, N. (2019). Instructors' perspectives on the pedagogy of architectural graduation projects: A qualitative study. *Frontiers of Architectural Research*, 8, 415–427. doi:10.1016/j.foar.2019.01.007
- Goldman, A. I. (2006). *Simulating of Minds: the philosophy, Psychology, and Neuroscience of Mindreading* . New York: Oxford University Press.
- Goldschmidt, G. (2004). Design representation: Private process, public image. In G. Goldschmidt, & W. L. Porter (Eds.), *Design Representation* (pp. 203–217). London: Springer.
- Groat, L., & Wang, D. (2002). *Architectural Research Methods*. New York: John Wiley & Sons INC.
- Hartley, J. (2014). Some Thoughts on Likert-type Scales. *International Journal of Clinical and Health Psychology* , 14(1), 83-86.
- Hemyari, C., Zomorodian, K., Ahrari, I., Tavana, S., Parva, M., Pakshir, K., . . . Sahraian, A. (2013). The mutual impact of personality traits on seating preference and educational achievement. *European Journal of Psychological Education*, 28, 863–877.
- Huertas-Delgado, F. J., Garcia, M. J., Van Dyck, D., & Chillón, P. (2019). A Questionnaire to Assess Parental perception of Barriers towards Active Commuting to School (PABACS): Reliability and validity. *Journal of Transport and Health*, 12, 97-104.
- Joshi, A., Kale, S., Chandel, S., & Pal, D. K. (2015). Likert Scale: Explored and Explained. *British Journal of Applied Science & Technology*, 7(4), 396-403.
- Krippendorff, K. H. (2003). *Content Analysis: An Introduction to Its Methodology* (2nd edition ed.). New York: Sage Publications, Inc.
- Lang, j. (1987). *Creating Architectural Theory: The Role of the Behavioral Sciences in Environmental Design*. New York: Van Nostrand Reinhold.

- Laseau, P. (2001). *Graphic Thinking for Architects and Designers* (3th ed.). New York: Wiley.
- Lawson, B. (2004). *What Designers Know*. Oxford: Architectural Press.
- Lawson, B. (2005). *How Designers Think: The Design Process Demystified* (4 ed.). Oxford: Oxford Press.
- Lee, S. W. (2005). *Encyclopedia of school psychology*. Thousand Oaks, California: Sage Publications.
- Li, Q. (2013). A Novel Likert Scale Based on Fuzzy sets Theory. *Expert System with Application* , 40(5), 1906-1618.
- Madanipour, A. (1996). *Design of Urban Space: an inquiry into a socio-spatial processes*. London: Willy.
- Madanovic, M. (2018). Persisting Beaux-Arts Practices in Architectural Education: History and Theory Teaching at the Auckland School of Architecture, 1927–1969. *Interstices Auckland School Centenary Special Issue*, 9-24.
- Mauch, J., & Park, N. (2003). *Guide to the Successful Thesis and Dissertation: A Handbook for Students and Faculty*. New York: Marcel Dekker, Inc.
- Mayring, P. (2000). Qualitative Content Analysis. *Forum: Qualitative Social Research*, 1(2).
- Moretti, F., Van Vliet, F., Bensing, L., Deledda, J., Mazzi, G., Rimondini, M., . . . Fletcher, I. (2011). A standardized approach to qualitative content analysis of focus group discussions from different countries. *Patient Education and Counseling*, 82(3), 420-428.
- Mugerauer, R. (1995). *Interpreting Environments: Tradition, Deconstruction, Hermeneutics*. Texas: University of Texas.
- Mugerauer, R. (2014). *Interpreting Nature: the Emerging Field of Environmental Hermeneutics*. Robert: Fordham University Press.
- Neuman, W. L. (2006). *Social Research Methods: Qualitative and Quantitative Approaches*. London: Pearson Education, Ink, Fifth Edition.
- Nichols, S., & Stich, S. P. (2003). *Mindreading: an integrated account of pretence, self-awareness, and understanding other minds*. London: Oxford University Press.
- Niezabitowska, E. D. (2018). *Research Methods and Techniques in Architecture* (1st Edition ed.). New York: Routledge.
- Palmer, E. R. (1969). *Hermeneutics: Interpretation Theory in Schleiermacher, Dilthey, Heidegger, and Gadamer*. Northwestern University Press .
- RIBA. (2014). *Architects and research-based knowledge: A literature review*. London: Royal Institute of British Architects.
- Sarkar, P., & Chakrabarti, A. (2011). Assessing design creativity. *Des Stud*, 32, 348–383.
- Silverman, D. (2004). *Qualitative Research: Theory, Method and Practice*. New York: SAGE Publications Ltd.
- Simone, A. (2004). People as Infrastructure: Intersecting Fragments in Johannesburg. *Public Culture* , 16(3), 407–429.
- Sternberg, R. J., & Lubart, T. (1999). The concept of creativity: prospects and paradigms. In R. J. Sternberg (Ed.), *Handbook of creativity* (pp. 3-15). Cambridge: Cambridge University Press.
- Tafahomi, R., & Nadi, R. (2016). Dehistoricisation the Urban Landscape through Transition of the Enclosure Ratio in Urban Fabric of Gonabad City in Iran. *J Archit Eng Tech*, Volume 5(Issue 2). doi:10.4172/2168-9717.1000162

Tafahomi, R., & Nadi, R. (2020). Derivation of a Design Solution for the Conservation of a Historical Payab in the Redevelopment of Doloeei, Gonabad. *International Journal of Built Environment and Sustainability*, 7(1), 1-9. doi:10.11113/ijbes.v7.n1.407

Taura, T., & Nagai, Y. (2013). *Concept Generation for Design Creativity* (Vol. 8). London: Springer. doi:10.1007/978-1

Ullman, D. G. (1994). *The Mechanical Design Process*. Boston: McGraw Hill.

UR, t. U. (2017). *Guideline on the Project-based Learning Approach*. Kigali: the University of Rwanda.

Van Bakel, A. P. (1995). *Styles of architectural designing: empirical research on working styles and personality dispositions*. Eindhoven: Technische Universiteit Eindhoven. doi:10.6100/IR437596

Vargas-Hernandez, N., Shar, J. J., & Smith, S. M. (2010). Understanding design ideation mechanisms through multilevel aligned empirical studies. *Des Stud*, 31, 382–410. doi:10.1016/j.destud.2010.04.001

Weisberg, R. W. (1993). *Creativity: beyond the myth of genius*. New York: WH Freeman and Co.

Xi, L., Yuan, Z., YunQui, B., & Chiang, F.-K. (2017). An Investigation of University Students' Classroom Seating Choices. *Journal of Learning Spaces*, 6(3), 13-22.

Yang, Z., Becerik-Gerber, B., & Mino, L. (2013). A study on student perceptions of higher education classrooms: impact of classroom attributes on student satisfaction and performance. *Building & Environment*, 70(15), 171-188.