

Insight into Research Dilemma in Design Studios and Relationships with the Architecture Curriculum

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Abstract: Design studios play a significant role to train the students in architecture programs. Studios call as core modules in programs that are supposed to apply the knowledge, skills, and abilities of the students for the design's topic, process, and project. However, the design process follows a tradition in studios based on project design than research activities. The research applied the qualitative content analysis method to analyze the design studio modules' descriptions. The finding of the research identifies that the content of the modules' descriptions does less adapt to research activities. Despite the inductive content explanations, the analysis activities are far from a comprehensive research approach due to the missing aspects in the content of the modules descriptions in the curriculum. In conclusion, research activity is an essential segment of architecture education that has been missing in the curriculum due to the time and location. However, complexity, uncertainty, and variety in the design context remind the necessity of integrating design studio with real-world studio activities through research orientation.

Keywords: Architecture education, Curriculum, Design studios, Research activities, Modules description

Introduction

An architecture design studio as the core module in each semester leads the training process in the architecture program through a project-oriented activity. This process starts from the first year of study and continues until the graduation day based on precedents studies and design projects. In this structure, each design studio encompasses a significant role to combine the design knowledge, skills and abilities of the students in a design project. Design studios are called in terms of the core modules and other courses are supportive courses such as history, theory, and building technology.

The tradition of the apprenticeship training (Mitrache, 2012; Madanovic, 2018) in design studios refers to a process of studies about precedents projects in terms of the study of precedent projects in which designed by elite architects to get inspiration for designing new projects (Drexler, 1975; Draper, 1977; Tafahomi, 2021a). This process of study includes tracing, sketching, redrawing, and repeating those projects (Littmann, 2000; Garric, 2017) to get an idea for the new project in terms of composition in design (Cikis & Ek, 2010; Taura & Nagai, 2013). It means the leader of the studio introduces two or three precedents projects as examples to be inspired by the students for an architecture design project. Seemingly, in this structure, a research activity

takes into consideration inessential in design studios due to the syllabuses of the course, the structure of the curriculum, and the implementation process.

The report of the Royal Institute of British Architects revealed that current trends in architecture education, firms, and projects are faced with deficiencies in architectural research activities (RIBA, 2014). This problem is not just a personal approach to doing research on the specific trend or interpretation. In fact, it has rooted in the architecture curriculum, program expectation, and learning outcomes that lead the research activities (Tafahomi, 2021b). Despite the studies on the research activity as the new generation of knowledge in the architecture's domain (Groat & Wang, 2002; Niezabitowska, 2018; Antrop, 2013; Deming & Swaffield, 2011), apparently, the research activities have been minimized in the training process of the program.

Research in architecture has been one of the important topics to engage the mind of researchers to discuss, develop, and publish theories, practices, and critics in academic and professional activities in the last two decades (Frayling, 1993; Groat & Wang, 2002; Niezabitowska, 2018; RIBA, 2014). As a matter of fact, the research activities not only emphasize the real research projects in private firms to reach a new knowledge in architecture but also the research is an essential part of the syllabus, curriculum, and the departmental plan to develop common skills in an academic context (Hmelo-Silver, 2004; Madanovic, 2018; Tafahomi, 2021c).

Studies referred to either problem-based or project-based oriented learning processes to support the research activities in the engineering and architecture programs. Studies have recommended problem-based learning for science (Williams & Robert, 1997; Hmelo-Silver, 2004) and project-based learning for practical professions (Blumenfeld et al., 1991; Prince & Felder, 2006; Kokotsaki et al., 2016). In detail, the problem-based learning approach applies to discover the possible answers to a problem through systematic research (Hmelo-

Silver, 2004; Kolmos, 2009) based on self-oriented research. However, the project-based learning approach includes similarities to the design studio process including tasks of projects, precedents studies, and design as the final product (Prince & Felder, 2006; Bell, 2010; Frayling, 1993; Franz, 1994; Tafahomi, 2021d).

According to the curriculum of the program, it is supposed that the students study architecture based on the core design studios, history, theory, and building technology (DoF, 2012). The curriculum anticipates precedents studies, critical thinking, and problem-solving to achieve the learning outcomes (DoF, 2012) although the learning outcomes were described in an implicit way.

In brief, the background of the undergraduate architecture program and curriculum refers to 2008 in the University of Rwanda with inspiration from a reference curriculum from the region. The booklet of the program specification includes the structure, aim and objectives, learning outcomes, and module descriptions. It was revised two times in 2009 and 2012 although the structure and the content remained untouched (DoF, 2012).

Although the curriculum includes a module with the name architectural research methodology, both content and the expectation from this module could fewer meet a research approach in the program (DoF, 2012; Tafahomi, 2021a). The main objective of this research is to analyze the missing aspects of the research approach in the design studios by analyzing the modules description of design studios in curriculum and the implementation of that.

Argument on the Research in the Architecture

Despite the rich literature on the classification of the research into pure and applied (Marshall & Rossman, 2006; Johnson & Christensen, 2014) or applied, strategic, and disciplinary research (Groat & Wang, 2002), the critical view argued that this classification of research unfitted with activities in architecture education (Frayling, 1993). Frayling recommended three

types of research including ‘research-in, research-through, and research-for’ art and design (Frayling, 1993). However, Till has criticized that three categories less support the outputs of the profession including architectural process, building, and the performance, which need other categories for research in architecture (Till, 2008).

In fact, the argument in architecture research refers to long experience in design studio activities (Frayling, 1993), integration of design studio with the firms (Madanovic, 2018), construction operation and design (RIBA, 2014) than a necessity of a research question (Groat & Wang, 2002). This differentiation is highlighted when the history of the architectural institutes addressed a strong tendency on the apprenticeship style of training in the private firm and technical offices than formal education (Madanovic, 2018), which borrowed from a construction project than academia (Dizdar, 2015). Apparently, research activities in an academic center fundamentally differ from research in a firm office (Mitrache, 2012), in which firms concentrate on the specific request of clients (Blumenfeld et al., 1991), the academia includes a wide range of the themes and topic (Piatkowska, 2016) particularly through research centers in universities (Mitrache, 2012).

Research Methods in Architecture

There are many doubts and questions about the architecture methods in both academia and professional institutions. The study revealed that the research approach in art, architecture, and design is a new topic on the agenda of academia and professional parts that are under development by time and location (Clemente et al., 2017). The studies criticized that the education process in the tradition of architecture training was established based on apprenticeship procedures in which research activities in the context of real users did rarely take place in a design studio (Drexler, 1975; Draper, 1977; Tafahomi, 2021a). Perhaps, for this reason, RIBA (2014) mentioned that research activities are essential for all architects. However, the main reason of the challenging between the academic and practical parts of the

architecture project took place in the transparency, accessibility, and dissemination of data and results (Clemente et al., 2017).

Another key issue in architecture research has been the effects of the transitional process of enlightenment, science, and context on architecture education (Littmann, 2000; Bashier, 2014) that appeared in the proportion of attention to context and creativity aspects in the architecture design studio (Bashier, 2014; Tafahomi, 2021e). The context refers to the social context in the architecture design process (Combrinck, 2018; Tafahomi & Nadi, 2021). In this perspective, the social aspect of the design and contextual factors are highlighted (Lefebvre, 1976; Simone, 2010; Thorpe & Gamman, 2011; Tafahomi, 2021d) in terms of cognitive process and problem-solving (Onal & Turgut, 2017). Contextual aspects of the research have been a core agenda for the activities in the architecture departments in some universities (Combrinck, 2018) with emphasis on the real architectural problem, for real people, in a real context (RIBA, 2014). The approach reemphasizes the contextual and the problem although creativity refers to the project production.

The conceptual paper of Frayling (1993) interpreted the Vitruvian view of architecture in terms of ‘commodity, firmness, and delight’ for ‘construction, utility, and aesthetic’ (Proudfoot, 2000, p. 4). In this orthodox view, he assumed three aspects of the analysis in architecture including architecture analysis, criticism, and evaluation. In this foundation, Frayling (Frayling, 1993, p. 3) listed research activities in art and design in three clusters in terms of “Research In, Research For, and Research Through” art and design. He did not detail each approach in the research and endeavored to open the discussion on the topic. However, importantly, he emphasized that all activities in design studios are part of research through design.

Franz (1994, p. 436) articulated research in architecture in three main orientations in terms of ‘frame-of-references’. The first orientation he called ‘technically oriented research (TOR)’

with three subtitles including systematic, computational, and management. Systematic research refers to the performance of buildings or projects in terms of the efficiency in which the results of the research lead to the typology of the projects and providing of laws and principles. Computational research refers to computer-based technology that provides better detailing, presentation, and expectation. The management frame refers to the architectural tradition to deal with the architecture, education, design and construction in which is attempted to control the process. The second orientation was mentioned in terms of ‘Conceptually Oriented Research (COR)’ (Franz, 1994, p. 438) which refer to the relation between the researcher and the topic of the research, with two branches including psychological and environmental aspects. The psychological frame refers to the subjective formulation and articulation of the objectives as research topics that from person to person vary. However, the environment frame refers to the social, cultural, and environmental forces that orient the research activities such as participatory and community-based research. The third orientation was called

‘Philosophically Oriented Research (POR)’ with two frames including epistemological and ontological. The epistemological refers to the self-enlightenment of the research to fulfil the knowledge based on a self-understating of the research activities based on the self-knowledge-acquisition through a personal journey in research. The philosophical frame refers to the human relation and built environment and how the human being develops or limits specific aspects of the development.

Till (2008) mentioned that architectural projects include varieties and so architectural projects could encompass at least three sorts of outputs including ‘project, process, and performance’ (Till, 2008). Groat and Wang (2002) also recommended a wide range of experimental activities with the more dynamic aspects of the research in the architecture that architects take into action in real projects. They proposed the word strategy for the research than methods and techniques as a continuous stage that results from philosophy and theory of architecture.

The relationship between design and research still is the key question in the architecture

Table 1: the classification of research activities by Franz

Title	Subtitle	Specification	Example
Technically Orientated Research (TOR)	with a systematic frame-of-reference	Focuses on the lows and principles	Performance of materials and project
	with a computational frame-of-reference	Computer aid Design	Detailing, rendering, and presentation
	with a management frame-of-reference	Tradition to do the design activities	Education, design, and construction
Conceptually Orientated Research (COR)	a psychological frame-of-reference	The effects of live experience to define the problem	Selection of the problem based on subjectivity
	a person-environment frame-of-reference	Selection of problem due to the cultural and social situation	Social and cultural aspect and effects of design
Philosophically Orientated Research (POR)	an epistemological frame-of-reference	self-enlightenment of the research	Investigation in specific aspect of the architectural design
	an ontological frame-of-reference	Relation between the man and the world	The reciprocal effects of design and context

Source: Adapted to (Franz, 1994)

programs, which also the relationship with art, science, and engineering. Despite the references to research techniques than approaches (Moughtin et al., 1999; Groat & Wang, 2002; Niezabitowska, 2018), some studies on the research activities tended to classify the research into the problem-based and project-based learning approaches in architecture and engineering education. The tendency of project-based learning structure included some similarities to practical professions such as architecture. Apparently, both the experimental approach to learning including the project-based and problem-based learning processes could clarify the interplay with the architecture products. Nonetheless, the thoroughgoing observation of Kolmos identified that the process of the inclusiveness of both problem-based and project-based learning took place in universities at different times gradually (Kolmos, 2009). Perhaps, discussion of both approaches with an architectural lens could illustrate the process for further discourse on the topic.

Problem-based Learning Approach

The critical study recognized the problem-based learning approach in the theory of thought's John Dewey (Hmelo-Silver, 2004) by focusing on pragmatism, functional psychology, and practical learning (Neuman, 2006). This approach was one of the foundations of the cognitive school and constructivism theory in education (Williams & Robert, 1997) based on critical thinking and

problem-solving (Barrows & Tamblyn, 1980). Problem-solving takes the position in the classroom when the answer to the problem is not defined clearly and needs extra activities (Seifert & Sutton, 2009; Tafahomi, 2021e). In this way, problem-based learning could expose a variety of methods and processes to answer a single problem (Hmelo-Silver, 2004). It meant that problem-solving is dependent on the self-journey of the researcher (Groat & Wang, 2002; Tafahomi, 2021a). Therefore, this approach facilitates the process of the construction the knowledge (Hmelo-Silver, 2004) through a personal research activity (Williams & Robert, 1997; Tafahomi, 2021b).

Some steps have been listed in terms of common activities in the problem-based learning such as a perception of a problem, presentation of the problem, studies on the problem, methodology and methods, and the results and the conclusion (Marshall & Rossman, 2006; Neuman, 2006; Silverman, 2004; Silverman, 2010). In the light of the exploratory interpretation (Palmer, 1969; Dreyfus & Rabinow, 1982) could illustrate the reason behind each stage of the activities as a logic-driven, which Figure 1 attempts to present this interplay of the process of problem-based learning approach although other researchers used a different pattern to present the stages and the interrelation among those elements (Groat & Wang, 2002; Henn et al., 2006).

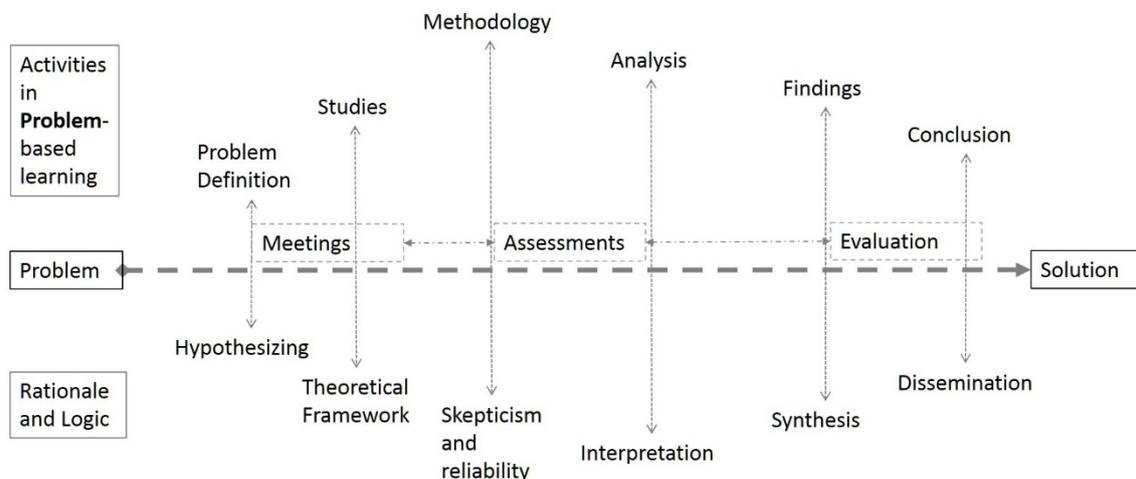


Figure 1: the Process of Problem-based Learning

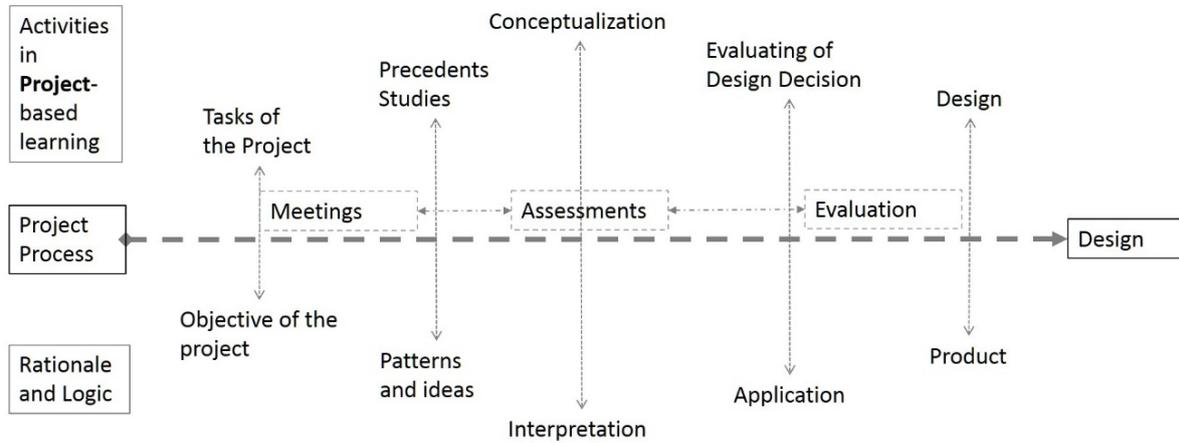


Figure 2: the Process of Project-based Learning

Although Figure 1 presents a linear process from the problem definition to the conclusion, the logical process demonstrates the methodology, reliability, and analysis of the problem. Both application and implementation of the results from the investigation and research process are depended on further research or project.

Project-based Learning

The project-based learning also has included a long time of experience in the practical professions such as architecture, construction, and engineering, which literally refers to the physical activities of the learners in the training process particularly through an apprenticeship process in projects (Drexler, 1975; Draper, 1977; Proudfoot, 2000). The activity starts with a specific task to design a final output (Prince & Felder, 2006) such as a concept, building, machine, or a system (Bell, 2010). The studies discussed the advantage of applying the project-based learning in three categories first, self-controlling of the students on the plan of the project, second, the connection of the project with both real and contextual aspects, and third, the application of different methods in the project presentation (Helle et al., 2006). However, the study argued that the project-based research activity is not fitted in the architecture design studios (Roberts, 2007).

The study highlighted the outcomes of project-based activities with some criteria such as self-role, student-center, and a constructivist style of learning from tasks to design (Kokotsaki et al., 2016). Blumenfeld and colleagues also highlighted the role of project-based learning with some important specifications such as the live project, contextual factors, and applicability on the site (Blumenfeld et al., 1991).

It was advocated that this approach enhanced the innovation among the students to achieve significant results (Vreman-de Olde et al., 2013). Although the study evaluated project-based learning as a method full of fun and motivation for the students (Noordin et al., 2011), evidence exposed the high influence of instructors as a superior on the students (Han et al., 2015; Tafahomi, 2021a). By putting project-based specifications in a diagram, both the process and the logic of the activities could form as Figure 2.

Figure 2 demonstrates a linear process in the project-based learning process. In fact, the main activities in the figure are grounded on the task, studies, conceptualization as a prototype, and the design as a product. This process operates through the interpretation of the previous

experience and personalization of knowledge for improving the product than repeating it.

Architecture Design Studio and Research Process

The style of the running architecture design studios has been under critics in recent years (Proudfoot, 2000). At the same time, architecture design studios have been unique and specific courses in the architecture program that perhaps can be compared with an art design studio, which was advocated by the tradition of Beaux Art (Drexler, 1975; Draper, 1977) in terms of ‘learning through doing’ (Neveu, 2009, p. 26). The design studio is the place where the students work on the studio theme and topic through precedents studios, redrawing, sketching, concept generation and design outputs (Collins, 1979). The process of an art studio and architecture have similarities due to drawing from the real object and drawing from real design projects and products in terms of precedents studies (Frayling, 1993). Despite the common process, each design studio is unique based on the thematic projects and the context of the study. In this case, the leader of the design studio either defines a specific design project or encourages the students to select a project for development through drawing, desk critics, and presentation sometimes in a ritual design studio process (Schon, 1987; Neveu, 2009; Owen, 2009). Despite the varieties of design studios

processes, the design studio may start from either concept development is called a ‘protocol’ (Schon, 1987, p. 46) or precedents analysis based on the introduced best practice to get inspiration that normally was introduced by the studio leader (Tafahomi. 2021a). This activity in the design studio is included analysis in relation to the precedents that are called research through design (Frayling, 1993) or discovery by design activities (Schon, 1987). Figure 3 conceptualizes the design activities in the architecture studios based on different stages of design.

Nevertheless, the curriculum of architecture programs and studios module descriptions have been important criteria to lead the studio coordinator in the leading process of the design studio. The leader of the design studio arranges the plan of the studio in the orthodox architecture (Collins, 1979) called by Shon in terms of reflection in action through a dialogue between the students and instructor (Schon, 1987) which reminded the ritual and tradition in architecture education (Owen, 2009). However, the structure of the module descriptions, learning outcomes, and the research orientation in the curriculum are critical in the restructuring the research as part of the studio.

In fact, the tradition of the design studio is a linear process although the research process is

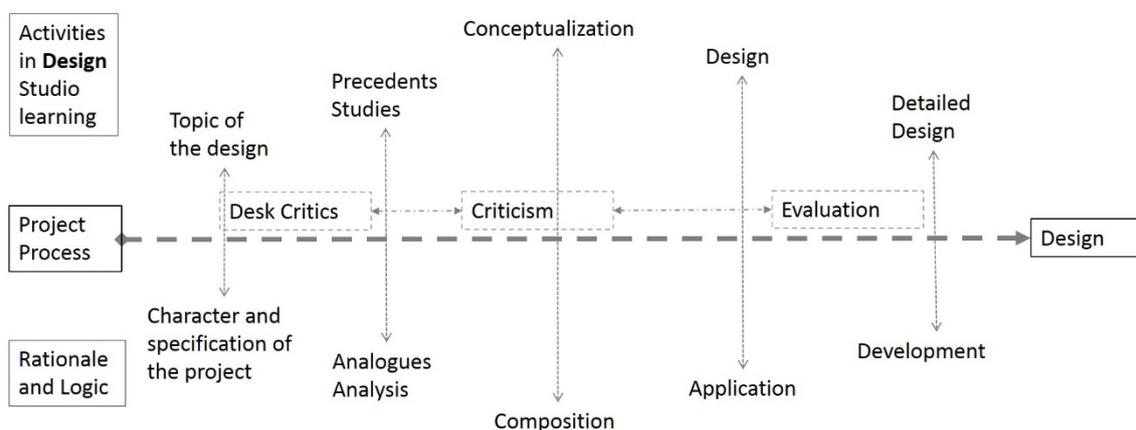


Figure 3: Architecture Design Studio Process

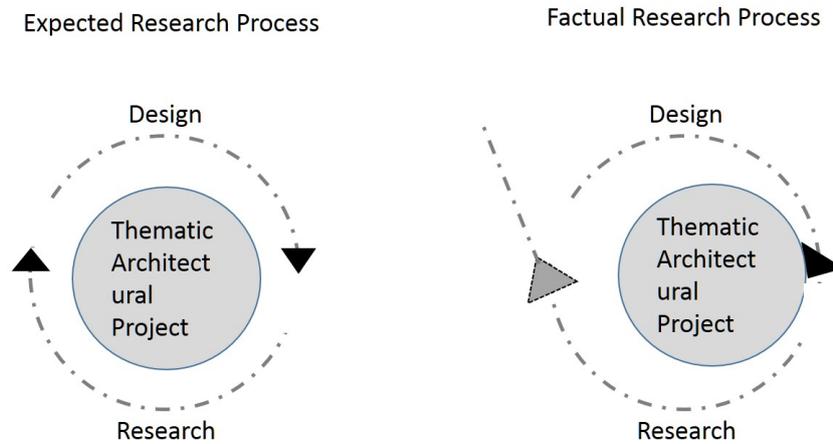


Figure 4: *Conceptualization the research and design activities*

more widely separated and abandoned from the design topic. The research takes into account the research takes into account a ‘counterproductive’ action in which drawings result in a design proposal (Stojanovic, 2014, p. 269). In addition, the study argued that the current structure of the design studio is not adapted to the education style in which the students need to understand, remember, and apply (Proudfoot, 2000). Nevertheless, the research activities are not a clear task in the design studio, which was highlighted as a gap in engineering (Fraser et al., 2018). In fact, although the design trends concentrate on the

project, the research trends spread toward other areas to explore more data, aspects, and factors for analysis activities. Figure 4 attempts to conceptualize the trends between design and research activities.

As a theoretical framework of the research, the literature highlighted that architecture design studios trended toward project-based learning. However, the results of the studies about relationships between research and design revealed almost four driven factors that Figure 5 represents the relationships. The relationships took place between four factors including

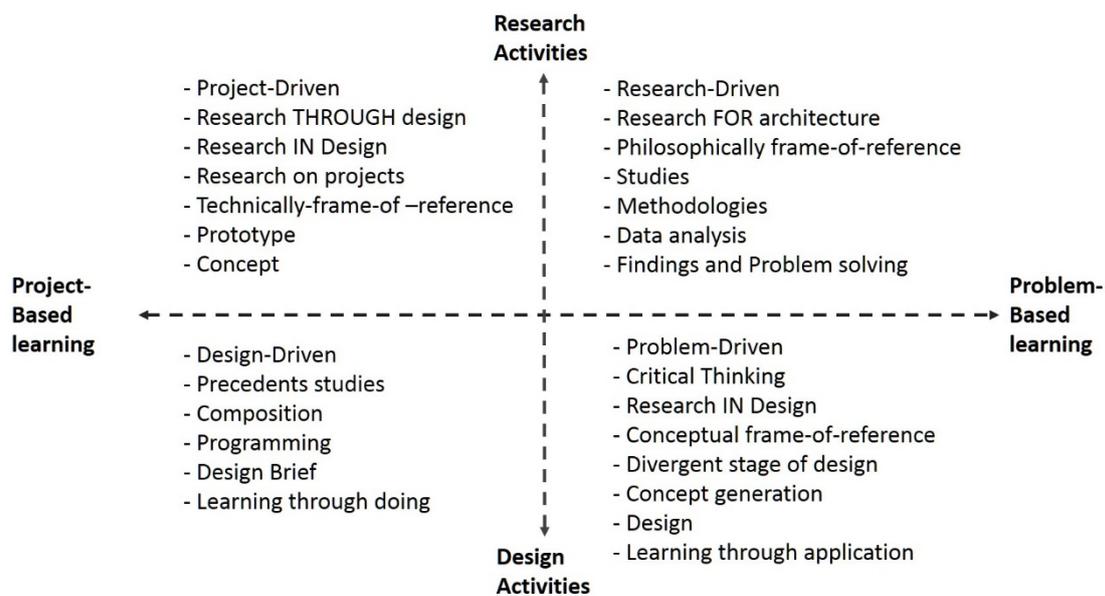


Figure 5: *the Research Paradigm in Design Studio*

research, design, problem-based, and project-based learning orientations in architecture education. Design-driven refers to a design studio that is focused on the design outputs. The project-driven is oriented toward the specific products in a limited theme, character and specification such as a competition or typical architecture project for the architecture design studio. The problem-driven project is focused on the specifics aspects of the design project to qualify, improve, or enhance the performance or functionality of the specific project. The research-driven projects refer to the research to improve the approach of design related to the context or specific condition of the users or time and location. Seemingly, the content of the syllabus, module description, and curriculum about the design studios' activities, process, and learning outputs have a significant role to lead the design studio toward research activities.

Method and Materials

The methods and material included some sections to clarify the activities were taken into account in research such as methodology, research design, research process, data specification, time and context of the study, and research limitation.

Methodology: similar studies used qualitative research methods for the analysis of the activities in both research and design activities (Groat & Wang, 2002; Lawson, 2005). The researchers applied content analysis (Krippendorff, 2003), ethnographical studies (Schon, 1987), hermeneutic interpretation (Mugerauer, 1995; Proudfoot, 2000), and structured behavioral patterns of the participants in the context of the research (Tafahomi, 2021e; Tafahomi & Nadi, 2021). The content analysis was applied by extracting the meaning of the text and documents with a scientific technique to reveal the meaning behind the words in the important document (Tafahomi, 2021c). Drisko and Maschi theorized the content analysis into three levels of analysis including basic, interpretative, and qualitative analysis (Drisko & Maschi, 2016). This technique was applied to explore the meaning of the text, themes of sentences, and viewpoints of speech, movie, or interview

(Krippendorff, 2003) although Cho and Lee classified this technique under the unobtrusive method (Cho & Lee, 2014). Moretti et al (2011) defined the content analysis in terms of a verified method for classification of the meaning in texts based on the similarities and dissimilarities. Qualitative content analysis was applied widely in different fields of study such as psychology, sociology, linguistics, education, and built environment (Mayring, 2000). Although the critical point of view highlighted the content analysis for verbal data (Schreier, 2012), the studies confirmed the application of this technique in the questionnaire and texts (Elo et al., 2014; Krippendorff, 2003).

In the precedents studies, for example, Carmona applied this technique in the interpretation of the urban design quality in the UK by designing a list of criteria to search in the relevant documents (Carmona, 2001). Lang applied this technique to interpret urban design projects with a phenomenology approach to discover the meaning and objective of the projects (Lang, 2005). In another research, Caliskan and Serce realized that the level of the research-based papers was so low due to thematic words of research with an interpretative approach (Çalışkan & Serçe, 2018) in the interpretation of the typology of the research papers in the education. This kind of thematic research (Vaismoradi et al., 2016) could apply technically to both digital and manual sources (Spannagel et al., 2005).

Research Design: the research was designed based on qualitative methods (Groat & Wang, 2002; Miller et al., 2004; Neuman, 2006; Silverman, 2004; Silverman, 2010) with the application of the content analysis techniques (Krippendorff, 2003) and the interpretative approach (Mugerauer, 1995; Groat & Wang, 2002; Mugerauer, 2014).

The studies highlighted that content analysis is inseparable from interpretation (Krippendorff, 2003; Schreier, 2012). Despite a variety of schools in the interpretation of built environment (Mugerauer, 1995; Mugerauer, 2014; Tafahomi & Lamit, 2013), all of them

dealt with texts, features, and traces (Mugerauer, 1995; Cho & Lee, 2014). To apply the technique in the analysis of the documents, the definition of the list of criteria in terms of units of the analysis was emphasized by studies to discover, analyze, and interpret specific topics, themes, words, meaning (Cho & Lee, 2014) with a concentration on the architecture and built environment aspects (Hancock, 1995; Seamon, 2015).

Research Process: the research process was grounded on analyzing the curriculum of the undergraduate architecture program at the University of Rwanda. The curriculum included 268 pages including the program structure, aim and objectives, learning outcomes, and modules description. To find out those themes, the curriculum was decomposed particularly the aim and content, learning outcomes, inductive content, and learning strategies of the module description of design studios in different years. In addition, the architectural research methodologies module description was added to the analysis owing to the inseparable relationship with the design studios. Therefore, the related variables to the research activities such as themes, keywords, and phrases were extracted and analyzed. Particularly, some keywords and activities took into consideration profoundly to discover the level of research concerns such as investigation, data, methods, techniques, research, analysis, problem definition, and problem-solving.

Data Specification: data included the curriculum specifically the modules description of the design studios and relevant modules such as the research methodologies. Data in the content of the module descriptions were selected based on the words, sentences, and paragraphs that refer to the research activities such as research, analysis, site visit, and exploration.

The curriculum included 2 Basic Design studios in the first year, 6 architectural design studios from the second to fourth year, and 2 thesis design studios in the fifth year. Each module description was structured in 14 sections, 8 parts referred to the teaching, learning and

assessments and 6 parts were administrative requirements such as name, code, teaching hours, and approval process. The teaching sections of the modules included aim and content, learning outcomes, inductive content, learning and teaching strategy, assessments strategy, inductive resources, and strategy for feedback and student support. The first four subtitles content the major part of the guideline for the designing of the studio activities.

Time and context: the curriculum of the architecture program was designed in 2009 and revised on 2011 and 2012 slightly. The program run for almost 10 years and the studio's coordinators have had the responsibility for the running the studio. The program included 10 design studios based over two semesters for five years. The curriculum was designed based on the core design studios to train the students based on the practical activities. The theoretical courses were introduced as supportive modules to familiarize the students with other related topics in the studio practical activities. The design studios included portable drawing tables and chairs with around 25 to 35 students to work in both group and individual activities. Some design studios have created links with the communities to get ideas for the design in terms of community outreach such as affordable housing, community center, or kindergarten. Each studio included a syllabus for the design process, a timetable of activities, and desk critics and evaluation in terms of formative and summative assessments. In fact, the curriculum is the key reference for the studio leaders to arrange the design activities through the studio syllabus.

Research limitation: the research was designed based on content analysis of the curriculum to discover the research requirements in the module descriptions. Therefore, the researcher lost the opportunity to get feedback from both students and instructors through interviews to find out their personal judgement about the research activities in the design studios.

Result

The content of the module descriptions of design studios was analyzed per year based on the written curriculum as the official documents in the archive of the department.

First-year design studio: the studios focused on the drawing abilities of the students and the concepts generation. According to the content of the learning outcomes, it was supposed the students learn the activities in the studio through practical activities such as 2 and 3D drawing. The learning outcome emphasized freehand drawing, physical model making, presentations such as pin-up, and communication through verbal presentation. The inductive content referred to the materials and fabrication free of a realistic building design. Seemingly, the content of both modules in the first year was targeted to lead the students for learning architectural elements through redrawing in the design studios.

Second-year design studio: the second year starts with the Tectonic and Order topic that is supposed to introduce the students to the programming and the human condition in the design process. The learning outcomes emphasized the rhythm, order, hierarchy, and proportion in design. The indicative content divided the semester into three parts including the design exercise, context and site research, and design project. This is the first attempt to lead the students in research activities outside of the design studio. For this point, this design studio is also called Architecture and Environment. Despite the title of the research, the activity was introduced in terms of selecting a site and dividing between the students for the partial design than a deep analysis process. The learning strategies were designed based on self-learning, peer-learning, group activities and getting feedback from juries. The second design studio was mentioned Architecture and Society in the second year. The aim and theme of the module was described as architecture beyond of physical form of building and paying attention to social, environmental, and contextual matters. The learning outcomes referred to both precedents and research activities for the design solution to develop a systematic and spatial

design solution. The inductive content of the module recommended four stages for the design project including 1) extended site research, 2) small design project, 3) intensive user and public research, and 4) final design project. In the third section, the students have been invited to do research on the public uses and specific user groups to bring into programming for the project.

Third-year design studios: third year includes two studios first Matters and Scales, and second cultural context. Matters and scale leads was introduced as a design project that supposed the students to apply all the lessons learnt in the designing of a small project and develop to a small master plan for the given area or site. The learning outcomes is similar to the other studio just moving forward and backward between the scales was recommended. The inductive content highlighted the site specification and analysis as key criteria for the design including physical, environmental, and behavioral aspects. The teaching and learning strategies referred to the freedom of the students for research and exploration.

The cultural context design studio was supposed that the studio visits historic cities in the East Africa region to get inspiration for the conservation, design, and vitalization in the new context. Therefore, the design project is divided into two parts analytical stage and understanding of the context and situation and the design of the project. The learning outcome focused on the design in the new context and sustainability, however, the precedents studies and research activities were highlighted as key criteria for the design of the project. The inductive content widely invited the students to investigate important criteria in the site for data collection and analysis including environmental, spatial, architectural, contextual, and functional factors. The design of the final project is resultant of the research and analysis process in real sites and contexts. The teaching and learning strategies were similar to the first semester.

Fourth-year design studios: the fourth year includes two thematic design studios including

urban ecology and participatory design. The aim and theme of the first semester referred to the urban and pre-urban relationship with the architectural design by paying attention to sustainable design through natural systems. The learning outcomes referred to the human and natural relationships and interactions and recommended urban and architectural design strategies to solve complex problems through multidisciplinary thinking. To support the idea, the inductive content recommended the site analysis and conceptual master plan for the design project. The latching and learning strategies are similar to other years, just was added group work and peer-learning process in the design studio. The second semester with the title of the participatory design was supposed to engage different stakeholders in the design process. Despite the unclear aim and theme for the design studio, the urban design projects such as public spaces or public buildings were taken into account as thematic projects. The learning outcomes highlighted social, contextual, functional, and environmental design values for the projects. The inductive content did not develop in a detailed structure and just indicated analysis and urban design and project design phases. The learning strategies repeated previous years and just indicated the guest and community critics in the students' presentations.

Final year thesis design studios: the final year includes thesis one and two as a continuous design project in one academic year. The first semester encompassed three modules including Research and Documentation, Project Programming, Conceptual Design, and the second semester included Conceptual Design and Resolution, Project Presentation, and Architectural Development Process. According to the modules descriptions, the first semester focused on the research, programming, and conceptualization, while the second semester targeted the design solution, project development and presentation. For this reason, the major part of the research activities was arranged in thesis 1.1 research and documentation that was supposed to lead the students for the research activities, the research project, and the thesis project through self-

directed studies by the students. The learning outcome indicated using of a variety of methodologies and research results as a platform for design processes and was expected that the students develop arguments in the design-decision-making activities. In addition, the section requested applying the interview technique for users and research backgrounds to respond to a need-based problem. The indicative content listed three topics based on the research activities including research and documentation, self-directed research, and research presentation. The learning strategies referred to one-by-one- meeting with the thesis committee as a supervisory process to lead the research projects. Other modules in the thesis program were supposed to be constructed on the results of the research activities outputs.

Architecture Research Methodologies

Module: the students take architectural research methodologies to prepare the backbone of the research requirements for the thesis program in the second semester of the fourth-year. The aim and content of the module underlined research methods, documentation techniques, critical analysis and writing assignments series as a preparation process the students for the thesis project. The learning outcome is a paraphrase of the thesis 1.1 and the inductive content was listed in three tasks the research meanings, data collection and analysis, and reporting of the research. Nevertheless, the module description was free of any detailed information about the qualitative or quantitative methods.

Interpretation of the Results

The results identify that the four sections are engaged to lead the studio coordinators and students in the research activities in the design studios including learning outcomes, inductive content, learning strategies, and architectural research methodologies. The aim and contents are less detailed and without deep description, expectation, and process of research activities in the design studios and generally attempt to draw a general perspective about the themes and topics.

Learning outcomes: the learning outcomes of the module descriptions include four aspects of learning, A. knowledge and understanding, B. cognitive, skills and application of knowledge, C. communication, ICT, analytical techniques, D. general skills. Despite the differentiation to arrange the topics in the learning outcomes, the major parts of the learning outcomes about the research activities take place in parts A and B such as site visiting and analysis, interview, and graphical analysis. Other parts target the same outputs such as integration and application of the theoretical modules in the design studios and the presentation through ICT skills. The similarity of the learning outcomes reduces the specialty of the modules in the different years and topics.

Inductive content: the inductive contents are included both structure and process of the design studio importantly the specific task, sequences, and the relationship between the aim and theme of the design studio, design activities, and the design project. Second and third-year design studios are structured in the four and five stages that the second and third sections of the inductive content reference either research activities or site and context analysis. Despite the linear process, the structure of each task highlights the analytical activities that are expected for the students to undertake in the design studios such as the topic of the project, site and contextual analysis, conceptualization or master plan, design of the project, and detailing. This structure leads both studio instructors and the students to deal with the research activities in the expected structure of the curriculum. Nonetheless, this detailed structure of the inductive content did not exist in the first, fourth, and fifth years of the study.

The teaching and learning strategies: the learning strategy section refers to the strategy of teamwork, individual, presentation, communication and desk critics in the design studio. In fact, the section is included a similarity in the whole modules that the link between each module specification and the teaching strategy of the model is difficult to recognize. Just the thesis module could be

ignored from this similarity due to the thesis committee.

While the architectural research methodologies model is presented in the fourth year to lead the students for the thesis project, the missing research orientation in the whole design studios appears obviously. Not only the design studios are arranged in the style of the linear process of the design but also the theoretical courses as supportive courses are less support the design studios' activities for research orientation activities. Seemingly, one course in the fourth year could less cover the research gap in design studios.

Furthermore, syllabuses include the section for the studio culture that referred to the activities in the design studio such as discussion, critical thinking, physical model making and site visiting. However, the studio culture structure is dependent on the studio leader's approach to how to apply and implement the studio culture due to missing a clear guideline in the curriculum.

In summary, the research activities have been mentioned in the structure of the module description of the design studios implicitly without a specific section or title for it. It was supposed that the instructor of the design studio reformulates the module description to a fitted syllabus for the students and design process for the research activities in and out of the design studio. Although some module descriptions are more structured than others, this structure could not essentially create an opportunity to align the analytical activities in the different years of the design studio.

Discussion

The research activities in an architecture design studio still is a fundamental dilemma (RIBA, 2014; Tafahomi, 2021a) that referred to the epistemology of architecture education (Franz, 1994; Groat & Wang, 2002). This topic resulted in a variety of classification, terminology, and interpretation of the research in architecture education (Frayling, 1993; Franz, 1994; Groat & Wang, 2002; Till, 2008). Importantly, the research activities of architects in both

academia and professional have resulted in either articulation of understanding of the activities such as research through architecture (Frayling, 1993), technically frame of reference (Franz, 1994), and architecture performance (Till, 2008), or applied methods in the research process such as strategies (Groat & Wang, 2002), design generation (Taura & Nagai, 2013), and research techniques and methods (Deming & Swaffield, 2011; Niezabitowska, 2018; Tafahomi, 2021c).

The theory of Frayling as the research-through art, design (Frayling, 1993) and architecture was one of the common approaches to design modules description of the curriculum and specifically the learning outcomes grounded on project-based learning. This approach was adapted to the tasks-oriented activities (Prince & Felder, 2006) based on the instruction of the instructor (Han et al., 2015). Despite the emphasis on the self-role, and students-center in a project-based learning process (Kokotsaki et al., 2016), the content of the curriculum reduced the freedom of the students to do self-design, self-control, and multimethod (Helle et al., 2006) to achieve the outcomes of constructivist approach in the learning process (Williams & Robert, 1997). Both program structure and learning outcomes were muted and left the module under the authority of the instructor to carry out the research by design based on the apprenticeship (Madanovic, 2018; Tafahomi, 2021a). In this perspective, the curriculum included deficiency to develop skills as mentioned by Till in terms of “life-long-learning” (Till, 2008).

The unstructured form of the inductive content of modules description was fitted to the theory of the research by design (Frayling, 1993) as a normal process in the architecture studio design, this approach grounded on the theory and history of architecture in the apprenticeship tradition of learning (Mitrache, 2012; Madanovic, 2018), which unfitted with the contextual and social requirement (Lefebvre, 1976; Simone, 2010; Thorpe & Gamman, 2011; Tafahomi, 2021a). For this reason, the new movement in the architectural departments advocated social aspects of design with the

problem-solving approaches (Onal & Turgut, 2017; Combrinck, 2018).

The module description led the design studio toward the technical research activities with an emphasis on solving small and technical problems such as materials, drawings, and forms of buildings through innovation in the design studio which is similar to the theory of Franz (1994) in terms of technically oriented research. This activity also was called research through design by Frayling (1993). Despite the long background for this approach in the design process, the critical studies challenged the education of architecture programs as an unmodern style of education (Garric, 2017; Madanovic, 2018), an unrealistic context for the design (Drexler, 1975; Draper, 1977), and conceptual than research-based (RIBA, 2014; Tafahomi, 2021a).

The module description of the research methodology course was designed with an eclectic approach to encompass both problem-based and project-based learnings (Hmelo-Silver, 2004; Kolmos, 2009; Tafahomi, 2021c). Despite the content of the module demonstrating the problem-based learning, the learning outcomes of the module fitted the project-based learning. In spite of the argument on the ill definition of both project-based and problem-based learning in the literature (Graaff & Kolmos, 2007), the module description did not overcome this problem. The objective of the module was designed to reach the design solution through programming although this monologue approach was unfitted in the character of the research in terms of many answers for a single problem (Hmelo-Silver, 2004).

The research activities are inseparable activities of the architectural design studios that either was called research (Frayling, 1993; Franz, 1994; Groat & Wang, 2002; Deming & Swaffield, 2011; Niezabitowska, 2018) or design studies (Drexler, 1975; Draper, 1977; Littmann, 2000; Madanovic, 2018; Tafahomi, 2021a). The complexity of the current design processes in the architecture have shifted the design activities from the design studio

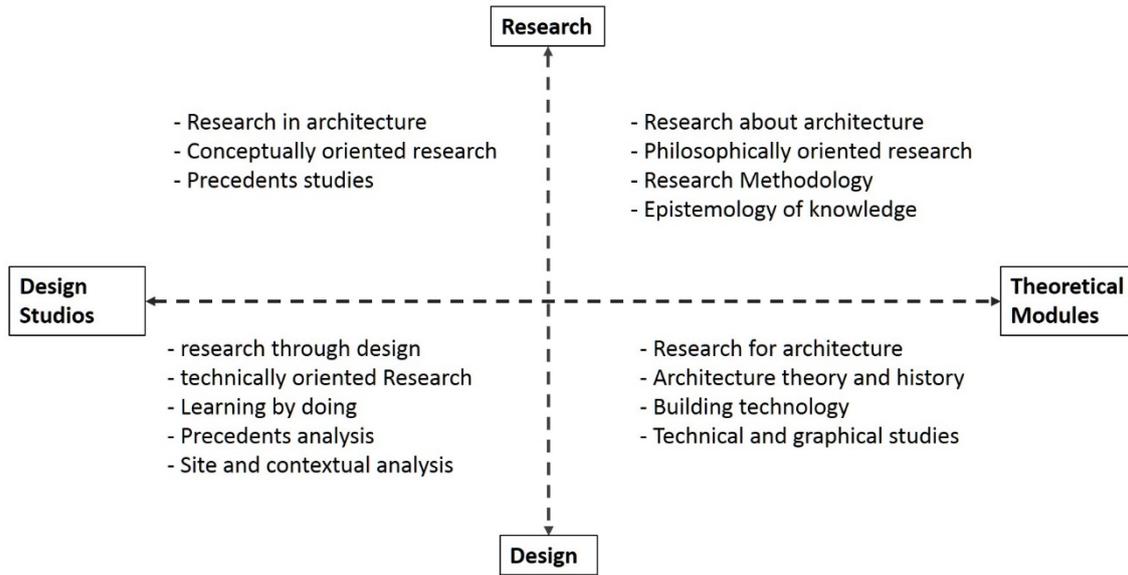


Figure 6: Different Perspective into Research Dilemma in Design

(Drexler, 1975; Draper, 1977; Madanovic, 2018; Tafahomi, 2021a) toward the real project in real-world (Roberts, 2007; RIBA, 2014; Rendell, 2004) in which differentiation, disagreements, and ambiguity have been existed among the field due to the epistemological varieties. Figure 6 attempts to present this variety in academic context.

Conclusion

The curriculum of architecture programs is under revision, updating, and editing progressively based on new findings in both academia and professional domains. The content of the curriculum is going toward more competitive, comprehensive, and educative. The design studios as a core module in the teaching of architecture programs are under many critics, analyses, and discussions to enhance the quality of teaching and learning based on students' needs, professional' requirements, and society's demands. Despite the policy of many universities for research-oriented education, seemingly still there are some institutes a little bit far from the research activities in both curriculum, teaching, and learning processes.

The architecture curriculum is more adapted to the project-based learning process similar to the

other practical disciplines. In this orientation, the design and output of the activity as a product take place as a significant priority in the design process of studios. This process is led by the module description and a drawn syllabus by instructors who have been educated in the same instruction and teach as has been taught. Just a course as research methodologies in the fourth year of the study could not support the research orientation in the design studios. The architectural research methodologies include deficiencies due to the absence of an integrated approach of the problem-based and project-based, which is diminished the objective of the module. Nonetheless, the research module could less be successful without a research approach in the whole curriculum. It means the research approach is an essential part of the whole training process through an updated structure for the curriculum.

Both structure and process of the module descriptions of design studios are so effective on the topics, tasks, orientations, research activities, and outputs of the design projects. The research activities are an essential stage in a design project that brings into account analytical processes for a deep understanding of users, site, and context. Despite the approval of the curriculum in the department, seemingly

there is a variety of styles in the designing of each module description that need essential revision to harmonize the content, structure, process, and learning outcome to enhance the quality of the teaching and learning in design studios.

Philosophically, the architecture field of study and profession has taken the position to add quality to the urban environment through design. For this reason, questioning the future of the world and the built environment has been the main topic for thinking, talking, and critics. Despite the long experience of critics in architecture education, epistemologically architecture education still needs to discover how people and professionals understand the world and urban environment. Knowing the processes, varieties, and aspects of understanding the users about the built environment require a wide range of knowledge, skills, and methods to create collective knowledge about the future.

Multidisciplinary and interdisciplinary approaches take place in many fields of study importantly architecture programs. Specifically, behavioral studies, human perception and understanding, wayfinding and well-being are common topics in the many architectural departments to use questionnaires, interviews, observations, and focus group techniques to discover the users' needs. In addition, more complex techniques such as SWOT (Strengths, Weaknesses, Opportunities, and Threats), PESTLE (Political, Economic, Social, Technical, Laws, and Environmental), and GIS (Geographic Information System), and simulation and animation are connected the architecture department to broader areas for research activities. Apparently, openness to the research activities leads the architecture programs to a wider horizon for discovery future.

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