Do Design Precedents Encourage Copy- Paste or Creativity in Landscape Design?

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Abstract | There are various perceptions about the impacts of design precedents on students' education. While some do believe that design precedents enhance the students' creativity some others believe that design precedents facilitate copying the ideas and do not increase the possibility of creation of new ideas. There have been several studies on the effect of design precedents on the students' outcome however there are few studies that have concentrated on the subject in landscape pedagogy. The current study aims to understand the students' different possible patterns of application of design precedents on their project applying a qualitative research method. It further attempts to understand the reason behind the students' copying from their own point of view. In order to achieve the study's aims mixed research method approach has been used. The result of qualitative research method reveals three patterns of application of design precedents. Group A used design precedents creatively in order to create new ideas. The group B modeled partially some parts of design precedents and group C copied completely a design precedent. A focus group and a series of interviews were conducted with the students to understand the reason behind copying ideas. The result of this part created a pool of item for conducting of quantitative research method. The result of this part revealed that lack of time, lack of working experiences, being interested in a particular design and even being professional in using of a 3D software may lead to copying a part or whole of a design precedents.

Keywords | Design Precedents, Creative Thinking, Architecture Pedagogy, Landscape Design.

Introduction | The significance and benefits of using design precedents is well understood in architecture. "The use of precedents has been positively as well as negatively approached" (Zarzar, 2005: 4). Some researchers have reached a consensus that study of design precedents is an important part of architecture education. However, some are more concerned about how to prevent students from merely copying the ideas. The tradition of learning in many architecture schools often takes place through collection of relevant case studies by the students. The advent of mass media has expedited the accessibility to the various architectural projects more than ever. The accessibility coupled with superficial perceptions of the precedents has eclipsed the real benefits of precedent-based designs as it does rarely encourage the students to capture the deep understanding of solution finding processes.

Consequently, students' analyses and abstractions of information are limited to some forms, facades or the analysis of building plans. In some cases, lack of understanding of a project may encourage students to simply copy the original idea than creatively use the design precedents to develop new design solutions (Liikanen & Perttula, 2008; Purcell & Gero, 1996). Some evidence shows that sample projects especially in the primary stages of the design can be beneficial and enhance the designers' ability in finding design solutions (Senbel et al, 2013).

Though much research exists on the benefits of using design precedents (Miranda 1998, Senbel 2013) it is less discussed why some students copy design precedents rather than using them as a source of inspiration, whether they have a negative view about copying design precedent or whether they find them useful. Despite a myriad of existing studies on the application of the precedents, our knowledge on students' perception of copying ideas is very limited. To address this gap, the current study attempts to answer the following questions: What do students think about the use of design precedents in developing creative design solutions? Why do they copy design precedents?

Literature Review

Architects have long been using design precedents in developing new designs. This practice has led to very advantageous, efficient, effective, and innovative results. A design precedent as a part of a past or prior design solution provides a unique knowledge that could be a source of inspiration to generate ideas for approaching problems (Oxman, 1994). Akin (2002) defined precedent as a "previously developed product or process which can be used to model new solutions in the problem domain of architecture" (Akin, 2002: 415). Similarly, this study has conceptualized precedent designs as a process of selecting relevant ideas from past designs.

Design knowledge gained from studying precedents can be helpful in different stages of the design process (Eilouti, 2009). In architecture area design knowledge refers to "architectural or engineering formal, structural, syntactic, semantic or systematic features that may provide partial or total exemplars of new design solutions" (Eilouti 2009, 340). Zarzar (2005) in her study titled "design precedents and identity, the exercises" found that architects may use some aspects of identity in design precedents to create a new identity or reinforce the existing one. Lawson (2004) discussed that experienced architects may have a myriad of geometric precedents to draw upon. However, Akin discussed that precedents might negatively impact "illustrating some sort of a failure and instructing students on what not to do" (Akin, 2002: 409).

Design knowledge is more dependent on designers' "experiential rather than theoretic memory" (Lawson, 2004: 451). Using design precedents include variety of processes such as collection, analysis and adaption of embedded information from past designs. While creating new designs, designers may "adapt and/or modify it to fit the new situation" (Zarzar, 2005: 6). Some researchers even have proposed a computational model for the organization of design precedent knowledge (Oxman, 1994, Flemming & Aygen, 2001). Mirand and Park (1998) argued that digital representation of information of architectural precedents promote an understanding of facts and have several advantages over traditional methods of design precedents usage (Mirand & Park, 1998). Flemming and Aygen (2001) emphasized the collection of precedents in a computable representation make searching required materials much easier and faster than that in a paper-based collection (Flemming & Aygen, 2001).

Design precedents and creativity

The creativity subject has attracted many researchers from various disciplines (Liu, 2000; Sternberg, 2005; Doboli &Umbarkar, 2014; Furnhama et al, 2011; Gorgul & Gorgul, 2012; Dorst & Cross, 2001). Creativity is often considered as "an innate ability, by which actions of original creation give rise to brand new items and elements. On the other side, creativity can be also regarded as a process able to transform and recombine existing entities, toward different, novel configurations" (Rabino et al, 2014: 224). There are several factors that influence designers' creativity. For example, previous studies show that students' creativity can differ significantly based on their educational domain and demographic variables (Furnhama et al, 2011). Sidawi's research revealed the "negative qualities on a personal level and on that of a design studio environment would hinder a student's

creativity" (Sidaw, 2012). Yuan and Lee (2014) found that while the time spent in the design process does not guarantee a higher creative outcome, the designers' experience can contribute to creativity.

Architectural creativity relies on "heuristics to find applicable solutions of the past and to adapt them to new design problems" (Schmitt, 1993: 14).

Gorgul and Gorgul (2012) developed a design program to enhance the creativity of architecture students. They emphasized some teaching strategies such as asking students to abstract representations and draw conceptual models focusing on territory, structure and surface. The students were also assigned to use glass, string or bamboo in their projects. The researchers believed this educational approach positively impacts students' creativity (Gorgul & Gorgul, 2012). In research conducted by Mahdavinejad and his colleagues (2012), it was found that the students who spent more time on the site analysis during their design process were more likely to have creative ideas in their projects than those who spent less time on this stage (Mahdavinejad et al, 2012).

The role of design precedents in producing creative ideas have also been examined in literature. For example, Doboli and Umbarkar (2014) in the context of electronic embedded systems found that though precedents did not increase the novelty or quality of solutions, they improved utility (solutions satisfy precise needs). In his paper "prior knowledge in design: a dynamic knowledge-based model of design and creativity" Oxman (1990) raised this question on how using design precedents lead to creative solutions of design. He further suggested that the classification of design precedents as an abstract and generalized knowledge stored in memory can contribute to the creative application of experience in design. Studies have also supported the notion that "to inspire creativity image collection from diverse domains can be valuable to the designer "(Do & Gross, 1995: 37). In research conducted by Holyoak and Thagard (1995), it was found that analogizing may play a central role in creative problem solving. Very similar to the nature of current study Collado-Ruiz and Ghorabi, (2010) attempted to examine the relationship between "the availability and nature of environmental information and the creativity of the final output of a conceptual design process". The results of their study revealed that environmental information had a strong effect on the creativity of the ideas generated by individual designers (Collado-Ruiz & Ghorabi, 2010).

All studies reviewed are mainly gathered on cross sectional data focusing on creativity issue through measuring one or a small number of variables. Due to this methodological limitation, these studies cannot fully capture the complex and multifaceted nature of creativity.

In addition, no study exists on students' perception about the creative use of design precedents in developing new design solutions. Therefore this study attempts to address this gap.

Research Methodology
This study used a mix method approach with more emphasis on the qualitative phase due to the intricacy of the issue and the lack of precedent architectural theories (see Zarzar, 2003). Qualitative phase of the current study informed the quantitative (Creswell, 2009). A qualitative approach helped us to view the issue through the lens of participants to see how they interpret events (Pring, 2004).

Sample and sampling technique
Participants in the initial phase of the study consisted of 15 volunteer students at master's level. Nine of the participants were women and six were men. The age of participants ranged from 23 to 26. Participant in the second phase of the study were149 (30 males and 117 females). This sample was drawn from Kerman Azad University. These students were taking landscape course at the time of data collection.

Data Gathering Method and Instruments
Focus group interviews and an online self report survey and drawings were the method used for collecting the data. We used focus group interview to encourage communication and generate more ideas among our participants (Kitzinger, 1995). As self evaluation of creativity is one of the most common ways to gauge creativity (Silvia et al, 2009), we designed a questionnaire consisted of three sections. The first section of the questionnaire elicited students' demographics data. The items in the second section developed based on the relevant literature and qualitative data to gauge the frequency, the extent to which students copy the design precedents (e.g. how often do you copy design precedents in your projects?), and the reason behind copying : a). because I am short of time and need to meet a tight deadline, b) because I want to impress my lecturer, c) because I cannot express my own ideas d) because I do not have self confidence).

Each item was measured using a 5-point nominal scale where zero stands for no agreement 5 means completely agree or zero stands for never and 5 means frequently. The third section of the questionnaire included an open ended question that ferrets out more potential reasons for copying design precedents.

Data collection procedure
Prior to recruiting our participants, ethical approval for

the study was obtained from Kerman Azad University. We followed the research ethical guideline proposed by Cohen, Manion and Morrison (2007). We briefed the participants about the time framework, purpose and significance of the study and assured them of their anonymity, non traceability and the confidentiality of the data. Following briefing, students were provided them with detailed information about the location and dimensions of a real site and were asked to design the landscape including children's playing ground, sitting out, resting and galleries in open space. Each student received 300 pictures of various landscape projects chosen by the teacher. The students were asked to file any of design precedents they used and reflect on their experience about the precedents. However, the students could choose to refer to any of design precedents at any time they needed.

The first author interviewed these fifteen students using a semi structured interview format. Each interviews lasted about 40 minutes. The interview questions were developed by the author based on the literature. Following the interviews, a survey was also conducted with the other students who were taking landscape course at the time of data collection.

Qualitative Data analysis

Students' drawings were analyzed with the specific focus on the absence or presence of creativity. All the data gathered through interviews and questionnaires were audio-taped transcribed, and hand analyzed. The approach for data analysis was inductive in a sense that no pre-set codes were imposed on the data (Bogdan & Biklen, 1998). First, the meaningful segments from interviews and open ended sections of questionnaires were identified, then meaning of each segments were summarized into meaningful codes. The irrelevant segments were deleted then codes were constantly compared, contrasted, grouped and main categories were developed and presented into themes. Verbatim examples of students' answers for each theme were presented.

Quantitative Data analysis

Data gathered from questionnaires were analyzed using percentage to indicate the participants' views about the use of design precedents in developing creative design solutions.

Design precedents and level of creativity

Analysis of the data gathered through drawings showed that students fell into three groups based on their level of creativity. The findings from the interviews and questionnaires could ferret out some potential reasons for copying design precedents.
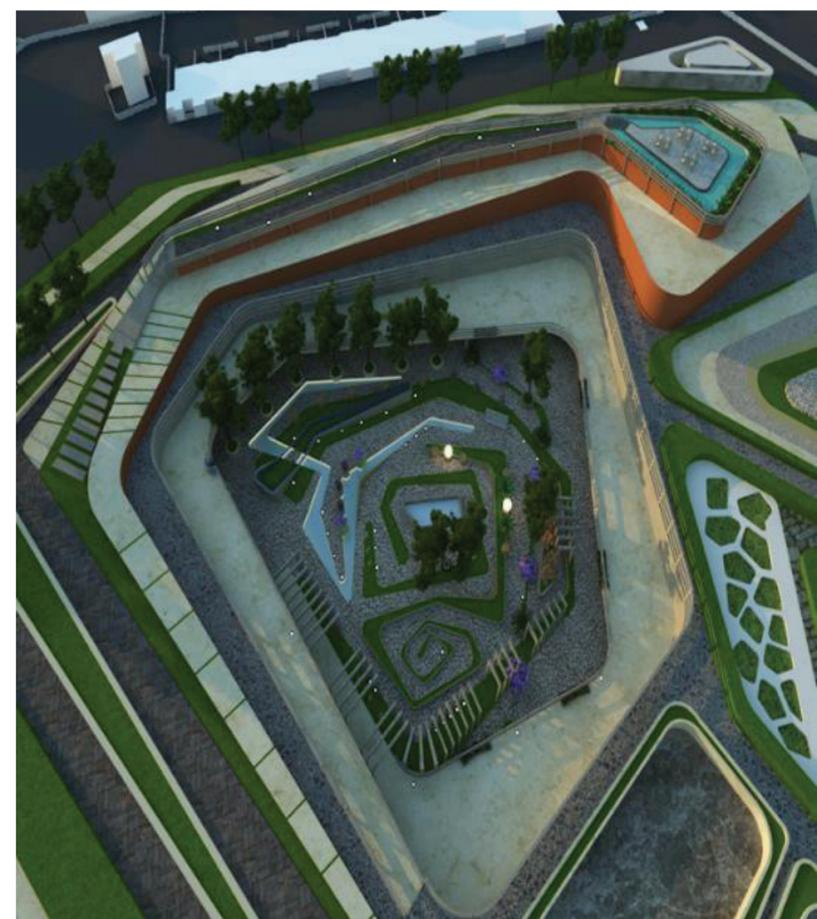
Pic 1: An Example of Group A project.
Source: Authors.

Participants in all groups felt that designing in practice is tricky and difficult in nature especially when there are no ideas how to approach a problem for instance one female student said:

> Study of design precedents was useful in our design process, there were some moments that we were sucked, when we saw various examples, we could create new ideas

12 students believed that the knowledge gained from precedents can stimulate their creativity. However; they felt that just having the knowledge does not guarantee creativity because in order to respond to unfamiliar problems creatively they have to draw on hands on experience, knowledge and intuition.

These three cohorts of students highlighted benefits and challenges related to using precedents.

Group A

Group A believed that precedents, as a source of inspiration for their designs, could motivate them to constantly revise some structures or concepts in the landscape with regard to the particular problem. They stated that revision occurred through investing time, analyzing the functions, benefits and features of structures in a specific artifact. This could save a lot of time and mental challenges to be

more innovative (Pic. 1). A shows how successfully they could incorporate some of the elements of precedents in their design and yet be completely original. One female participant said:

> "As could be seen in this picture, there is a spiral shaped canopy and round vases. We were inspired with this design and designed spiral shaped stream and several round vases that are not exactly similar to the original idea. We modified design precedents to create a new design different from the original one".

Group B

Some students just isolated some elements of the given precedents use or abstracted some of its features (Pic.2)

This group posited that using design precedents at preliminary stage of designing may impede them from thinking in creative ways and result in the mere repeating and replication of the precedent. For example one female student said: "I personally believe watching design precedents at the very early stages of designing can affect our thoughts and can lead to only copying the ideas and we may not think to create new ideas at all".

For this cohort of students designing precedents was a threat to cultural identity, cultural expression and authenticity. For example one female participant
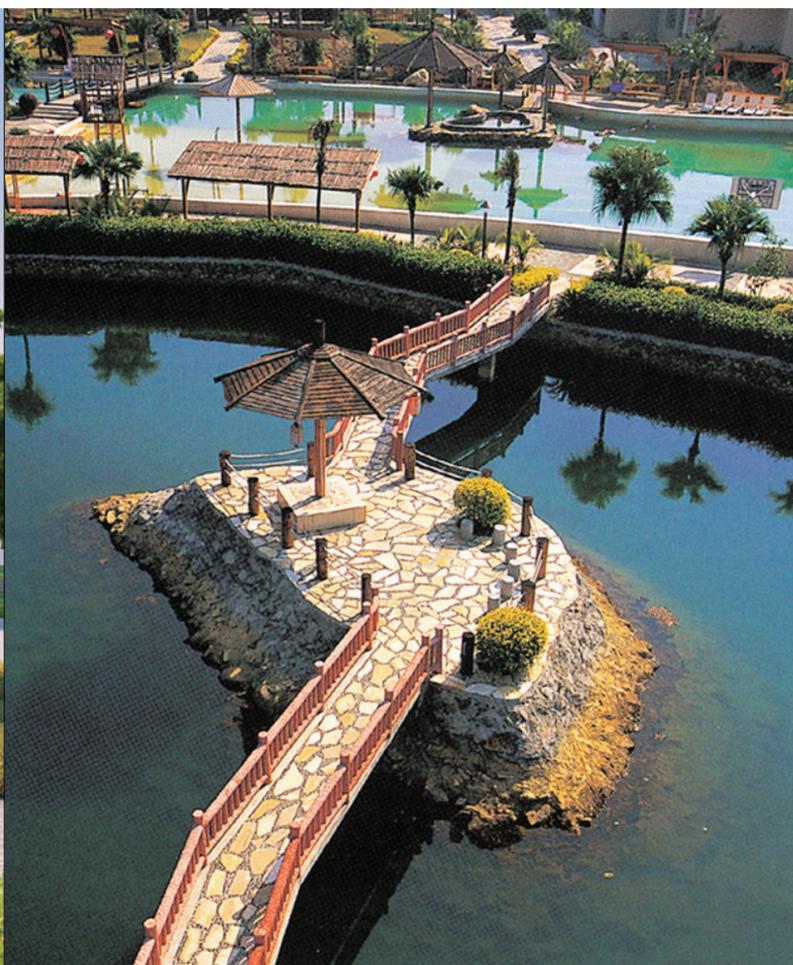
Pic 2: An Example of Group B project.
Source: Authors.

highlighted:

"*I wanted to design a park similar to Iranian traditional gardens, so we didn't find it necessary to refer to given design precedents.*"

However, two participants reasoned that design precedents copied some design precedents as they were impressed by them.

"*I modeled parts of design precedents in our own not because we was unable to create a new idea but because we admired the original idea very much*".

Group C

This group of students copied the whole precedent as it is shown in Pic. 3. They highlighted that they had no idea how to embrace inspiration and use it. Participants posited that lack of cognitive ability (lack of analogical reasoning, inability to generate new idea) was a major culprit for not knowing how to efficiently use multiple possibilities in precedents or how to overcome conflicting issues that could rise through analysis.

The ability to find an idea that suits the students' projects is an ability that not everyone has……..

Three students reasoned that their lack of analogical reasoning was associated with the system of education in which developing critical thinking were not focused on.

Students had niggling worry that their ideas were not true or fruitful.

This problem couple with affective attributions such as lack of confidence in designing was one of the main reasons behind selecting precedents based on other features such as their appearance.

"*I am not sure about my selection I think I liked the way it looked*

However, only one of the participants stated that she copied the design precedent as she was really and instantly impressed by it.

I like the idea, it was an interesting idea I wanted to have exactly the same idea in our project"...

Stressing on the progressive nature of creativity, some students in this group felt that precedents are useful for the novice designers who seek guidance in designing and developing their creativity. One male student stated:

" *We learn from copying the past, it was my first landscape design project and by collecting good ideas and attempting to apply them to our own design we learned a lot*"

Creativity predictors

Participants posited that assurance of the creative use of a design is a complex phenomenon is influenced by a myriad of variables. Students stated that grade as tool

Pic 3: An Example of Group C project.
Source: Authors.

for judging the students' design is one of the factors that reduce the creativity level of this group. Students voiced deep concern about fulfilling their teachers' expectations. That is why they were not motivated enough to invest more time on their design or preserve through difficult problems. One female student said:

The students know the good final score in design studios is bounded with an impressive design and we are almost completely judged based on our final design.

Lack of hands on experience, inefficient or lack of training and time constraints, are other reason for copying the precedents.

4.5 Quantitative data analysis

Analyzing the responses to the first question show that one half of students agree (51%) and almost two fifths totally agree (42.9%) that using design precedents will positively contribute to students' creativity. In relation to frequency, more than a third reported that they never (36.7%) copy design precedents and less than a third (30.60%) rarely

do that. Analyzing the reasons behind copying design precedents show that almost half of students (46.9%) may copy design precedents because they wish to have the same design. More than a third totally disagree (34.7%) and almost a quarter disagree (26.5%) that they may copy an idea due to time constraints. Over a fifth (22.4%) believe that impressing the lecturer is the reason for copying (24.5%) while a quarter disagree (26.5%) this idea.

More than a third disagree (36.7) a fifth totally disagree (20.4) that they may copy precedents as they are not able to express their own ideas. Almost less than a third (32.7%) totally disagree and a quarter disagree (26.5%) that they may copy design precedents because they are not self confident about their own design. Overall, this suggests the frequency, the extent to which students copy and the reasons for copying are different among the students.

Conclusion | This study sought to investigate whether student perception of design precedents can explain why some copy design precedents the while others creatively use them in developing new design solutions. The results of study suggest that design precedents improve their creativity. This study identified three groups of students. Group A could creatively use design precedents in developing new design solutions. For this group, design precedents as source of inspiration could save a lot of time and mental efforts to be more innovative. Group B could isolate some elements of the precedents for use or abstracted some of their features. This group argued that using precedents could be a threat to cultural expression, identity and authenticity. However, they emphasized that precedents were valuable designing resources. Group C copied the whole precedent. This group had no idea how to embrace inspiration due to their cognitive ability (i.e. Analogical reasoning) and affective attributes (i.e. lack of self confidence).

The study found that lack of cognitive ability and motivational attributes could explain some of the variance in the degree and frequency of copying, though they were not its sole predictors. The result of the study revealed that creative use of design precedents is a phenomenon expected to be driven by a numerous of factors such as lack of hands on experience, time constraints, grade and many of which probably interact with each other. Many of the factors have been identified by scholars in prior studies. However, it is not clear which factors can have more influential impact on the creativity level of students who are different in terms of cognitive abilities or affective attributes. Perhaps future research can extend our understanding about this aspect by addressing this question. Future studies can collect the data on perceptions prior and during the course to identify the degree of change that may happen in students' perceptions and consequently creativity. Understanding student perception of design precedents can provide better insights into the problems that hinder students from transferring knowledge into a new design problem.

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