Examples in Design Education: Inspiration or Fixation?

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Abstract. Inspiration has an important role in design education. Searching existing design examples is a widely-used practice for inspiration. There are two different approaches regarding exposure of examples in design process. Some researchers claim that examples can inspire designers and increase the originality of outcomes, while other researchers highlight that examples cause fixedness to their features as a negative effect for creativity. The aim of the study is to analyse different modalities of examples, such as text, photograph, diagram, object as stimulation and to examine the impact of quantity, abstraction, proximity and method on each modality in design education. The paper reviews empirical studies of idea exposure from the existing literature and summarizes results relevant to understanding the effects of the design examples. Overall, to avoid the potential negative effect of using examples in different modalities, designers could pay attention quantity, abstraction, and proximity of examples for each modality.

1 Introduction

Designers search for inspiration in diverse sources. Inspiration triggers the memory search and creativity. Searching existing design examples is a widely-used practice for inspiration since it has been assumed that idea exposure by existing examples stimulate designers. Some researchers found proves for the assumption that examples can inspire designers and increase the creativity of outcomes [1-5], while other researches claimed that examples cause fixedness to the features of existing examples [6-10]. Thus, there are two different approaches regarding to the exposure of examples in design process. It seems that this is an ongoing contradictory discussion in the literature. Being a crucial issue for comprehending the nature of a design problem, this dilemma has been searched by researchers extensively in the field of design education; and still needs further research evidence and attention.

The aim of this paper is to summarize and discuss the overall research findings which reveal the impacts of example exposure during design process from the literature. Thus, depending on the different modalities of examples such as text, photograph, diagram, object as stimulation, the paper is a systematic review of existing research findings which prove exposing examples cause inspiration or fixedness in design education. Each modality has

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been examined according to the parameters of fidelity, quantity and proximity. The tested hypotheses based on these parameters are listed below:

- Fidelity (abstract or concrete) (H1); whether abstract or concrete example exposure create a difference or not.
- Quantity (one or more) (H2); whether one or more example exposure create a difference or not.
- Proximity (within-subject or between-subject) (H3); whether examples which are related or unrelated to the subject of the design problem create a difference or not.

The detailed and systematic review of this study can contribute to the future researchers to understand the whole picture of the issue and accordingly help to position their hypothesis in a more accurate way.

2 Background

The design task is ill-structured. There is initially no definite criterion to test a proposed solution [11]. Thus, design problem has ambiguity through problem and solution space (as a nature of ill-defined problem [12]. Memory search is prevalent practice to solve problems. Therefore, experience have a significant role to deal with new design problems. Schön [13] claim that actions of designers are affected by what they are seeing. Each new experience enables them to face the next design problem. Searching design examples is effective in establishing relationships with experiences. Acquired information is processed in ill-structured character of a design problem.

Designers often search some information or images related to design problem. Petre, Sharp and Johnson [14] claimed that designers tend to select and adapt a related source to generate indirect or unexpected ideas. Therefore, related source triggers designers as inspiration. Inspiration sources can be defined as any stimulus retrieved from one's memory or from the outside world, during a design process, that affects the framing of the problem [15].

In contrast, some researchers highlight that examples cause fixedness to their features which is called "fixation". Design fixation in creative problem solving describes a negative transfer of knowledge between a source (perceived stimuli) and target (solution idea/concept) [16]. In design contexts, this happens when one's adherence to the elements of previously seen examples in the current context [6]. Furthermore, it is generally an unconscious behaviour [7].

Examples can be exhibited in many ways, such as words, photographs, diagrams and objects. Likewise, those representations may be at different levels of abstraction. Number of examples can be another parameter as well as whether it is in the same or different problem domain. All of these parameters may explain the uncertainty of the impacts of example exposure in the literature.

3 Method

The paper reviews empirical studies of idea exposure and summarizes the results relevant to understanding the effects of the design examples. To do that, thirty-nine articles are analysed with respect to quantity, abstraction, proximity of examples and methods. We improve Vasconcelos and Crilly's [17] review and analysed them in terms of positive and negative resulted approaches.

Some studies do not explicitly mention the detailed features of examples. However, they can be understood from the figures illustrating examples which are shown to designers. Following that, the features of examples are compared with different modalities.

Two different approaches are examined depending on these variables in order to understand the reasons of opposite claims.

4 Results

The results gathered from literature review on textual, photographic, diagrammatic and physical object example exposure during design process have been analysed and presented based on the parameters of fidelity, quantity and proximity in the following section.

4.1 Results of textual examples

Figure 1 presents the results on the effects of textual examples from the literature. There are sixteen articles with positive implication and ten articles with negative implication. Positive outcomes result from seeing more examples rather than one. Although there are similar results as using abstract examples, concrete examples are used more in positive resulted articles comparing negative outcomes. Researchers who highlight that examples are kind of inspiration utilized more example as between-subject than within-subject
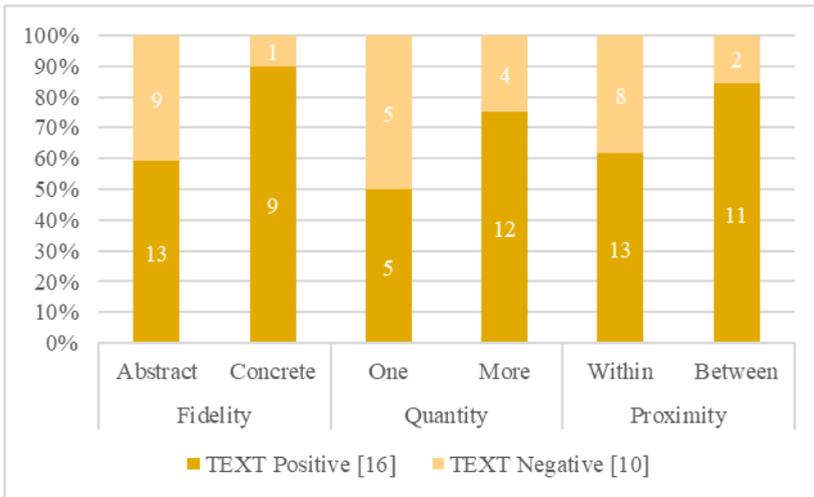

Fig. 1. Differences in fidelity, quantity and proximity of examples for textual examples.

4.2 Results of photographic examples

Figure 2 presents the results on the effects of photographic examples from the literature. Sixteen researches claim that examples inspire designers, ten researches claim that examples cause fixation. More example exposure than one is preferred from former researches. Positive resulted articles which were used concrete examples are more than negative resulted articles, while they have similar usage in abstract examples. Although within-subject examples have similar results, between-subject examples have an important role in positive outcomes.
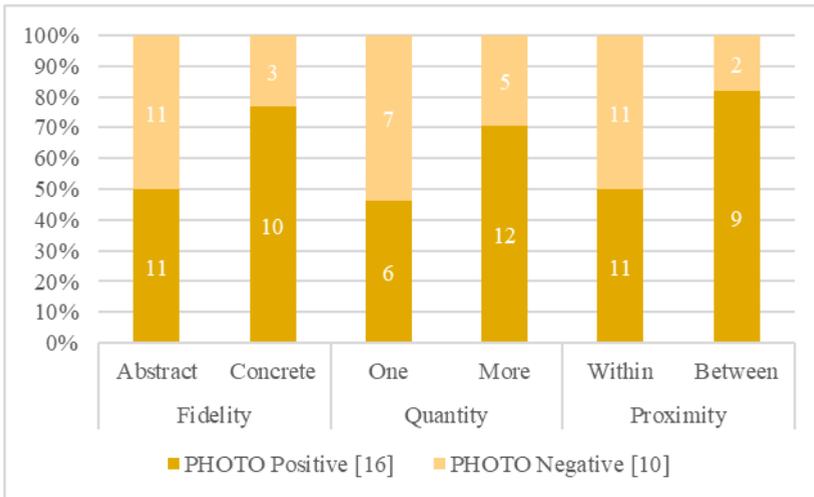
Fig. 2. Differences in fidelity, quantity and proximity of examples for photographic examples.

4.3. Results of diagrammatic examples

Figure 3 presents the results on the effects of diagrammatic examples from the literature. There are three articles with positive implication and one article with a negative implication. Positive outcomes result from seeing more examples rather than one. Abstract examples are used more in positive resulted articles comparing negative outcome. Researches who highlight that examples are kind of inspiration utilized more example as between-subject than within-subject.
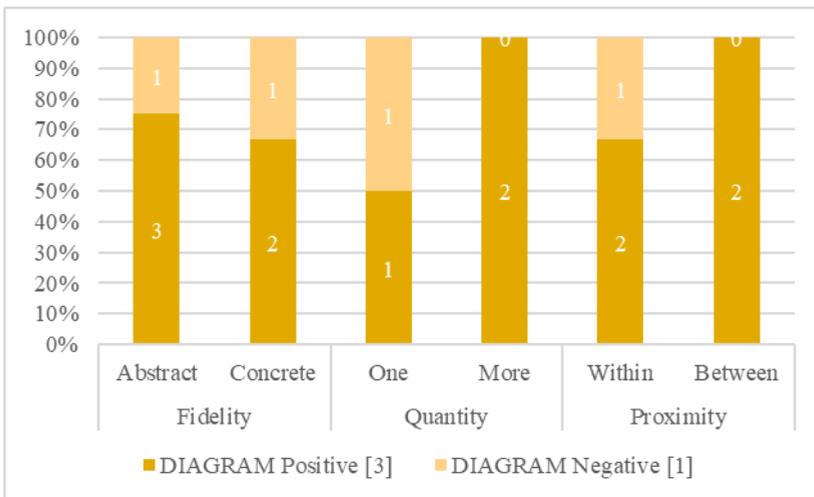

Fig. 3. Differences in fidelity, quantity and proximity of examples for diagrammatic examples.

4.4 Results of physical object examples

Figure 4 presents the results on the effects of physical examples from the literature. Three researches claim that examples inspire designers, two researches claim that examples cause fixation. More example exposure than one is preferred from former researches. Positive

resulted articles which were used concrete examples are more than negative resulted articles, while they have similar usage in abstract examples. Although between-subject examples have similar results, within-subject examples have an important role in positive outcomes. It is a different result from all other modalities.
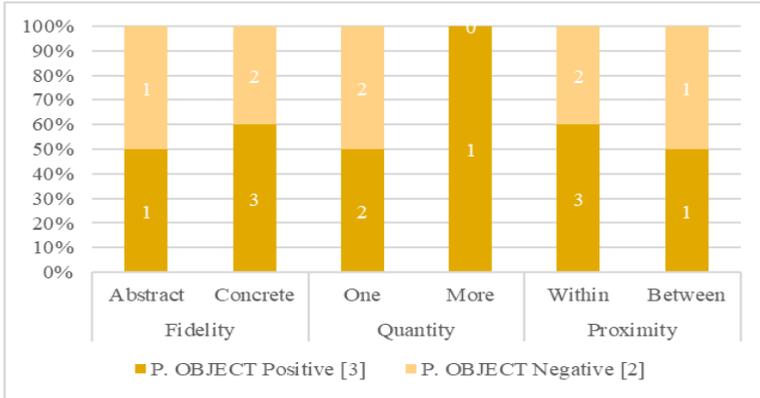

Fig. 3. Differences in fidelity, quantity and proximity of examples for physical object examples.

4.5 Overall results

Analysis of the literature allows us to draw inferences from the parameters of existing design examples which is shown in Table 1 and Table 2. When we compare two opposite approaches with the contribution of these tables, it is seen that the researches found more positive impacts of example exposure than negative ones. Besides, there are more research findings on the effects of texts and pictures than diagrams and physical objects both in positive and negative resulted researches.

Table 1. The review of the researches which highlighted that examples are a kind of inspiration.

Table 2. The review of researches which highlighted that examples caused fixation.

	Author_Year	Modality of Representation				Fidelity		Quantity		Proximity	
		Text	Picture	Diagram	P. Object	Abstract	Concrete	One	More	Within	Between
NEGATIVE OUTCOME	[44]		■			■				■	
	[42]	■	■			■	■		■		■
	[6]	■	■			■			■	■	
	[7]	■	■			■				■	
	[18]	■				■					■
	[8]	■	■			■			■		
	[19]	■				■		■			
	[10]	■	■			■			■		
	[22]	■	■			■				■	
	[9]	■	■			■			■	■	
	[16]		■			■					
	[41]			■		■	■			■	
	[26]				■		■				
	[43]				■	■	■			■	■

As figure 5 shown, exposure to more than one example, concrete example, between-subject example and qualitative research tend to show positive impact in design process. Impacts of other parameters seem not clear from the overview. Therefore, a detailed review is required for drawing inferences.
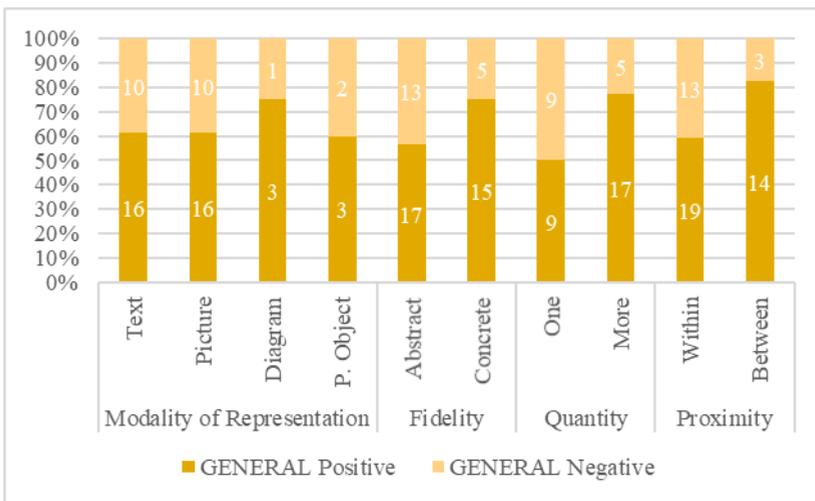

Fig. 5. Overall results of the literature review.

5. Discussion and conclusion

As conclusion, parallels and comparisons of outcomes between the results are drawn in the study. Then some issues are identified, such as more than one example exposure seems to reduce fixation. It suggests that alternative examples may help to hinder to fixate features of one example. A number of studies which include concrete examples differ between positive and negative resulted articles for textual, photographic and physical object examples. However, the abstractness of examples seems to have an important role for diagrammatic representation, in order to build relationships between examples and solution which designers proposed.
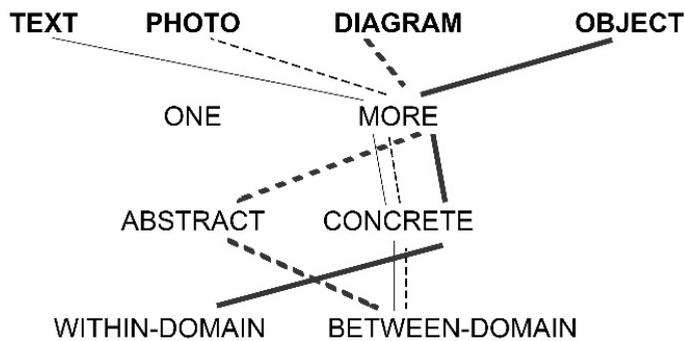

Fig. 6. Overall results of the literature review.

Most of the modalities in positive resulted articles have shown differences from negative resulted articles as between-subject examples. Different ideas which are out of the problem may stimulate designers to combine them into their design process. However, within-subject examples as physical object representation may have a positive effect on design education. To explain this result, we suggest that designers have a tendency to focus on mechanisms and functions of design when observing to physical objects. Overall, to avoid the potential negative effect of using examples in different modalities, designers could pay attention quantity, abstraction, and proximity of example for each modality.

As a limitation of the study, number of articles which is used examples of diagram and object can be found insufficient to infer to results clearly. Therefore, more studies with these modalities of representation need to study in detailed in order to extend existing literature and to analyse characteristics of diagrammatic and object examples.

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