

# DIGITAL-MEDIA IMPACT ON THE DECISION-MAKING CAPABILITY OF ARCHITECTS

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## Abstract

*The underlying assumption of the research is that media the representational environments of architects' design thoughts, have impact on the way by which architects practice design and develop their design capabilities. This research aims at exploring the interrelationship between the media used by the architect and the development that might occur in the Decision-Making capability. The role of digital media in the architectural design process has become exploration and suggestion of what is being made, rather than, illustration of what has been already made. Depending on primary data (a global questionnaire) and secondary data (synthesis of the previous research), the results have substantiated the observation that there has been positive impact of digital media settings on the Decision-Making capability of architects. The analysis reveals some detailed findings, which provide a better understanding of the subject matter.*

## 1. Introduction

Digital media are posing additional challenges and opportunities for the architects of the present day. While there are established methods and procedures in the use of traditional media, the full impact of digital media on these methods and procedures is yet to be identified (one may maintain that this identification process is an ongoing process). One of the challenging obstacles against this identification is that approaches and tools offered by digital media are in continuous development, with a much rapid rhythm than architects' use of such approaches and tools.

The use of digital media is certainly more fluid and flexible than the use of traditional media. It gives the clarity of what is being made without depending on our imagining. Thus, there is a need to look at how digital media can impact the design capabilities of architects. The research aims at identifying the impact of digital media on the Decision-Making capability, through defining this capability and classifying the basic approaches of digital media used in design process.

The design capabilities of architects can be classified into five types: Conceptualization capability, Form Giving capability, Representation capability, Decision-Making capability, and Knowledge Building and Retrieving capability. Although there is no order of how architects use these design capabilities against various tasks of

design process, the features of a generalized portrait can be discovered. Within this portrait, architects move forth and back inside a reciprocal-influence loop that connects between Conceptualization, Form Giving, and Representation capabilities. Meanwhile architects use a mixture of both Decision-Making and Knowledge Building and Retrieving capabilities in order to guide the foregoing mental loop in evaluating the tentative proposals they have in mind for solving the given problem or its sub-problems (Abdelhameed 2003).

## 2. Decision-making capability

Decision-Making capability allows architects during design process to understand, specify, evaluate, and decide how the designed forms and shapes are suitable for the required functions and needs. In a sense, this capability helps architects determine what architecturally fits or does not fit, in response to the appropriateness of both functioning and ordering of the designed architectural elements. During design-problem solving, this capability causes the abandonment of some decision routes or the change of organizational principles previously chosen. It encompasses many activities such as logical thinking, mental organization, criticism, evaluation, and selection.

Architects use this capability to evaluate various steps within which design scheme crystallizes into a more

definitive form. There is a network of constraints and requirements to shape a decision route or to solve each sub-problem of design. In most cases, the architect's mind is not occupied by one constraint at a time, rather by a combination of different constraints, which shape a given route of decision. Choosing any decision route happens towards a decision sequence for solving the whole design-problem. For example, the dimensions of a building form are specified upon the program requirements, functional elements, layout conditions, architectural codes, and aesthetic proportions of masses and facades.

The different levels of conception generated along the process of design-problem solving affect the different qualities of solutions, and influence design development in general. Therefore, media have important impact on the Decision-Making capability through helping architects to increase their conceptive levels of design solutions. Architects may seize the advantages of each type of media, by which a better position is offered to make design decisions. This could be achieved through acknowledging the characteristics and qualities of each digital or manual medium.

### 3. Digital media impact

Exploring positive or negative areas of impact, introduced by the various settings of media use, on the Decision-Making capability of architects will be investigated through a two-ways methodology:

- Extracting the impact from the synthesis of previous research in the related areas. This methodology overcomes the obstacles resulting from the fact that some concepts of digital media use are not available for many architects to use because of the cost (of the sophisticated software or hardware), or the relation to computer science (which requires a programming background to benefit from).
- Assessing the impact by surveying a sample of experts and professional architects. The impact in this case is according to the visions of respondents.

#### 3.1. Extracting the impact from the previous research

In the past, the media used by architects in design exploration and presentation were manual media, such as freehand sketching, manual drawing, physical modeling, etc. The use of computer within the design process was limited to pragmatically resolving technical issues, i.e. using the computer after finishing the design to produce a version of drawings with qualities that cannot be obtained through manual media. During 60's, the potentials of software and tools, which accompany computer use, have developed this use from being just a tool for drawing to being a medium through and by which design is performed and solutions are generated. Manual media have the flexibility that allows the architect to start without having a certain idea. The characteristics of manual media, which help the Decision-Making capability of architects during design process, encompass: 1) ability to work with imprecise design-idea or information, and 2) providing the experience of vitality through physical model making.

Architects may let digital media empower the positions, within/by which they shape decisions. The productive conversation with the computer as a participant in design leads to develop design ideas, or suggest forms architects cannot even envisage in some cases. For example, the designs of Frank Gehry are initialized into a physical model, and then, transferred into a digital environment for manipulation and calculation. Decision conducting is still up to the architect. However, digital media powerfully enhance what they can perceive, explore, and conceive.

It could be concluded that what might be conceived, perceived, and comprehended of a design idea, is related to how this design idea is modeled, presented, and represented (by the type of media). Many scholars and architects (for example, Marx, 1998; Lynn, 1999; etc.) consider the digital environment more apt and powerful for design.

Within some concepts of digital media used in form generation, the computer under the influence of certain contextual parameters can introduce a set of forms

from which the architect chooses responding to her/his creative intents. These computational programs are agile explorers, rather than definers, of architectural composition. To benefit from these concepts is achieved by leaving form suggestiveness of issues, such as social, environmental, etc. for the architect to evaluate.

Within using algorithms of form generation, computers are metaphorically allowed to propose architectures of their own. The role of the Decision-Making capability is not prominent in the initial phases of design process. Form is generated by software, which delays decision making to later phases. This results in a negative impact on the Decision-Making capability and its role in the design process.

The use of both digital and manual media improves decision-making process in cognitive, qualitative, and productive terms through the transition and reinterpretation. However, in some cases of form generation programs through which the validation of form is delayed until the form is completely designed, the total concentration on formalism during the initial phases of design process may stray the design content away from important architectural issues.

### 3.2. Extracting the impact from the previous research

#### The questionnaire

A questionnaire was conducted (during the period from June 2002 to April 2003) to assess the impact of various digital and manual media settings on the Knowledge

Building and Retrieving capability of architects. An invitation of participation was electronically sent to the members of the conferences of: ACADIA, eCAADe, CAADRIA, and SIGraDi. Also, an invitation was sent to the professors and the students of M. Sc. and Ph.D. in Arizona State University “U.S.A.”, University of Sydney “Australia”, and ASCAAD “Arabic Society of Computer Aided Architectural Design”. The total number of replies was 56. Few respondents preferred not to assess all various uses, concentrating only on what they use.

The sample encompasses both practical and theoretical views of those who are practicing, teaching and researching in the subject matter: 1) 35.72 percent of participants are architects who are pursuing either Master’s or Doctoral degrees in architecture; 2) 16.07 percent of the sample are professional architects, e.g. CAD managers, etc.; and 3) 48.21 percent of participants are faculty members involved in teaching and research (Assistant Professors, Associate Professors, and Professors). Other important characteristics of respondents, such as the period of computer use and self-assessment of computer use are summarized in “Table 1”.

#### Results of the questionnaire

Architects were asked to assess the impact of their use of various media settings on their Decision-Making capability. “Table 2” and “Figure 1” summarize the results of the survey in a comparative way; the columns represent various media settings while rows represent the various impact levels of each setting as viewed by respondents.

**Table 1: Characteristic of respondents: period and self-assessment of computer use**

Characteristics of Respondents		Number of Respondents	Percentage of Respondents
Number of Years of Computer Use	Less than 5 years	17	30.36%
	5-10 years	11	19.64%
	10-15 years	16	28.57%
	15-20 years	5	8.93%
	More than 20 years	7	12.5%
Self Assessment of Computer Use	Low User	1	1.79%
	Below Average User	4	7.14%
	Average User	0	0%
	Above Average User	32	57.14%
	Intensive User	19	33.93%

- The Impact of Fully Manual Media Setting: The results refer to decrease in the impact of fully manual media use on the Decision-Making capability, as that impact was more dominant in the past.
- The Impact of One-Way Interactive Media Setting: The results indicate that half of the respondents find that this kind of media setting does not have a significant impact on the Decision-Making capability.
- The Impact of Multiple Media Interactive Setting: The results refer to increase in the positive impact of the use of multiple interactive media on the Decision-

Making capability.

- The Impact of Fully Digital Media Setting: The results show that more than half of the respondents find that the use of fully digital media has a very positive impact on the Decision-Making capability.

**4. Conclusion**

- The use of digital and manual media enhances decision-making process in cognitive, qualitative, and productive terms through the transition and the reinterpretation within the both types of media. Developing designs in digital environment elevates

**Table 2: Comparison of the impact of various digital and manual media settings on the decision-making capability of architects**

Media Settings	Fully Manual Media Setting	One-Way Interactive Media Setting	Multiple Interactive Media Setting	Fully Digital Media Setting
Very High Impact	14.55%	0.0%	14.29%	42.85%
High Impact	14.55%	37.5%	28.57%	14.29%
Medium Impact	27.27%	12.5%	42.85%	28.57%
Little Impact	43.63%	25.0%	0.0%	0.0%
No Impact	0.0%	25.0%	14.29%	14.29%

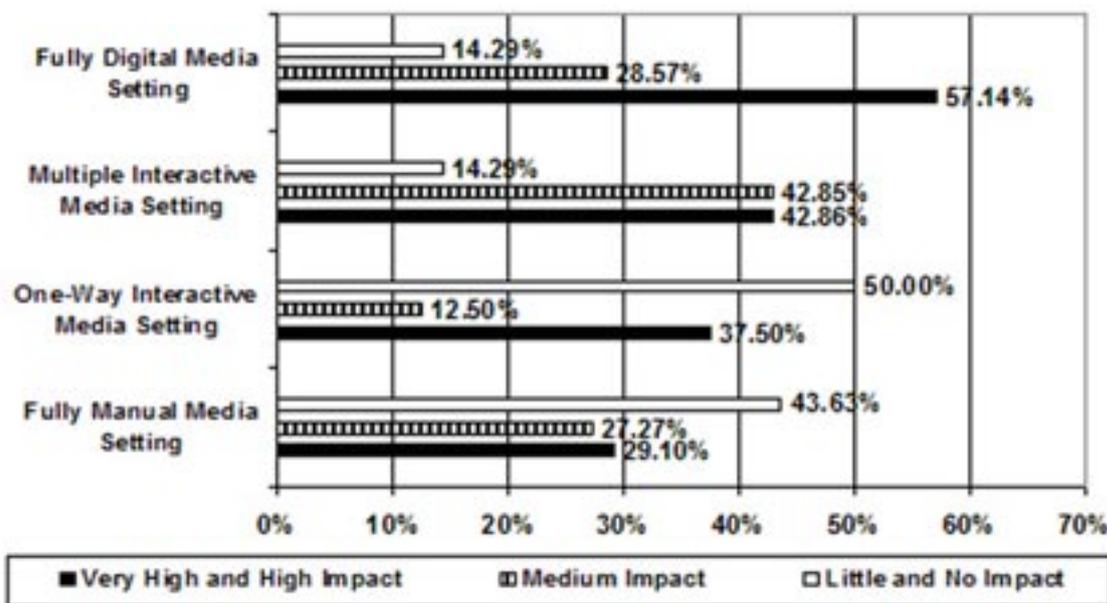


Figure 1: Comparison of the impact of various digital and manual media settings on the decision-making capability of architects

the Decision-Making capability of architects to extents beyond what would have been possible if these designs have been manually explored and developed.

- Within some digital-media concepts of form generation through which the validation of form is delayed until the form is completely designed, architects should avoid the total concentration on formalism away from the immaterial issues of design content. To benefit from these concepts is achieved by leaving form suggestiveness for the architect to evaluate.
- From the results of the questionnaire, the major trend that represents the very high and high impact of various uses of media on the Decision-Making capability of the respondents increases towards the use of fully digital media. This result of the questionnaire conforms to the synthesis of previous research regarding the powerful role played by the use of digital media in enhancing the position by/ within which architects make decisions.

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