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Visually Impaired Learning Design Experience through In-Vitro Design Protocol

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Abstract: This paper identifies a new research area of visually impaired learning form of design, where it emerged from the literature case study that the blind community commonly have not conceived to interpret design products. Moreover, it is related to the metaphoric of semantics in design language through design thinking as a product form entity translation known as formgiving. This research article folds to structure the ecological form creation in the semiotic of product's form orders, orientated by the extrapolative morphs design thinking. Using the in-vitro design protocol strategy that mediated through objects and haptic form understanding assessment enables the researcher to explore design attributes by its ergonomic through blind user touch experience sense. In return, the response can be digitized in extrapolative morphs design thinking (design anatomy) before entering the user-product interaction framework stage provisionally. In advance, basic qualitative preferences of blind user-designer experience can be detailed and put to highlight when it comes to predetermining product designing factoring through user experience.

Keywords: *Visually impaired, blind-user-experience, in-vitro design protocol, design analysis.*

INTRODUCTION

Touch and pleasure, certainly if one wants to understand the mechanisms underlying the effect of touch on humans' behaviors, cognitive and neuroscientific studies addressing the relationship between touch and pleasure are going to prove particularly relevant, which in this study the tangible product. Taking after (Desmet & Hekkert, 2006), he recognized that there are three (3) segments or levels of item experience: aesthetic pleasure, attribution of meaning, and emotional response. From this understanding of product experience it can be defined as "the entire set of affects that is elicited by the interaction between a user and a product, including the degree to which all our senses are gratified (aesthetic experience), the meanings we

attach to the product (experience of meaning) and the feelings and emotions that are elicited (emotional experience)" (Desmet & Hekkert, 2006). These three (3) parts or levels of experience can be recognized in having their own, but profoundly related legal fundamental procedures. Fig. 1 below demonstrates how the three (3) levels of item experience being classified.

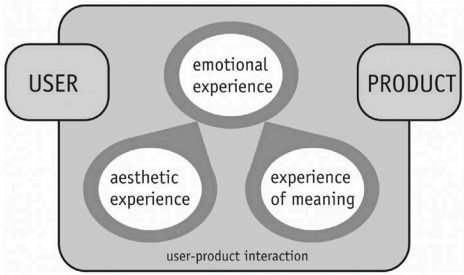


Fig. 1 Framework of product experience (Desmet & Hekkert, 2006)

Anwar et al. (2016) who experiencing the In-Vitro Design Protocol (IVDP) as illustrated in Fig. 2 the ambiguous characteristics of metaphorical form through designers sketching processes of Islamic product design has lead to a natural variety in output. Whereas Abidin (2012) refer this phenomenon as "consistency." Thus,

how do designers assess metaphorical form through their sketching assignments has discovered (Abidin, Bjelland, & Øritsland, 2008). Throughout thirty minutes of design activity (short-term memory), this empirical study stipulates in-depth qualitative data reflected all artificial situations that have been arranged.

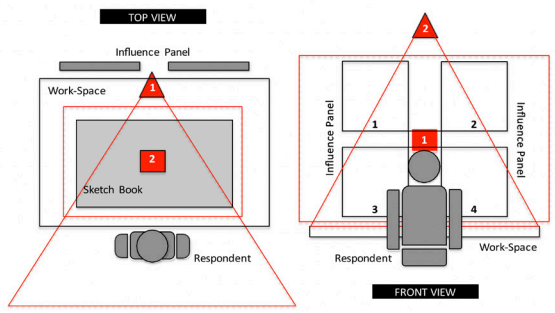


Fig. 2 IVDP experiment setup (Anwar et al., 2016).

Further along with the study, through the model of Dagman et al. (2010), she execute verbalized information through her experiment by presenting the product in front of the panel as in one way to render human experience of the product perceived through touching without the interference of visual information (see Fig. 3). From the information, she collected information on different "haptic product properties" (HPP) from the literature (Heller & Schiff, 1991; Klatzky & Lederman, 2003). Hubka and Eder (1988) characterize the property as any characteristic for an item that has a place with it and describes it; the sought properties are the most imperative aspects of a technical system (a product of human art and workmanship).

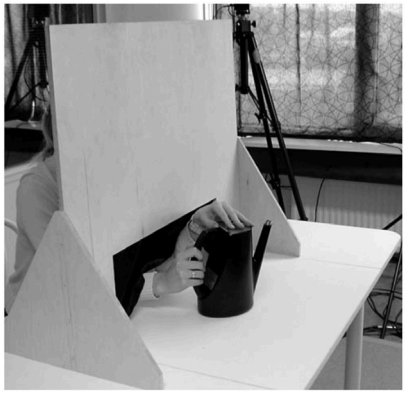


Fig. 3 Experiment setup where the participants could only touch the product without the influence of vision (Dagman et al., 2010).

USER DESIGN AND EXPERIENCE

2.1 User Centered Design

Based on Bjelland (2008) to separate the general knowledge of touch from the specific needs of the designer especially in haptic technology development; user-centred design (UCD) can be used as a framework reference in understanding the nature of the design process. UCD is both a design perspective and a process in which the needs, wants and limitations of the end-user of a product are given extensive attention throughout the development of a product. It is related to both product design and human factors (Lawson, 2005; Maier & Fadel 2008). The

physical appearance of a designed product justifies a philosophical effect through the way they are perceived. The designing process is crucial to determine the momentous factors in a designer's success. "Design" is both a noun and a verb and can either refer to the end product or to the process (Lawson, 1997, p. 3), both of which are important for the researcher to understand. In order of creating good end products, there is a need of knowledge on the capabilities and limitations of general human touch; the technical possibilities of designing for touch; and how resulting designs affect haptic interaction and the overall use (Vermol et al, 2016).

2.2 User Experience Design (UX)

The issues in this research are to uncovering general responses of touching activities through visually impaired perspective by looking at positive aspects, negative aspects, ethics, and conclusions. In order of finding how the aptitudes are articulated. The main purpose of this research is to establish a systematic approach to fundamental knowledge of what constitutes the quality of haptic product experience and access to methods and tools that can support the verbal elicitation of BVIG users' experiences and design requirements (Vermol, 2018). Without appropriate evaluation of users' problems and challenges in using 3-dimensional products and tools, we cannot begin to solve these problems and challenges faced by this particular user. Touch has traditionally received little attention in design or research on ceramic performance-critical products. Isaksson (2004) concluded the designer crucial process when dealing with tactile enhancement in product development is rarely documented. Supported by the findings of Kuiper & Scheepens (2000 cited in Sonneveld, 2007, p. 11) stated that designers very hard to articulate their knowledge of their long-term experience and skills.

2.3 User Design Awareness

Physical appearance of a designed product justifies philosophical effect through the way they are perceived. Designing process is crucial to determine the momentous factors in designer's success. "Design" is

both a noun and a verb and can either refers to the end product or to the process (Lawson, 1997, p. 3), both of which are important for the researcher to understand. In order of creating good end products, there is a need of knowledge on the capabilities and limitations of general human touch; the technical possibilities of designing for touch; and how resulting designs affect haptic interaction and the overall use (Vermol et al, 2016). According to Krippendorff & Butter, (1984); Monö (1997); Coates (2003), it is important to to consider the responses of consumer towards product appearance and taking the information as part of the process in communication. By taking this measure, it is significant to understand the connection of visually impaired group response in the context of visually impaired model of connection as per shown on Fig. 4, taken from the previous study. It is by setting up visually impaired at the middle between designer and user; both requisition and response can be channel to the development of the product (Vermol, et al., 2015).

BLIND-USERS' ACTIVITY EXPERIENCE: THE EMPIRICAL FOUNDATION

Throughout conceptual framework, researcher reflects to (Bannon & Bødker, 1991) consideration to human activity of three-layer system, which, opens up a possibility for a combined analysis of motivational, goal-directed, and operational aspects of human acting in the world. She explains her consensus on user application of how important it is to distinguish different aspect on application based on the characterization of the different focuses in the use activity. This section provides the activity framework that stresses out product evaluation by the respondent (see Fig.4.) while at the same time questioned and observed by the researcher. Through the dinamic interactive interview, with open-ended question, the researcher bargain for detail factors that influencing the behavior of each respondent. The intended questions however never stringent only to one mediating object as a study however, through course of previous pilot study conducted and series related literature indicates that what involved on the sudy was certain physical properties that together make up the design of the product (e.g., shape, and texture) and to be define through context of use driven from the touch senses looking through the collective study of (Dagman et al, 2010; Kaul et al, 1994; Snelders et al, 1995;

Veryzer,1999; Geistfeld et al, 1977 and Blijlevens et al, 2009). The sequence of activity overviewed through 3 components of understanding.

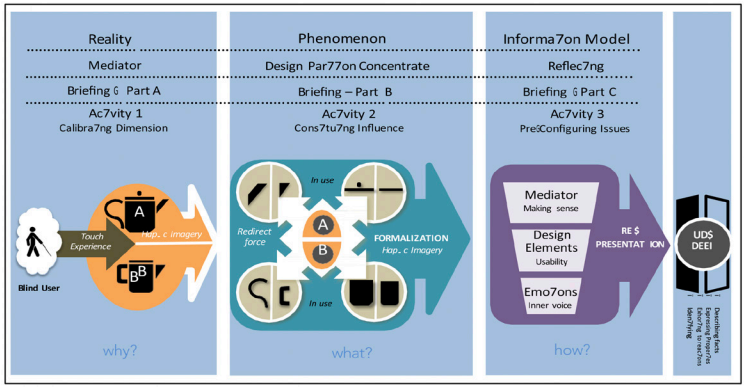


Fig. 4 Conceptual model of blind-user experience design experiment (Vermol et al., 2018)

3.1 Blind User Activity 1 – Blind Users Early Response To Product

Looking through mediating influence coming from the object. Questioning "why" is the product preferences understandable to the blind user. Is there sufficient haptic information triggered from the product? By questioning so, enables researcher to calibrate respondent dimension in confirming the quality of response, eligibility to be interview and direction of questions. Hence the important preferences that required in this section are to understand the early description of product information through its features ant attributes.

3.2 Blind User Activity 2 - Blind Users Performing Product In Use

Influenced by their experiences and how do they perceive things, mediated object are segregated to oversee what is the redirected force from each component and "what" is it contributing on. As in focus, it re- directs researcher to analyze on what is constituted the influence? To which particular part of the product involved? During which context of use does the influence commence? Throughout the emerging data gathered, enables the researcher to conduct formalization of haptic

imagery that forming the blind user identification to touched product.

3.3 Blind User Activity 3 - Blind Users Product Experience Response

Reflecting what had happened throughout the whole experience involved from the task, the researcher integrates "how" blind user life experience may depict the same scenario and situations. Through asking what is there conflicting or what is suppose to be there on the product , the researcher can mark an early framework over factors arise within mediator (product), design elements (attributes) and emotions (over blind user inner voice).

Activity plan constructed by the researcher in respond to clarify the needs and emotions involved in an activity, the meaning from blind users' experience and view on product appearance. Throughout the experiment the researcher question (Why) - by trying to clarify the needs and emotions involved in an activity, the meaning from blind users' experience. (What) - Only then, it determines the functionality influencing the experience and finally (How) the appropriate way of putting the functionality into action for the blind users' reflecting their perspective within their parameter (Geistfeld et al, 1977).

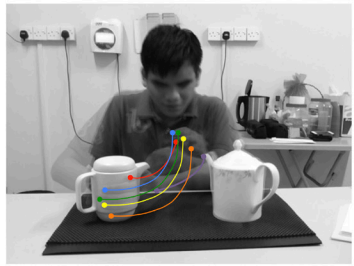
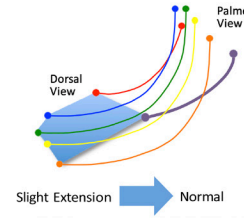
BLIND-USER EXPERIENCE: PERCEPTUAL ON PRODUCT AND DESIGN

Distinguishing blind user as legitimate subject to be taken as sample of study for haptic expression are due to their ability of adapting to the "mainstream products" of which designed without consideration to their needs However through time and experience, blind user learned to handle this designed product through their own possible way (Hersh, 2010). Even through extreme measure of activities that are sometimes not designed according to their perspectives. For an example, using a hot iron for clothes or cooking on a hot pan, to even

pouring hot coffee to cup and much more. It is said that touch to be the most reliable in sensory modalities. It is even considered as to be reliable than sight (Sekuler & Blake 2002). The opportunity of learning from observing and questioning them pertaining to product haptic properties leads to the

contribution of design factors which important for a product designer, Vermol, V. V. 2018).

Table 1. Ergonomic analysis of blind user respondent hand postures and movement in sensing a product design (Vermol et al., 2018)

Respondent	Artifact/Design Analysis
	Product A / Topic 1/ Sensing Knob and Lid  
	Product B / Topic 1/ Sensing Body 

An example of ergonomic study shows in Table 1 is inflicting from the visual images of blind-user experience experiment that was conducted. As reflection to the visual images, coloured wireframe provided on the right side columns indicating the hand movement observed (Bella Martin and Bruce Hannington, 2012) in a micro level. From the in information given from this experiment sampel of ergonomic study, inflicting from the visual images of Experiment that was conducted. As reflection to the visual images, coloured wireframe provided on the right side columns indicating the hand movement observed (Bella Martin and Bruce Hannington, 2012) in a micro level. From here, we able to grab some basic qualitative preferences of blind user respondents' ergonomics on hand grasping through visual observation of respondent grasping action (see Table 1 illustrating sampel of blind user as respondent reflecting from to the IVDP activity). This experiment taken through analyzing visual information from the videos recorded in accordance to Cutkosky grasp taxonomy, 1989) within 20 respondents

of blind users. In order of creating good end products, there is a need of knowledge on the capabilities and limitations of general human touch; the technical possibilities of designing for touch; and how resulting designs affect haptic interaction and the overall use (Vermol et al, 2016).

4.1.1 Product Understanding

With the great global increased on design and technology evolvement; product design activity is not only emphasizing the needs of utilarian, but also considering the value of affective, epistemic and hedonic requirements as well. It's a growing interest which developed through sensory design by other meaning taking human senses quality into consideration. Vision may have been regarded as most important sense in viewing a product; thus, in order to explore the whole quality interaction of product which designed for the people especially BVIG, the role of product appearance and its information especially during the state of product in use that can sense through touch are critically important (Vermol et al, 2015).

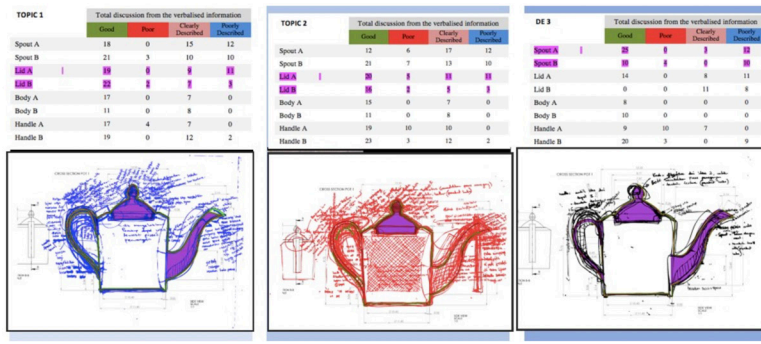


Fig. 5 Over-layering Designer Sketch Design Information (DSDI) feedback within product components (Vermol et al., 2018)

CONCLUSION

From the verbal information gathered throughout the whole topic of activities, the researcher quantifies emerging factors from key components of mediated Product A and B. This key finding from this analysis provides an actual overview in confirming which components from mediated product are the most important the most in making decision for improvement. Decision factor matrix analysis of components information provides analysis on decision factor matrix that representing five (5) mediating product components which are the 'handle', 'spout', 'lid', 'body' and 'texture'. In the process, the components are treated as contributing attributes. Overall, results form this study broading up the conventional way of product understanding in which, from the study of collaborative technologies approach will gathered information from multiple angles especially looking through product feedback and development.

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