

MANIPULATING DESIGN RESEARCH IN DESIGN EDUCATION FROM EMOTIONAL PERSPECTIVES

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ABSTRACT

After applying design research and practising in design industries for decades, designers now understand that design research is the foundation for creating products, services and systems that respond to market needs. However, not all design research is effectively applied or contributes to the design process for generating predictable design outcomes. In recent years, new aspects of design discipline have been developed. Users have also developed new perspectives on design. These factors have influenced the effectiveness of applying existing design research in the design process and the corresponding design outcomes and have ultimately influenced the competition of enterprise. The scholars who have proposed most of the existing design research have adopted rational approaches. To meet the fast-developing new disciplines of design, finding new insights is necessary. A group of design researchers have proposed alternative design research methods. Exploring more design research directions from a humanistic perspective is appropriate. To address these distinct views, this paper intends to explore the potential use of emotional research procedures in design research and design education. This is a qualitative analysis on the effectiveness of user emotion portfolios in design research for design education. This study provides insight into how students experience, understand, perceive and conceptualise various aspects of the design research process. These findings affirm aspects of emotional research procedures and represent the first step in explaining the different ways in which students' emotions are implemented in the process of design research.

Keywords: Design education, design research, emotion, design outcome

INTRODUCTION

Various scholars have suggested that design research is the foundation for creating products, services, and systems that respond to market needs. Design research can help make decisions regarding a variety of users' considerations. For example, design research can help designers understand the positioning of the design, the optimal design objectives, and the needs of the target users. Design research has predicted users' loyalty, satisfaction, and customer preferences.

The central concern has been addressed in the design of curricula. Various fields of research have investigated how to optimise design research procedures such as the process of design research, research question formulation, and the methodologies of data collection. However, not all design research is successfully conducted. In recent years, new aspects of design disciplines have been developed that have incorporated economic, cultural, and environmental changes, creating considerable challenges and increased stress for users. Concurrently, users have developed new perspectives on design which they depend on for their livelihood and quality of life. The humanistic factors of living have been discussed and have increased awareness about inclusive design, service design, and emotion and design.

These factors have also influenced the effectiveness of applying existing design research in the design process and the corresponding design outcomes.

Solely cognitive processes in design activity no longer guarantee appropriate solutions. To meet the fast-developing new disciplines of design, finding new insights is necessary. Several design researchers have proposed alternative design research methods for exploring more design research directions from a humanistic perspective. To address these distinct views, this paper explores the potential use of emotional research procedures in design research and design education. This is an investigation of the development and implementation of emotion on various design research processes in design education for sharing insight into how students experience, understand, perceive, or conceptualise various aspects of the design research process. The findings affirm the aspects of emotional research procedures and represent the first step in explaining the different ways in which emotion introduces students to the process of design research.

Cognitive Processes in Design Education

In past decades, various scholars have investigated whether an individual's thinking and learning process is followed by a self-referential system (Christiaans, 2007). According to this cognitive perception, most existing design research has investigated the product-related levels which focus on the effectiveness of functions and materials. Brezet and van Hemel (1997) presented lifecycle design strategies (LiDs) which are among the most effective tools applied at the first stage of the product design process. LiDs distinguish seven strategies ordered on product-related levels and one special strategy on a conceptual level, such as the 'product component level' and 'product structure level'.

LiDs mainly concern the life cycle of design and are the basis of qualitative data and the personal interpretation of data. Thus, designers have gained a clear understanding of possible strategies for their design. Thus, they have selected the most appropriate strategy for application in the conceptualisation phase. Some designers have adopted methods for exploring users' habits. For example, Gaver et al. (2004) proposed 'cultural probes' to learn about intended users in a purely inspirational way on the basis of their self-documentation. The intended users were provided with generative packages which helped them to record their daily experiences. Compared with other existing design research, this method enabled exploring the users' habits. However, because there was no direct contact between designers and intended users, cultural probes could not provide a deep understanding of the intended users. Insights can create possibilities, but they cannot validate results. Therefore, the designer could understand the daily grooming experiences of the participants, but could not explain the reasons behind their experiences. Cultural probes were also not suitable if designers aimed to find answers to specific questions.

Trend in Design from Cognitive Aspects to Human Activity

Increasing trends in design research place more importance on the cognitive aspects of human activity (Simon, 1969, Lawson 1986; Schön, 1987; Cross, Dorst, and Roozenburg, 1992; Hekkert and Overbeeke, 1999; Love, 2003; Norman, 2003). Studies from other disciplines have contributed to the growing incorporation of aspects such as creativity, imagination, emotions, and intuition in design theory. These disciplines have included psychology, neurocognition, and physics. Relevant studies by Gardner (1989), Guntern (1996), and Damásio (2000) have influenced this trend. Hanington (2007) investigated the trends of design research in design education, determining that in the design profession, new generations had to confront broader responsibilities challenges that were more abstract. Hanington indicated that traditional design education mainly emphasises design research on

materials and products. Project planning, recruitment, and communication were essential agendas of the design research process. Along this traditional direction, traditional methods such as surveys, questionnaires, interviews, and various forms of observation typically contain prescribed protocols attached to their design and conduct, with standard examples available to use as guiding templates. The agendas of design research have been prioritised into three areas: ‘user-centred design research’, ‘research on domestication of design’, and ‘cultural design research’. Hanington studied several indicators which showed favourable procedures in the prioritised research process. However, since the development of design characteristics, the purpose in teaching design research methods has been to inspire the development of new and innovative methods created to suit the unique characteristics and questions of a particular design situation. Hanington suggested that such research methods are consistent with the mission and methods of creative education. Relevant research has been successful through active knowledge generation and practice. The trend of change in design research has provided a new generation of knowledge and has advanced the development of design education. The development of design research has led to the transformation of design education.

Process of Organising Information

In the present study, understanding how the participants processed the information they received was essential. Constructivist theory and cognitive psychology inspired design scholars to be conscious of the importance of emotion in information processing. The information organising process involves the cooperation of the two main memory systems, working memory and long-term memory. The external stimulus induces emotional responses and leads to the thinking process in real time (Atkinson and Shiffrin, 1968). According to Freudian theory, this real-time thinking process (working memory) processes information and considers the factors involved in the thinking process (Freud, 1937). The working memory interacts with long-term memory, which includes distinct categories such as individual experience, value and missions, and learned knowledge and skills. These categories are recalled and used as a reference for decision making. The interaction between working memory and long-term memory generates the motivation and appraisal for judgement and responses (including actions) (Craik and Lockhart, 1972; Longueville et al., 2003). Scherer (1984) investigated how emotion leads to information processing, arguing that emotion is a pattern of judgement and response to external stimuli and situations. After the occurrence of an event, an individual’s intrinsic pleasantness and goal relevance emanate primary appraisal, or ‘evaluation of an outcome’. This primary appraisal is generated from the attribution of causation that directed the individual’s responses. To make an appropriate judgement, the individual must compare primary appraisal of external or internal standards with those that are influenced by cultural expectations or norms, resulting in secondary appraisal. Therefore, when designers bring their emotional concerns into the decision-making process, their information processing abilities are affected. According to Scherer’s concept of emotion, the emotional concerns of designers affected their decision-making abilities and their consideration of internal and external factors in the overall design process (Ho, 2010). Hence, designers can use their emotions to develop appropriate responses that optimise their designs.

Emotion Involved in Design

Design is an emotional and intuitive process. The emotional experience is a ‘succession of neuronal and chemical reactions’ (Damásio, 2003). Hence, designers should consider emotions and feelings in new disciplines.

These neuronal and chemical reactions cause a temporary change of the state in the structures of the brain that form the substrate of thinking. Because of this, students should know about the influence of emotional conditions in the creative design process. Damásio showed in his many neurological publications that emotions and feelings are fundamental for rational thinking and decision making. Damásio demonstrated that it is possible to change feelings by thinking from different perspectives. ‘Value-laden’ words, for example, can alter the perception of a situation and thus the associated feelings.

In the design process, emotions and feelings can perform the following functions but are never a substitute for rational thinking:

- Identify and redefine project problems more quickly and easily;
- Reduce the unavoidable complexity of design situations and become a catalyst for decision making;
- Reinforce existing preferences on, for example, styles, values, and attitudes, and accelerate the formation of new preferences;
- Judge naturally the ambience of group work and the relations in the team and react appropriately;
- Understand and accept interruptions caused by negative emotions in the thinking process and develop a strategy for overcoming the negative emotions.

Demir, Desmet, and Hekkert (2009) examined participants in a design and emotion research project who learned how to set up and execute a research project. They also indicated crucial activities in conducting design research projects such as reviewing literature and formulating research questions.

PROPOSED ACTIVITIES FOR DESIGN STUDENTS TO UNDERSTAND THE USER'S EMOTIONS

User Emotion Portfolio Tool 1: User Emotion Questionnaire

In today's competitive consumer market, it is increasingly important that designers understand how people use and interact with their design outcomes. Designers must understand why people form relationships with design outcomes so that they can influence a richer and more sustainable connection between design outcomes and consumers. A checklist is proposed for designers to administer at the design research stage:

- How can the user control and personalise the design outcome or adapt how it is used?
- Which materials become more desirable with use or time?
- Which materials provide sensory pleasure to the user?
- How can memories be associated with the design outcome?
- What pleasure can the user experience by using the design outcome?
- How can the sustainability of the design outcome be enhanced?
- How can the user be encouraged and the product be developed concurrently?
- How does the user exhibit personality in his or her habits?
- What is the personality of the user?

Emotion Checklist

The main objective of the checklist is to recognise the user's emotion by identifying the ‘what’, ‘when’, ‘how’, and ‘why’ causes of the particular emotional changes. The table is used to identify what is and is not in the users' control and whether they recognise their own

emotions by overly associating or disassociating. The eight main categories represent the emotional changes that the users should be asked.

The eight types of emotions identified by Russell (1980) were used as the measurement to evaluate open-ended feedback of the visual design elements in the sample experience design system. It was expected that the participants would describe their emotions by differentiating them on the basis of the ‘underlying dimensions’, an approach proposed by psychology scholars.

Based on the assumption that emotions are interrelated and that some emotions are more similar (e.g., anger and irritation) than others (e.g., boredom vs. inspiration), psychology scholars proposed to describe and differentiate these emotions according to the ‘underlying dimensions’ of emotion (Wundt, 1905). These ‘underlying dimensions’ include emotion words (Averill, 1975), facial expressions (Gladstones, 1962), and self-report emotions (Mehrabian and Russell, 1977). Desmet (2002) also adopted this method to describe emotions in his product-emotion research, whereby emotions are differentiated on the basis of their manifestations, preceding appraisals, and underlying dimensions. Because emotions are interrelated, and some emotions are more similar (e.g., anger and irritation) than others (e.g., boredom vs. inspiration), they are best described and differentiated using the underlying dimensions. The dimensions are generally labelled as ‘pleasantness’ and ‘activation’. The pleasantness dimension ranges from unpleasant (e.g., unhappy) to pleasant (e.g., happy). The activation dimension is defined as physiological arousal (Clore, 1994), and ranges from calm (e.g., content) to excited (e.g., euphoric). On the basis of these two dimensions, emotions can be classified into eight types (Russell, 1980) as shown in Figure 1.

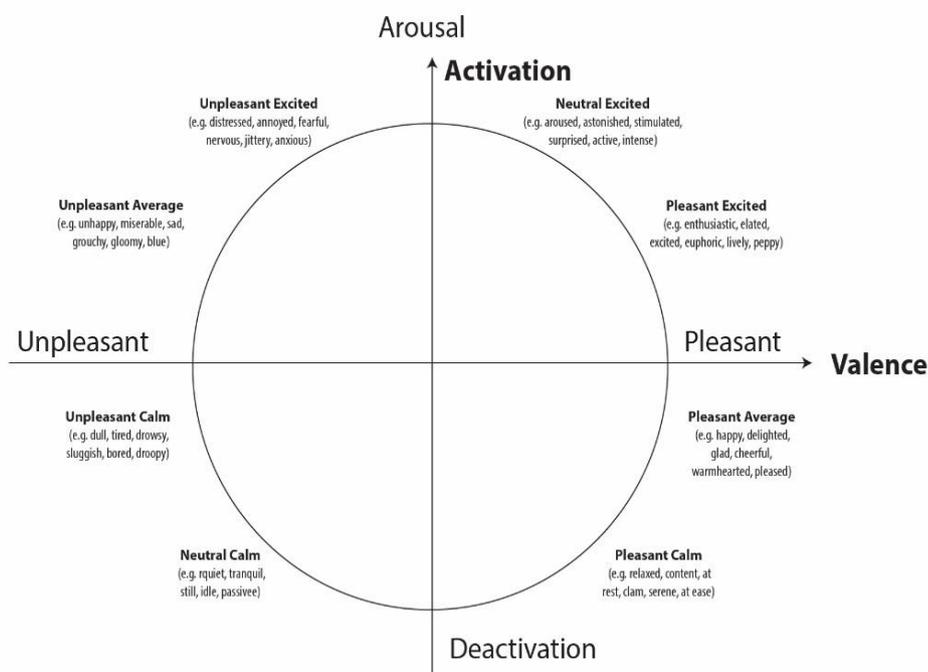


Figure 1. Proposed Eight Types of Emotions (Russell, 1980)

The concept of underlying dimensions has been used in psychology and cross-disciplinary studies to differentiate emotions in various ways through emotion words (Averill, 1975), facial expressions (Gladstones, 1962), and self-reporting (Mehrabian and Russell, 1977). The underlying dimensions help participants describe their emotions and identify their emotional responses more effectively. In this study, the participants described the emotional changes they experienced from the visual design elements and the generated perception according to the above categories (i.e., underlying dimensions). To determine how the sample experience

design influenced the motivation of the users, the final questionnaire asked whether the customer would repurchase, revisit, or recommended an airline website and its services.

Table 1. Emotion checklist

What cause me neutral excited (e.g. aroused, astonished, stimulated, surprised, active, intense)?	When does it cause me neutral excited (e.g. aroused, astonished, stimulated, surprised, active, intense)?	How does it cause me neutral excited (e.g. aroused, astonished, stimulated, surprised, active, intense)?	Why does it cause me neutral excited (e.g. aroused, astonished, stimulated, surprised, active, intense)?	What will I react?
(Participant's feedback)	(Participant's feedback)	(Participant's feedback)	(Participant's feedback)	(Participant's feedback)
What cause me pleasant excited (e.g. enthusiastic, elated, euphoric, lively, peppy)?	When does it cause me pleasant excited (e.g. enthusiastic, elated, euphoric, lively, peppy)?	How does it cause me pleasant excited (e.g. enthusiastic, elated, euphoric, lively, peppy)?	Why does it cause me pleasant excited (e.g. enthusiastic, elated, euphoric, lively, peppy)?	What will I react?
(Participant's feedback)	(Participant's feedback)	(Participant's feedback)	(Participant's feedback)	(Participant's feedback)
What cause me pleasant average (e.g. happy, delighted, cheerful, warmhearted, pleased)?	When does it cause me pleasant average (e.g. happy, delighted, glad, cheerful, warmhearted, pleased)?	How does it cause me pleasant average (e.g. happy, delighted, glad, cheerful, warmhearted, pleased)?	Why does it cause me pleasant average (e.g. happy, delighted, glad, cheerful, warmhearted, pleased)?	What will I react?
(Participant's feedback)	(Participant's feedback)	(Participant's feedback)	(Participant's feedback)	(Participant's feedback)
What cause me pleasant calm (e.g. relaxed, content, calm, serene, at ease)?	When does it cause me pleasant calm (e.g. relaxed, content, at rest, calm, serene, at ease)?	How does it cause me pleasant calm (e.g. relaxed, content, at rest, calm, serene, at ease)?	Why does it cause me pleasant calm (e.g. relaxed, content, at rest, calm, serene, at ease)?	What will I react?
(Participant's feedback)	(Participant's feedback)	(Participant's feedback)	(Participant's feedback)	(Participant's feedback)
What cause me neutral calm (e.g. quiet, still, idle, passive)	When does it cause me neutral calm (e.g. quiet, still, idle, passive)	How does it cause me neutral calm (e.g. quiet, still, idle, passive)	Why does it cause me neutral calm (e.g. quiet, still, idle, passive)	What will I react?
(Participant's feedback)	(Participant's feedback)	(Participant's feedback)	(Participant's feedback)	(Participant's feedback)

What cause me unpleasant calm (e.g. dull, tired, drowsy, sluggish, bored, droopy)?	When does it cause me unpleasant calm (e.g. dull, tired, drowsy, sluggish, bored, droopy)?	How does it cause me unpleasant calm (e.g. dull, tired, drowsy, sluggish, bored, droopy)?	Why does it cause me unpleasant calm (e.g. dull, tired, drowsy, sluggish, bored, droopy)?	What will I react?
(Participant's feedback)	(Participant's feedback)	(Participant's feedback)	(Participant's feedback)	(Participant's feedback)
What cause me unpleasant average (e.g. unhappy, miserable, sad, grouchy, gloomy, blue)?	When does it cause me unpleasant average (e.g. unhappy, miserable, sad, grouchy, gloomy, blue)?	How does it cause me unpleasant average (e.g. unhappy, miserable, sad, grouchy, gloomy, blue)?	Why does it cause me unpleasant average (e.g. unhappy, miserable, sad, grouchy, gloomy, blue)?	What will I react?
(Participant's feedback)	(Participant's feedback)	(Participant's feedback)	(Participant's feedback)	(Participant's feedback)
What cause me unpleasant excited (e.g. distressed, annoyed, fearful, nervous, jittery, anxious)?	When does it cause me unpleasant excited (e.g. distressed, annoyed, fearful, nervous, jittery, anxious)?	How does it cause me unpleasant excited (e.g. distressed, annoyed, fearful, nervous, jittery, anxious)?	Why does it cause me unpleasant excited (e.g. distressed, annoyed, fearful, nervous, jittery, anxious)?	What will I react?
(Participant's feedback)	(Participant's feedback)	(Participant's feedback)	(Participant's feedback)	(Participant's feedback)

Testing the Effectiveness of the User Emotion Portfolio in Design Research

To examine the effectiveness of the user emotion portfolio in the design research, a 1-day workshop was organised at a university in Hong Kong. In the workshop, a group of designers were exposed to the proposed design research process and subsequently asked to apply them while manipulating a design research task. The design research task was to generate a design with an assigned emotion. The examination was conducted in a workshop for a more accurate observation. Learning to use new design research methods in industry requires proper circumstances, which were often shaped by organising ‘training days’ or ‘workshops’ around specific skills and methods (Daalhuizen, 2014). Workshops are also commonly used in academia, and previous research investigating design for emotions has relied on a workshop setup (Yoon et al., 2012; Demir et al., 2010).

Designers’ Views on Emotional Approach

The proposed tools in this paper include the user emotion portfolio, the user emotion questionnaire, and the emotion checklist. The views reported by the participants on the design research process are closely linked to the application of the tools.

Table 2. Designers' views on emotional approach

<i>Why would you design for emotions?</i>		
1.	To have better employability	6
2.	To improve users' well-being	7
3.	To explore a new aspect of design that I am interested on	7
4.	To design more strategically	8
5.	To acknowledge that I am designing for other human beings	7
6.	To become a better designer	8
7.	To design richer experiences	7
8.	To enable users to interact better with products	6
9.	To design products that may have better opportunities to succeed in the market	8

From Table 2, it can be seen that participants agreed with most of the reasons for designing for emotions. Four reasons, however, emerged as stronger than the others: 'to design richer experiences', 'to design more strategically', 'to become a better designer', and 'to design products that may have better opportunities to succeed in the market'. At least three of these reasons are oriented towards the user. Four additional reasons were also judged important to them: 'to improve users' well-being', 'to explore a new aspect of design that I am interested in', 'to acknowledge that I am designing for other human beings', and 'to design richer experiences'.

Design Research Process

After finishing the design task, participants evaluated the usefulness of the user's emotion portfolio. The questionnaire-based evaluations are reported in Table 3. Each statement in 2 was rated using a scale from 1 to 10 (1 represented *strongly disagree* and 10 represented *strongly agree*).

Table 3. Design research process

<i>About the Overall Design Process (Select the emotion/getting knowledge about it/ creating design solutions)</i>		
	I think the overall design process taught in this workshop is useful for designing emotions	8
<i>About the Design Solution</i>		
	I am disappointed with my design solution	4
	My solution resulted from the design process and used tools	7
	I like my design solution	7
	I feel that my solution fulfils the aim of evoking the intended emotion	8
<i>About the Overall Design Research Experience</i>		
	I think the overall design research experience in this workshop is useful in designing emotions	7

As shown in Table 4, the participants agreed (8) on the usefulness of the design process. Regarding the design solutions, the participants also tended to agree (7) that these resulted from the process used. The solutions produced were approved (8) by the designers and deemed to fulfil (8) the design goal. The participants agreed that the design task was clear, achievable within the time constraint, and that it was not too difficult.

Table 4. Usefulness of the design process

<i>About the Overall Design Process (Selecting the emotion/getting knowledge about it/ design solutions)</i>		<i>creating</i>	<i>Tool 1</i>	<i>Tool 2</i>
1.	It is useful because it offers new knowledge of emotion		7	7
2.	It is useful because it is clear to understand		6	5
3.	It is useful because it gives a structured overview of the emotion		7	6
4.	It is useful because I have space to explore my ideas		8	7
5.	It is useful because I can use it for future projects		8	8
6.	It is useful because it gives ideas that I can further develop		6	7
7.	It is useful because it guides my design process		8	6
8.	It is useful because it helps me to improve my design skill		6	7
9.	It is useful because it provides the information that is needed to design		7	8
10.	It is useful because it is effective to develop a design solution		6	7

CONCLUSION

This was a preliminary study investigating whether emotion can influence design research in design education. A qualitative analysis was conducted on the effectiveness of a user emotion portfolio in the design research process. The processes of students experiencing, understanding, perceiving, and conceptualising various aspects of design research were recorded. More research is necessary to understand how emotion influences the design research process. For example, some design research processes in bachelor's and master's degrees could be documented for investigating how emotions function. The findings affirm the aspects of formal research procedures and represent the first phrase in explaining the different ways in which students' emotions are involved in the conception of design research.

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