

A HOLISTIC EXPERIENTIAL APPROACH TO DESIGN INNOVATION

Woo, Heung Ryong ¹

Department of Industrial Design, Seoul National University of Technology
hrwoo@snut.ac.kr.

ABSTRACT

The primary purpose of this study is to develop a model for a holistic design approach (HDA) for experiential design. We regard experiential design as a transformational process between concept and experience, with a holistic view of design phenomena. Through the stages of research, design and innovation, a design concept emerges, ripens and matures through the process of externalization. Here, experience is first perceived by the sensory modalities. Then, knowledge is formed, and the creative abilities work towards problem solving. Thinking modes control all of these procedures, which are interrelated with experiential design. To confirm the weights of research, design and innovation in relation to the practical fields, we reviewed and reinterpreted 'The World's Most Innovative Companies', surveyed by the Boston Consulting Group. Finally, we proposed a revised model of the HDA, which could be helpful in developing valuable solutions and creating a positive experience.

Key words: holistic design approach, cognitive approach, experiential design

1. INTRODUCTION

Design is a typical form of creative problem solving in today's complex working environment. For the problem that is being considered, designers aim to bring about a desired solution that is something new and valuable (During, 1999). The designer must identify problems, select appropriate goals, and realize solutions. Therefore, design is regarded as an open-ended problem-solving activity that requires great creativity, and the typical style of the designer's behavior underpins their creativity (Cross, 1982).

Friedman (2007) argued that designers work on several levels: an analyst who discovers problems; a synthesist who helps to solve problems; a generalist who understands the range of talents that must be engaged in order to realize solutions; a leader who organizes teams when one range of talents is not enough. Moreover, the designer is a critic whose post-solution analysis ensures that the right problem has been solved (Friedman, 2007).

We regard design as a creative and experience-oriented process. Facing a new design case, a designer will recall their memories and imagine ideas accumulated from their experience and knowledge. Then, the designer will attempt to find a solution, a new experience, from these similar cases through adaptation or synthesis. As a discipline, though, experiential design (ED) is still somewhat in its infancy, and has only recently become recognized and named. It consists of diverse disciplines such as digital media, theater, graphic design, storytelling, exhibit design, theme-park design, online design, game design, interior design, architecture, and so forth. Collaboration among design teams is necessary because each part of the design constrains the others. It can therefore help to connect the many related disciplines. At the core of ED are methods for examining, interpreting, and organizing everyday experience in a way that is useful to the people involved in all aspects of design development, including business strategists, product and brand managers, designers, marketers, and engineers (Cain, 1998).

ED is not driven by a single design discipline, but instead requires a truly cross-discipline perspective that considers all aspects of the brand/business, from the product, packaging and retail environment to the clothing and the attitude of the employees. In ED, we need to deal with collaborative and cognitive approaches to design knowledge, and take note of cognitive interaction using a holistic view of design phenomena. In short, a holistic approach is significant in situations where design is multi-dimensional and complex.

2. COGNITIVE APPROACH IN DESIGN

2.1 DESIGN KNOWLEDGE AND EXPERIENCE

We are moving from an economy and a society built on the logical, linear, computer-like capabilities of the Information Age to an economy and a society built on the inventive, empathic, big picture capabilities of what's rising in its place, the Conceptual Age. It is an age animated by a different form of thinking and a new approach to life. In this regard, Pink proposed that High Concept involves the capacity to detect patterns and opportunities, to create artistic and emotional beauty, to craft a satisfying narrative, and to combine seemingly unrelated ideas into something new. Therefore High Concept could be a core principle for the experience design, and form the basis of experience economy. (Daniel H. Pink, 2007)

Experience design is a design approach which focuses on the quality of the user experience during the whole period of engagement with a product: from the first impression and the feeling of discovery, through aspects of usability, cultural relevance and durability, to the memory of the complete relationship. Also it considers the form, content and context of communication occurring over time. The simple way to think about what influences experience is to think about the components of a user-product interaction, and what surrounds it. *Users* represent how people influence experience. Users bring to the moment all their prior experiences, as well as their emotions and feelings, values, and cognitive models for hearing, seeing, touching, and interpreting. *Products* represent how artifacts influence experience. (Forlizzi, J., Ford, S. 2000)

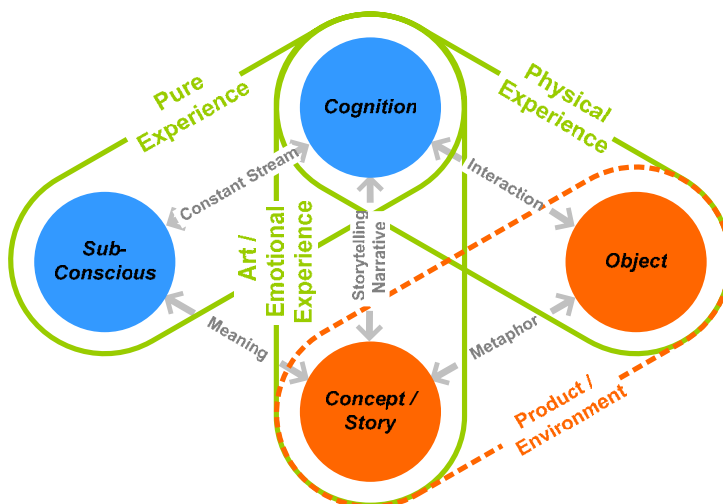


Figure 1: A Model of Experience Design

We take Forlizzi's definition of three ways that they talk about experience: *experience*, an *experience*, and *experience as story* (Forlizzi, J., Ford, S. 2000). On the basis of Forlizzi's classification, we divided a product and service into concept and object, then draw three types of experiences. The purest form of reference is *pure experience*, the constant stream that happens during moments of consciousness. Self-talk or self-narration is often the way that people acknowledge the passing of this kind of experience. Another way to discuss experience is to talk about having *physical experience*. This type of experience is built up from interaction between user and product through actively using it. We use all our senses, our mind, and our body. The experience is the awareness of what's happening to us when we do all this perceiving, acting, and processing. A third way to deal with experience is to talk about *art and emotional experience*. Concepts and perceived through cognitive process, then art and emotional experience is made up. This type of experience involves aesthetic sensory pleasure, construction of meaning and emotional responses (Fig.1).

With joining these three types of experiences, we can make a specific experience complex. We know that a singular experience is made up of an infinite amount of smaller experiences, relating to contexts, people, and products. It is more of a trans-disciplinary approach in which the traditional boundaries of what constitutes an expertise or a discipline are transcended. And expertise in experience design is something that is equitable, shared and distributed across a broad range of participants.

Experience as a general concept comprises knowledge of, skill in or observation of some phenomena gained through involvement in the thing or event. Design knowledge consists of both declarative and procedural knowledge. The concept of experience generally refers to know-how or procedural knowledge, related to how one performs tasks, and is generally acquired by experience. Facts, concepts and relationships are declarative knowledge. Some of this design knowledge is based on a compiled understanding of underlying declarative knowledge, but much of it is gained from experience. This is especially true of conceptual design for which little declarative knowledge exists (Miles & Moore, 1994).

Experiential design is the practice of designing products, processes, services, events, and environments based on the consideration of an individual or group's needs, desires, beliefs, knowledge, skills, experiences, and perceptions. The problem in ED is more difficult to understand, and requires a great deal of research, more than any other design domain. Davenport and Prusak (1998) argued that experience refers to what we have done and what has happened to us in the past. Design experience refers to the cumulative experience of designers or design groups in mastering competence in developing products over a long period of time in many diverse circumstances. Therefore, experience is information about

products that a designer possesses in a form that can be immediately used for developing new product concepts (Teixeira, 2007).

Teixeira (2007) defined that design knowledge is a fluid mix of designers' experience, their values, contextual information about the production and use of products, and the combination of structured methods and designers' intuition, that provides a framework for conceiving a product, fashioning the means to carry it out, and estimating its effects. The in-depth analysis of design knowledge characteristics is presented through four major categories: expert insights, design experience, design values, and contextual information (Teixeira, 2007).

As Bunge (1996) suggested, knowledge arises through the interaction of many forms of learning, in which thinking, experience and action all play a role. Although the process of learning and the nature of knowledge are not completely understood, there is wide agreement that knowledge creation requires experience. Kolb's definition of learning as "the process whereby knowledge is created through the transformation of experience" offers a useful perspective (Friedman, 2007).

Any kind of experience may, in principle, be transformed into knowledge. Kolb emphasizes the relationship between experience and knowledge as a dynamic process of continuous reproduction and regeneration (Friedman, 2007). Knowledge and experience have a close relationship and dynamic interaction, and a holistic approach carries these convictions into design research and practice.

2.2 RESEARCH, DESIGN AND INNOVATION

Knowledge supports the human capacity to understand present situations and shape future action. Experience is transformed into knowledge in several ways. One is reflection on the past. We argued that design innovation extends along a continuum between inquiry and application, and exists in a specific position between the symbolic world and the real world. We divide the holistic design process (HDP) into three stages: research, design, and innovation. Here, knowledge is built by research, and it is used for design and innovation by building experience, which is an object for research. In short, research is a way of asking questions. All forms of research ask different questions, divided into three types: basic, applied and clinical. The different forms and levels of research ask questions in different ways (Fig. 2):

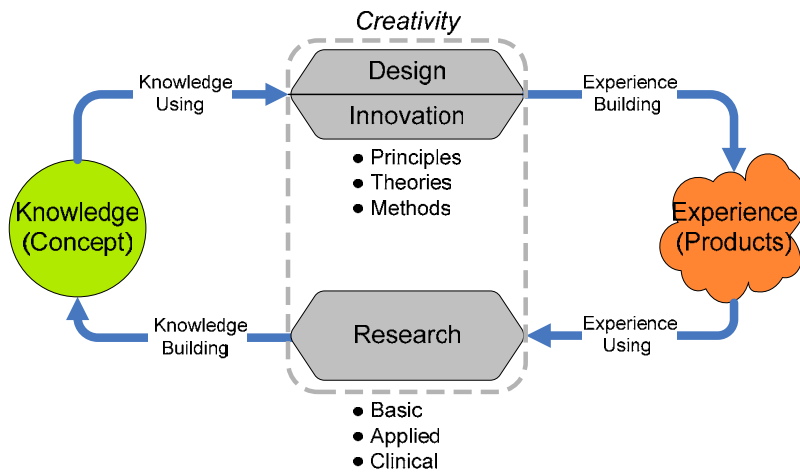


Figure 2: Experiential Design Process

Firstly, research is important as the source of design and innovation, and falls into one of three types: basic, applied, and clinical. Especially, the application of research results determines successful design practice. After all, without using appropriate knowledge in design, good experience cannot be effectively applied.

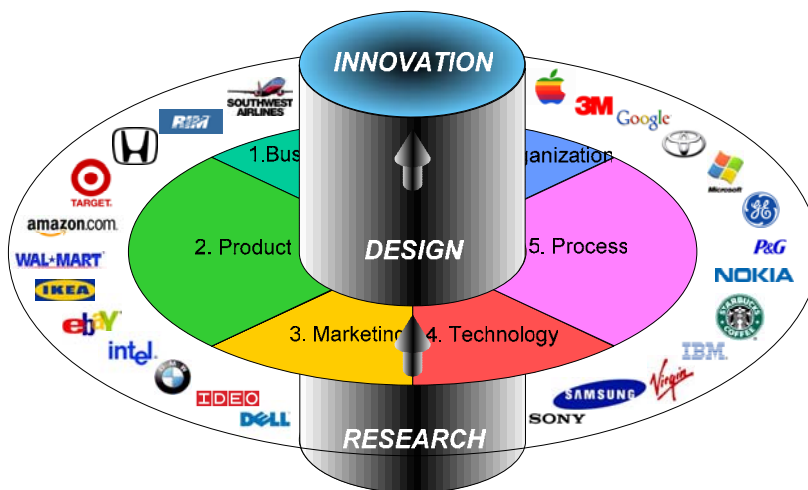
Secondly, design work is more concept-oriented than simply striving for innovation. One of the most useful definitions of design is by Michael Wolff, here quoted in an abbreviated form: *“Design is a vision ... Design is a process Design is a result”* (Swann & Birke, 2005). This three-faceted definition is very useful, and many of the other definitions focus on one or other of these three facets. Moreover, each of these facets raises important design issues.

Finally, innovation is typically understood as the *introduction* of something *new* and *useful*, for example introducing new methods, techniques, or practices, or new or altered products and services. It involves finding a new and better way of doing something. In the process of design and innovation, there are three types of knowledge: principles, theories, and methods. All these emerge through research.

We have presented design as an open-ended problem-solving activity that requires creativity. However, we need to pay more attention to the role of research, design and innovation as a channel for creativity in the design innovation process (Swann & Birke, 2005). Here, creativity is seen as providing the ideas of design and innovation for successful implementation. Specially, design can help transform concepts as knowledge from experience into a usable end product, effectively acting as a bridge between research and innovation.

2.3 CASE STUDIES ON THE THREE STAGES OF DESIGN: RESEARCH, DESIGN AND INNOVATION

Research, design and innovation are core competencies of almost all competitive companies. To confirm the actual facts in relation to the practical fields, we reviewed and reinterpreted 'The World's Most Innovative Companies', a 2006 survey and analysis of 1,070 senior executives in 63 countries by the Boston Consulting Group. The Boston Consulting Group announced the World's Most Innovative Companies on the BusinessWeek website in 2006. The Boston Consulting Group survey on innovation was distributed electronically to executives worldwide in early 2006. The surveys were sent to the largest 1,500 global corporations, determined by market capitalization in U.S. dollars, with instructions to distribute the survey to their top 10 executives.



Three Stages of Design Innovation

Figure 3: Three Stages of Design Innovation with Interwoven Areas

We carried out protocol analysis, which involves the identification of basic knowledge objects within a protocol, a transcript of 'The World's Most Innovative Companies', and then drew up Table 1 through analyzing the reasons for them being the World's Most Innovative Companies, most of them involving the three stages of design innovation: research, design and innovation. The results present a powerful message that research, design and innovation are meaningful differentiators to the companies.

Fig. 3 shows the three stages of design innovation: research, design, and innovation. Each stages of design innovation is related to six interwoven areas: (1) Business, (2) Product, (3) Marketing, (4) Technology, (5) Process, and (6) Organization. (BusinessWeek 2006)

Therefore, we should keep our eyes on these areas for the performance of the three stages of design innovation.

Table 1: The World's Most Innovative Companies

2006	2005	Company	(1) Business	(2) Product	(3) Marketing	(4) Technology	(5) Process	(6) Organization	Experience	Design & Innovation
1	1	Apple	●	■					◆	D&I
2	8	Google	●	■		▼			◆	R
3	2	3M		■		▼				R&D
4	14	Toyota		■	◐	▼	▲			I
5	3	Microsoft	●	■	◐				◆	I
6	3	General Electric		■			▲	★		C
7	9	Procter & Gamble	●	■			▲	★		D&I
8	9	Nokia	●	■	◐		▲			D
9	19	Starbucks	●	■	◐				◆	C
10	7	IBM	●	■	◐	▼	▲			C
11	11	Virgin	●							C
12	12	Samsung		■			▲	★		D
13	5	Sony		■	◐					D&I
14	6	Dell	●				▲			C
15	18	IDEO		■			▲		◆	D
16	20	BMW		■		▼	▲			R
17	16	Intel	●	■						I
18	15	eBay	●		◐					C
19	New	IKEA	●	■	◐		▲		◆	D
20	13	Wal-Mart			◐		▲			I
21	16	Amazon		■	◐		▲		◆	R&D
22	New	Target	●	■	◐				◆	D
23	23	Honda		■		▼				I
24	New	Research In Motion		■	◐					I
25	21	Southwest Airlines	●		◐		▲			I

Legends ●: Business, ■: Product, ◐: Marketing, ▼: Technology, ▲: Process, ★: Organization, ◆: Experience, C: Creativity, D: Design, R: Research, R&D: Research & Development, I: Innovation

Meanwhile, R&D is a creative process, involving the development of ideas fit for implementation by a business, which is an important input to innovation in many, but not all, sectors and businesses. The linkage to design is more complex. Many firms consider design to be part of their R&D process, some even calling it RD&D. But design and creativity can also add value beyond any technological innovation. For example, a new car design or a toaster may embody no fundamental change in technology, but the change comes via new design (DTI, 2005).

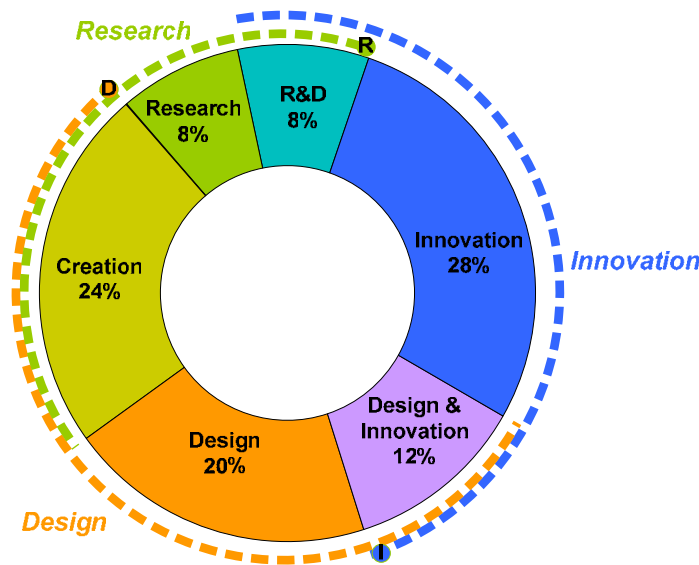


Figure 4: Research, Design and Innovation

In general, design is located in the middle of the process of research and innovation. From Table 1, the stages of design innovation are extracted, but there are some overlapping areas, like creation, R&D, and design and innovation (Fig. 4). These case studies support the fact that the three stages of design innovation are important for innovative companies. Whether the company's emphasis is on inquiry or application, each stage is essential to the company's competitiveness.

In the experiential design process, design knowledge is essential. It has two different roles: inquiry and application. The experiential design process takes place through three stages of design innovation: research, design and innovation. This can be summarized as design knowledge being used to build experience through the design or innovation stage, and experience being used to build knowledge.

We have confirmed that the World's Most Innovative Companies have the three stages of design innovation, which include the following interrelated and overlapping areas: creativity, R&D, and design and innovation. The three stages of design innovation have six interwoven areas: business, product, marketing, technology, process, and organization. Also, knowledge and experience are inseparable from the three stages of design innovation. In terms of implementing open-ended, future-oriented design projects, the balance of knowledge building and use shouldn't be overlooked, nor should experience building and use.

3. EVOLVING A HOLISTIC DESIGN APPROACH

3.1. COGNITIVE INTERACTIONS IN DESIGN

As mentioned above, design is a creative and experience-oriented process. In an experiential design process (Fig. 2) it is necessary to study cognitive approaches during knowledge building and use. This knowledge should be concerned with the whole rather than separation into parts. We take a holistic view of design phenomena. In our previous study (Woo, 2005) we examined cognitive interaction in design, which has four components: senses, intelligences, concepts, and experience. On this basis, we developed a cognitive design map (CDM), which has four layers: four causes (FC), four thinking modes (TM), five senses (FS), and four creative abilities (CA). In the former study we found that there are close relationships and mutual influences among thinking modes, sensory modalities and creative abilities (Fig. 5). We regarded design as a transformational process from concept to experience. First, the experience is perceived by FS and then recognized by the intelligence. Next, the concept is coined by the intelligence. Finally, we change the concept into an object through the design process. These provide the basis of a new approach to cognitive interaction in design.

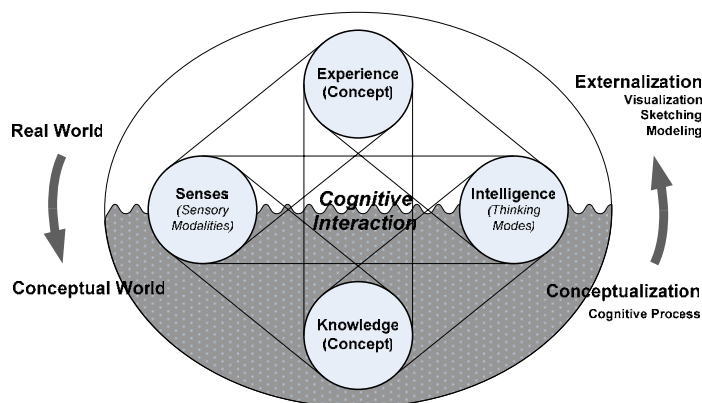


Figure 5: Cognitive Design Map (CDM)

Any kind of experience may, in principle, be transformed into knowledge. Kolb emphasizes the relationship between experience and knowledge as a dynamic process of continuous reproduction and regeneration (Friedman, 2007). It contradicts the static model of learning as acquiring knowledge external to and independent of the learner. Information and facts are external to and independent of the learner. Knowledge inheres in human beings and the specific form of knowledge is often contingent upon the learning process (Atherton, 2007).

Because knowledge is human, developing knowledge requires thinking and practice, mind and body both. Mindless recording will not transform experience into knowledge (Friedman, 2007).

Generally, a design project has three phases of problem solving: input, process, and output. Human experience has a close relationship with these phases. The experience of the input phase or the process phase is one of the major influencing factors on the project. Here the designers' experience of the output provides feedback for the following projects. Experience directly and indirectly influences the design project. Therefore, experiential design is a phenomenon resulting from cognitive interaction in design.

From the viewpoint of cognitive interaction and the cognitive design map (CDM), we set up a experiential design knowledge system (EDKS), illustrated in Fig. 6. It shows a dynamic interaction among thinking modes (TM), sensory modalities (SM), and creative abilities (CA) under design knowledge (DK).

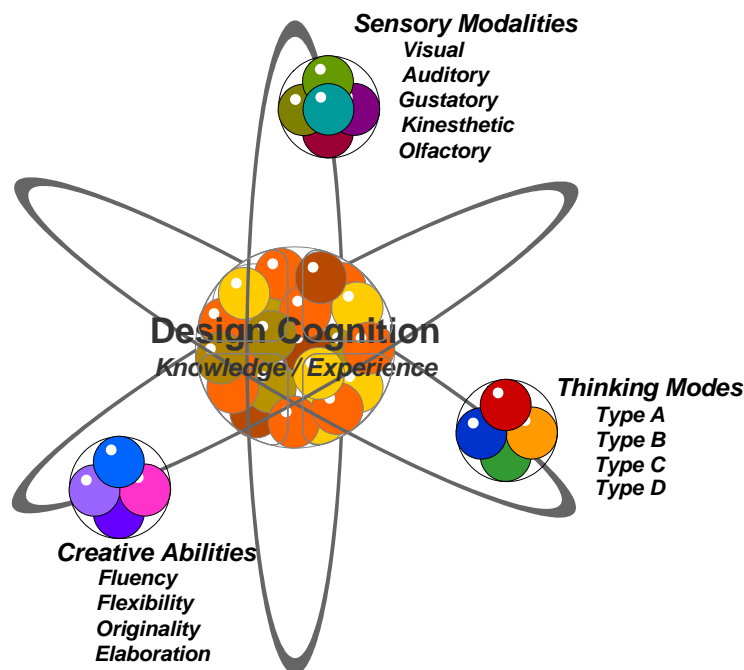


Figure 6: Experiential Design Knowledge System (EDKS)

The thinking modes, sensory modalities, and creative abilities turn repeatedly around the design knowledge (DK). Here, we regard the DK as two sides of the cognitive domain: knowledge and experience. Then, experience and knowledge are formed and the design project is affected by these components. We should not consider these as fragments of these objects, but rather as the organic whole of the experience and knowledge. We can also apply this map to experiential design and other problem-solving fields.

3.2 HOLISTIC DESIGN APPROACH

We argued that the organic whole of design phenomena constitutes holistic design. In order to suggest holistic design approaches (HDA), we applied experiential design knowledge (EDK) to the three stages of design innovation (research, design, and innovation), as shown in Fig. 7. The EDKS has different weight and balance for each stage. It shows various patterns according to the nature of the design project.

- 1) Research stage: We clarify the tasks and elaborate upon the design knowledge (DK). Design is recognized as a critical factor for business success. The result is new interest in the quality of design available, and – more fundamentally – interest in how design can be improved. The improvement question becomes very important, its answer imperative. In the acts of both doing and judging, questions are asked, answers obtained and decisions made. How theses are formed is the key to using knowledge successfully to build new knowledge (Owen, 1998).
- 2) Design stage: We identify essential problems, establish function structures, search for solution principles, combine and firm up into concept variants, and evaluate against technical and economic criteria. We develop preliminary layouts and form designs, select best preliminary layouts, refine and evaluate against technical and economic criteria. Design is a process. A design process is rooted in and involves both theoretical disciplines and fields of practice. As all fields of practice do, design knowledge involves explicit knowledge and tacit knowledge. Disciplines also involve explicit knowledge and tacit knowledge both.
- 3) Innovation stage: The innovation process involves the introduction of a good or service that is new or substantially improved. This might include improvements in functional characteristics, technical abilities, ease of use, or any other dimension. Finally, we optimize and complete form designs, check for errors and cost effectiveness, and prepare the preliminary parts list and production documents.

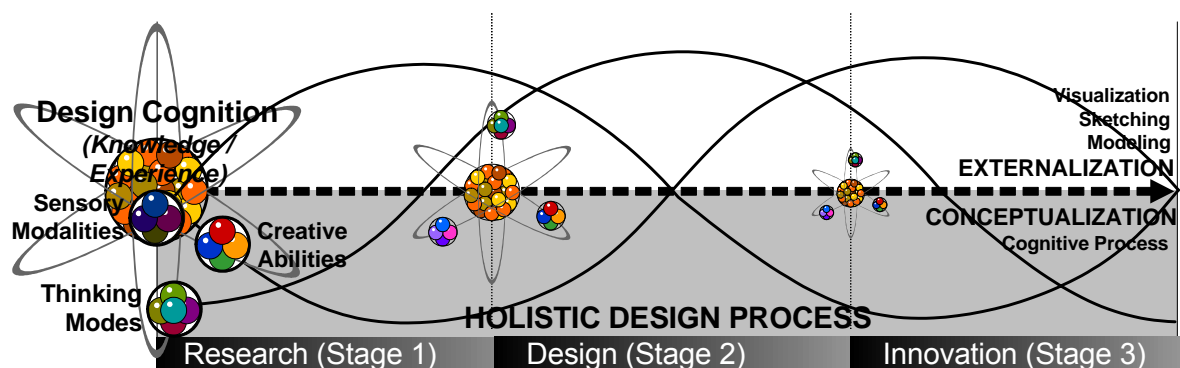


Figure 7: A Model of Holistic Design Approach (HDA) (I)

Revolving sensory modalities, creative abilities, and thinking modes around design cognition through the three stages of design innovation, design concepts ripen and mature through a process of externalization. It turns as a curve, creating a base of new experience, and repeats its rotation between conceptualization and externalization (Fig. 6). When we observe the direction in which the experiential design knowledge system (EDKS) moves forward, it draws a spiral curve toward the front (Fig. 8). Here, the spiral curves are generated during their rotation around the EDKS.

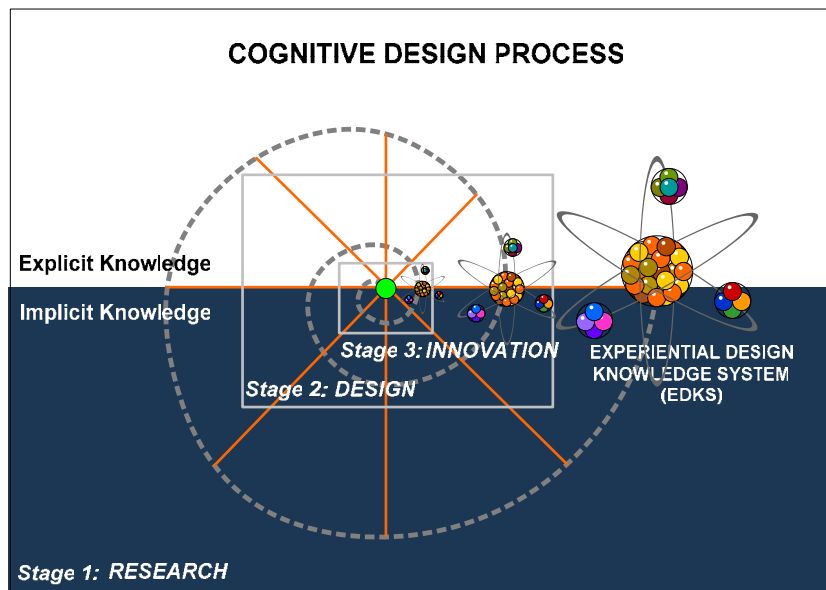


Figure 8: A Model of Holistic Design Approach (HDA) (II)

4. DISCUSSION

In design innovation, concepts are embodied in the experience, which is coined by the intelligence and senses. Meanwhile, the experience is changed into new input for the following design projects. These cognitive interactions in design are iterated through the stages of research, design, and innovation. Therefore, the holistic experience design approach is coined as a continuum of the experiential design knowledge system (EDKS). Even though the weight between inquiry and application in the three stages may be different, the balance between them is significant in order to reach a sound solution.

1) In the research phase, which is the analytical side, questions are sharply honed against the context of a discipline's value system, which requires answers to be similarly crafted. Creativity

is inspired by good questions. Considering the phase of design and innovation at the same time is valuable for an organic approach to the three stages of design innovation.

2) In the design phase, which is the synthetic side, the design discipline should look to the research phase for further design inquiries. Even though it comes under the knowledge-using phases, it opens up special opportunities for creativity as well as innovation.

3) In the innovation phase, which is the real application side, the knowledge of research stage or the design stage are still of use. To reach solutions and better thought-out endings, question-asking phases are more important. The results of innovation render different experiences as the design's benefits.

5. CONCLUSION

In this paper, we argued for an integrated design process for experiential design, and set up a model for a holistic design approach (HDA). An experiential design knowledge system (EDKS) moves based on three stages of design innovation: research, design and innovation. In this HDA, experience is first perceived by the five senses. Then, knowledge is formed, and the creative abilities work towards problem solving. Thinking modes control all of these procedures, which could be repeated several times. We regard these as phenomena of experiential design.

Based on the results of this study, HDA can be helpful in order to develop valuable solutions and create good experiences. Even though this study does not offer a practical and specific design process, these holistic design approaches are helpful frameworks for research and practice in design.

In this study, we concluded that experiential design is a holistic, multi-disciplinary and multi-sensory way of bringing to life the essence of a brand, product or service, which sees the designer as a creator of possible user experiences through HDA. In terms of the future of research into experiential design, we need to study the detailed design processes and elements of HDA.

REFERENCES:

AIGA (2007) Journal of Design for the Network Economy | Volume 1, number1 p1 (FORM + CONTENT + CONTEXT) TIME = EXPERIENCE DESIGN

Atherton, J. (2007) The Experiential Learning Cycle,
<http://www.learningandteaching.info/learning/experience.htm>

Bunge, M. (1996) *Finding the Philosophy in Social Science*, Yale University Press, New Haven. p. 13.

BusinessWeek (2006) The World's 25 Most Innovative Companies,
http://www.businessweek.com/pdfs/2006/0617_top25.pdf?chan=search

Cain, J. (1998) Experience-Based Design: Toward a Science of Artful Business Innovation, *Design Management Journal*, pp. 10–16.

Cross, N. (1982) Designery ways of knowing, *Design Studies*, 3(4), Elsevier Science, Oxford, pp. 221–227.

Daniel H. Pink (2007) <http://www.danpink.com/excerptwnm.php>

Davenport, T. H., & Prusak, L. (1998) *Working Knowledge: How Organizations Manage What They Know*. Boston: Harvard Business School Press, pp. 7–8.

DTI (2005) Creativity, Design and Business Performance, DTI ECONOMICS PAPER NO. 15, p. 7.

During, D. (1999) Intuition in Design: A perspective on designers' creativity, *Asia Design Conference*, pp. 2–3.

Forlizzi, J., Ford, S. (2000). "The Building Blocks of Experience: An Early Framework for Interaction Designers." *Designing Interactive Systems 2000 Conference Proceedings*, New York, 419-420.

Friedman, K. (2007) Creating design knowledge: From research into practice, pp. 13–18
<http://magpie.lboro.ac.uk/dspace/bitstream/2134/1360/1/Friedman2000.pdf>,

Miles, J., & Moore, C. (1994) *Practical Knowledge-Based Systems in Conceptual Design*, Springer-Verlag, London, pp. 17–19.

Owen, C. L. (1998) Design Research: building the Knowledge Base, *Design Studies* 19, No. 1 pp. 9–20.

Swann, P., & Birke, D. (2005) How do Creativity and Design Enhance Business Performance? DTI, pp. 6–19.

Teixeira, J. C. (2007) Applying Design Knowledge to Create Innovative Business Opportunities, pp. 2–6
http://www.id.iit.edu/papers/design_knowledge.pdf

Woo, H. R. (2005) The Influence of Cognitive Factors on the Creative Abilities in Design, *Proceedings of 2005 International Design Conference*.