A Strategy on Introducing Inclusive Design Philosophy to Non-design Background Undergraduates

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Abstract. Focusing on how to integrating design into crossover-education, which is a controversial topic in china's education. And in china, all china's colleges and universities are trying their best to set up crossover education. Cause firstly they all think that it is vital important for the college students to broaden their horizon, secondly, more and more projects need diverse and professional genius to cooperate to be finished. They need to know the design thinking. But the problem is coming, differing from design-major background students, how to make design curriculum transforming a better and easier way to accept and assimilate by the other background students. How to cultivate the design thinking in crossover education, I think, which is the most things we as educator need to concentrate. This paper focuses on how to introduce inclusive design philosophy to non-design background undergraduates. This is one of the parts of a research project "Applied universities' design education reform and practice based on the principle of inclusive design" supported by the Shanghai Education Science Research Program (Grant No. C17067) [1].

Keywords: Inclusive design · Design philosophy · Strategy
Non-background undergraduates

1 Introduction

Since 1998, China has begun to promote general education. Design education, as a means to improve the national aesthetic quality, has become one of the contents of general education. At Fudan University and Shanghai University of Finance and Economics (SUFE), for example, design education is listed as one of the categories of general education courses. With China gradually entering the aging society [2], it is more and more urgent to incorporate the inclusive design concept into design education, not only for design students, but also for non-design background students. Based on this position, the authors' educational practice at SUFE provides a good case.

Inclusive design, which is defined by BS 7000-6:2005 as "a comprehensive, integrated design which encompasses all aspects of a product used by consumers of diverse age and capability in a wide range of contexts, throughout the product's lifecycle from conception to final disposal" [3], the first author has assisted a general course "Design

Art Innovation" at SUFE for 5 semesters. He tries to introduce inclusive design philosophy to those non-design background undergraduates in this course. Some difficulties were met during the teaching process and he clarified the barriers, found several targeted solutions, and summed up a set of conceptual teaching model.

In China, "With the occurrence of a rapidly aging population, the issue of universal access and inclusivity is a challenging and complex one" [4]. Though there are exactly so many practices in crossover education recent years, just like the general curriculum is been built, but it really exists a gap between theories and practice in china. It is hard to find an effective way to find resources and tools of inclusive design in china. So trying to identify the barriers and limitations of integrating inclusive design into china's crossover education is a very important purpose.

Of cause, design discipline has a lot of different branches, so as to understanding how to make design work for crossover education and building up the knowledge base in this area is probably one of the most pressing tasks and challenges for Chinese design educators. As we all known, Inclusive design is one of design disciplines, as a user-centered design approaches. Can we propose a hypothesis that from so many design curriculums, we pick up the most essential and basic ones for them (the crossover education ones) to control by professional systematical learn? Can we use the way in an inclusive perspective to transform the knowledge, integrating design into crossover education? To explore a new world in crossover education through studying the inclusive design thinking. And the next is how to do for the Chinese educators, especially in theoretical and practices. This paper will organize the viewpoint by the actual teaching practice, the design general curriculum in shanghai University of Finance and Economics and a preliminary conceptual framework is proposed to organize the barriers and corresponding actions.

Although part of the work has been done, but there is still a gap between theory and practice. Undergraduate design education, especially for non-design background students, while related courses such as user research and user experience, user-centre factors often embedded a implement course, but seldom see inclusive design as a kind of unique curriculum. Key users involved in the embodiment of the various functions and user research is still limited by time or funds. In addition, it seems that inclusive design method such as characters, scenes and so on need to be translated into Chinese context. In addition, the Chinese version of the website design tools, it is difficult to find resources and inclusive design in the Chinese version of the tool. For example, type in "inclusive design" the jingdong search engine, China's largest online bookstore, the result is zero. This may indicate that it hasn't been able to use inclusive of design of teaching materials in China. The phenomenon of all listed above show that inclusive design is not widely spread as we want in China. This article attempts through the obstacles and limitations will be inclusive design into design education in China.

2 Methodology

Firstly, a literature review related to the inclusive design and design education, especially on the inclusive design education books and some essays about design philosophy (including some design methodology), were carried out. Several books and essays on

inclusive design and design philosophy are picked out and six of them refer to the design methodology and inclusive design education, they are:

- Strategy of Design Research [5]
- Inclusive Designing: Joining Usability, Accessibility, and Inclusion [6]
- Designing a More Inclusive World [7]
- Thinking About Design: An Historical Perspective [8]
- Inclusive Design: Design for the Whole Population [9]

According to the reviews and lots of practices and perspectives from the very different books and literatures from home and abroad are synthesized. Of course problems and issues from different counties can be organized and compare with the issues and barriers of inclusive design education from the literature reviews, and adding the first authors' working experience (the first author has been a assistant teacher at Teaching General Curriculum Office of Shanghai University of Finance and Economics for three years), issues focusing on integrating the inclusive design education into the non-background undergraduates were initiated empirically, then demonstrated to expert interview. Hopefully, combined with the barriers of the literature review and issue or ideas from the different expert interview (including the different background experts), some new thoughts relevant the crossover-design education will be come up.

Literature review mainly focused on two areas literature: design education and general education, especially on inclusive design education. But the purpose of literature review and experts interview is to get some perspectives and insights from interdisciplinary experts, especially from teaching administrators from different background university under the Chinese context. Limited by time and funds, only six experts were available to interview at the moment, they are from these two areas:

- Design education who having a general curriculum experience (3 persons on product design, Tongji University)
- Teaching administration (3 persons from teaching affairs office of Tongji University, covering educational theories, teaching organization, and students' innovation projects administration and the others from Shanghai University of Finance and Economics)

Synthesizing different researchers' perspectives through literature review and based on the authors' teaching experience. Main barriers for introducing inclusive design principle to non-design background students were clarified. Then the appropriate education strategies were discussed with several experts. They are from design education and non-design education background. Many good ideas and insights were inspired. After the preliminary education strategies were generated, they were put into practice and quickly get the students' feedback through questionnaire. Through in-depth discussion of some typical teaching cases, a set of conceptual teaching model was initiated.

The experts interview were open-minded and face-to-face, a free talk as the beginning with issues on china's design education situation nowadays and some problems meet in the context of Chinese specific culture, including the challenges and opportunities. Then a more depth discussion about how to integrate inclusive design into exiting China's education system, especially the universal design education among all Chinese populations.

Of course a brief introduction of inclusive design was given from the experts to teaching administration in advance. The preliminary barriers were brought forth and assessed. Perspectives from two-side experts were absorbed and four aspects of barriers were finally clarified. One of the experts from teaching administration suggested a further case study of Tongji University's strategy of integrating sustainability as a whole. It could be a trigger from different angle, that means discuss design issues out of design. Case study gave the authors some clues, and then a conceptual framework was outlined.
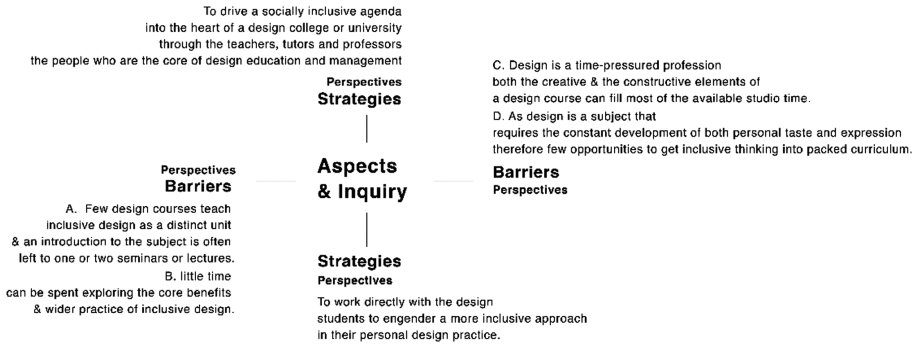
3   Literature Review

Literature review mainly focused on two areas literature: design education and general education, and the how to integrate inclusive design into non-background undergraduates through the some design strategies and design philosophy, especially by inclusive design education. By synthesizing different researchers' perspectives through literature

Table 1. Inclusive design education

Countries	Universities (Time)	Practices	Types of education
China	Tongji University (2010)	User research, inclusive design as courses	2 courses
Japan	Ritsumeikan University in Kyoto (2003)	Inclusive design course towards master students from a wide range of disciplines	Master's course
	Tama Art University (1996)	Collaboration between university and NEC, the university had a revised undergraduate curriculum infused universal design	Undergraduate education
USA	University of California (1973)	Involve users	Traditional design studio
	The Adaptive Environments Center in Boston (1989)	The "Universal Design Education" project	Education project
	Eastern Michigan University (1993)	Infuse universal design throughout undergraduate programs	Interior design education program
	University at Buffalo (1984)	Long history in research, education, practice of accessible design	Research, education, and practice
	San Francisco State University (1990)	Involve with universal design	Product design program
Norway	Several universities across the country (1997)	Adapt the model used by the US "Universal Design Education" project	4 year pilot program
UK	Polytechnic of Central London (1972)	Design for non-average	Diploma course
	The Architectural Association in London	The first qualifying certificate from any institution in the world	Certificate program for people who are already working
	University of the West of England (2002)	BA (Hons) in architecture and planning on the universal design	Undergraduate program
	Royal Society of Arts (1986)	The "New Design for Old" project	Student design awards program
	Glasgow School of Art & the University of Glasgow (2004)	Embed inclusive design in a design-centered engineering curriculum	A course
	Helen Hamlyn Centre of RCA (1999)	A series of inclusive design projects undertaken by new graduates of RCA with external partners in a wide variety of contexts	Research associates program

review and based on the authors' teaching experience, critical review focused on inclusive design education was carried out among key publications on inclusive design. From literature review, many practices and cases from different countries were synthesized. Table 1 lists the results:

And from a lot of literature reviews, some inclusive design strategies or design philosophy can be proposed and used by some non-design background education. Telling a perspective how to integrating the inclusive design ideas to non-design undergraduates. It is summarized in Table 2 (Chart 1):

To drive a socially inclusive agenda
into the heart of a design college or university
through the teachers, tutors and professors
the people who are the core of design education and management

Perspectives
Strategies

C. Design is a time-pressured profession
both the creative & the constructive elements of
a design course can fill most of the available studio time.
D. As design is a subject that
requires the constant development of both personal taste and expression
therefore few opportunities to get inclusive thinking into packed curriculum.

Perspectives
Barriers

**Aspects
& Inquiry**

Barriers
Perspectives

A. Few design courses teach
inclusive design as a distinct unit
& an introduction to the subject is often
left to one or two seminars or lectures.
B. little time
can be spent exploring the core benefits
& wider practice of inclusive design.

Strategies
Perspectives

To work directly with the design
students to engender a more inclusive approach
in their personal design practice.

Chart 1. Strategies and barriers of introducing inclusivity into design

During literature review, some perspectives from western researchers like Geheerawo and Donahue [7] about strategies and barriers of introducing inclusivity into design were found, which can bring some insights for Chinese design educators. And an inclusive design thinking of art, the design or non-design background undergraduates can use an inclusive design strategy view from researcher Richard Buchanan. Inclusive design has four orders, respectively symbols, things, action and thoughts. Figuring out the problems of design, and knowing how to solve the problems in inclusive design thinking. Some problems and suggestion about how to deal with will be proposed in the expert interview part.

4   Expert Interview

Speaking of figuring out the problems on how to transfer inclusive design knowledge or design philosophy into non-design background undergraduates. Firstly, knowing the problems of strategies of inquiry or art of design thinking or fields of design problems. Problems of communication symbols, problems of construction things, problems of actions and problems of integrating thoughts are all the steps of upgrading the inclusive design problems. And those also the important part for us to do the expert interview, but cause the complicate of these questions, all school educator are the objects of our interviews, interviews provided information on the barriers from two aspects, one side is from the angle of design education, and on the other side is from the angle of teaching administration. So the perspectives are diverse and can be sorted out in Table 3:

Based on interview results, the barriers of integrating inclusive design into China's non-design education can be preliminarily cataloged into four aspects and corresponding response are initiated: lack of awareness, lack of resources, practical difficulties and cultural factors. So the corresponding response also are illustrated by the Chart 2.
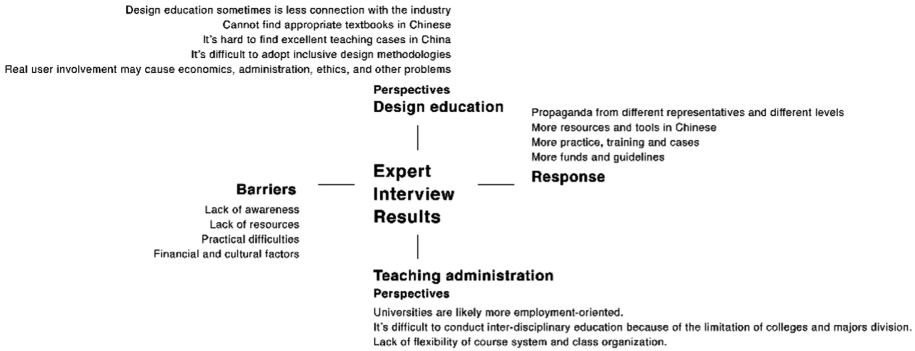
Design education sometimes is less connection with the industry
Cannot find appropriate textbooks in Chinese
It's hard to find excellent teaching cases in China
It's difficult to adopt inclusive design methodologies
Real user involvement may cause economics, administration, ethics, and other problems

Perspectives
Design education   Propaganda from different representatives and different levels
                                  More resources and tools in Chinese
                                  More practice, training and cases
                                  More funds and guidelines

Barriers ———— **Expert**   ———— **Response**
Lack of awareness   **Interview**
Lack of resources   **Results**
Practical difficulties
Financial and cultural factors

Teaching administration
Perspectives
Universities are likely more employment-oriented.
It's difficult to conduct inter-disciplinary education because of the limitation of colleges and majors division.
Lack of flexibility of course system and class organization.

Chart 2. Expert interview results

5   Case Study

A case study of educators of Tongji university and undergraduates of SUFE on mainly talk about inquiry of inclusive design strategies was conducted, based on the discussion and suggestion from the educator and experts home and abroad. A theme called " the inner ability of design discipline" was proposed by Tongji university and cooperated with the undergraduates from SUFE. And it is as a impressive topics in design discipline and a experiment conducted by the undergraduates in SUFE. A vision of how to integrating inquiry of design strategies into non-design background undergraduates, a interdisciplinary courses and general curriculum were conducted in the crossover education issue. It was through five stages'work to realize the mission:

- Stage 1: Education aim redefined
  The education aim need to be redefined since the different purpose between the design background undergraduates and non-design background ones. The education aim was modified from how to build a teaching methods to finally form a design thinking of inclusive sights in the undergraduates' mind. Some stages in the midst of the case study.
- Stage 2: Teaching methods training-encourage to present
  The aim of teaching methods training was to encourage all the non-design background undergraduates to present their ideas first before the educators inform their some strategies. Teaching methods training was integrated into standards model which consists of three levels (standards/ways to realize the standards/methods to evaluate the outcomes) and three aspects (knowledge/abilities/personalities).
- Stage 3: Educational activities modified-activities of design education
  Activities will be modified in this stage, mainly illustrate some design education thinking to the crossover education. According to the new educational standards

organized by the different thoughts or ideas by their presentation. The particular educational activities for the non-design background undergraduates would be conducted. The purpose of this stage is to give them a deep understanding and a specific experience so as to form the course system.

- Stage 4: Course systems reorganized-focus on interaction
  The course systems were reorganized according to the new educational activities standards. The inner ability of design should be saying that is very impressive topic for us design background educators no more than crossover education. The only thing we as educators can do is that according to lots of activities to find out a interactive way for them to understand the inclusive thinking of design strategies. Finally the course systems were revised to reflect inclusive concept and the core courses will be built.
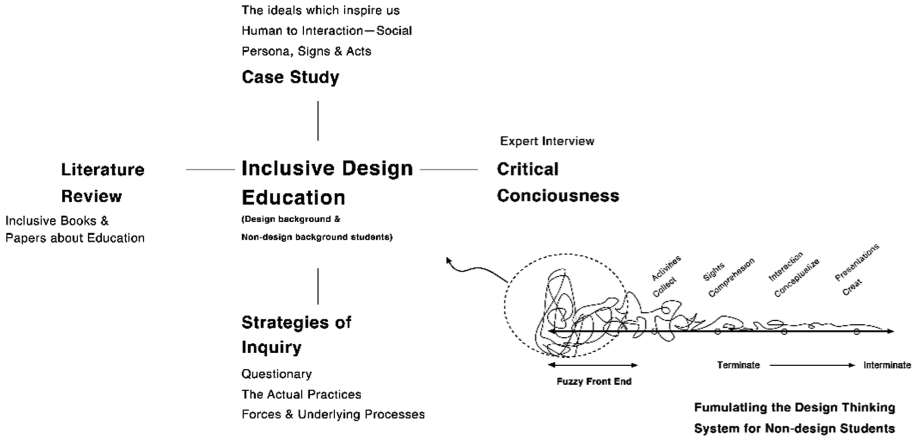- Stage 5: Core courses building-form the ability of sights
  Based on SUFE-Tongji cooperation about transfer the theoretical discussion into actual emerging practise. The university provided a lot of training opportunities by means of competition, workshops, lunch discussion, etc. 8 course packs towards all the students have been developed.

Although the inquiry of inclusive design strategies originated from the design background education research and it is some means difficult to used in the general curriculum to the non-design background undergraduates. But it is also a inclusive way to integrate some design strategies to non-design background undergraduates, cultivating them can have a better understanding of design thinking so as to cooperated with more different background education people, finally improve the whole project well, or the quality of some projects. And that's also a very important inner ability of design discipline. Five key elements were filtered out within China's talents cultivation system, namely education aim, teaching methods, educational activities, course systems reorganized, and core courses. These elements are hierarchical and successional. The case study gives some inspirations for design education. It may suggest looking inclusive design's integration into China's non-design background education as a whole. Based on this, a conceptual framework was triggered.

6   A Conceptual Framework

Actually, the authors proposed some functional elements; formulated a model of introducing inclusive design principle to non-design background undergraduates; intention to embody the model in the means or materials; synthesis and the form of the solution, definition of the specific need or problem. And also proposed some phases of action of methods of systematic inclusive design: the analytic, the creative and the executive and etc. some cross-shaped charts will be drawn to illustrate the thoughts about how to make inclusive design thinking into crossover education (Chart 3).

The ideals which inspire us
Human to Interaction—Social
Persona, Signs & Acts
Case Study

Literature ——— **Inclusive Design** ——— **Critical**
Review   **Education**   **Conciousness**
Inclusive Books &   (Design background &
Papers about Education Non-design background students)

Expert Interview

Activities Collect · Sights Comprehension · Interaction Conceptualize · Presentations Creat

Strategies of
Inquiry
Questionary
The Actual Practices   Terminate ——— Interminate
Forces & Underlying Processes
                               Fuzzy Front End

Fumulatling the Design Thinking
System for Non-design Students

Chart 3. "Cross + 4C Model" framework.

Firstly, cause there's no exact or specific model focusing on integrating design into non-design background students, so according to a lots of literature reviews and experts interview, it needs a procedure to seeking for a system, and we need to find out a quite clear mind through a very fuzzy front end, forming a cross of inclusive design education to guide the non-design background students. So the first step, figuring out the theoretical system of inclusive design education for non-design background students from lots of research and literature review, while seeking out a cross model from the fuzzy front end. And several literature review and experts interview will be proposed and analyzed in this paper.

Secondly, the cross organized by the literature reviews and experts interview from the theoretical fuzzy front end about design review will be as a base to build a practical model. A procedure will be organized as a system of how to do design for non-design background students, proposing 4C model, respectively the collect, comprehension, conceptualize and create, each one corresponding to a specific actions, beginning with very different kinds of activities, it is a vital important way to collect materials. And combined with their own special background sights to comprehend the materials or activities. Then interaction with each other, including the students and teachers, will be carried out, forming a specific concept. In addition, conceptualizing an ambiguous product, another saying, transforming a concept into specific things is not easy, so create a way to encourage non-design background students is more suitable for them.

Finally, an emerging practice, as a model, concrete measures should be proposed, we totally have ten classes in one semester, in each class, we will carry out the different practices, including how to interact, discuss and present. Such as the discussion with each other is face-to-face and open-mind, with a free talk. Educational standards and practices usually determine the graduates' qualities requirements. They are directed by educational aim and meanwhile guide the course system organization. One side has three levels: the standards, ways to realize and how to assess, the other side is at each stage what knowledge should be taught, what abilities students should master, and what personalities should be cultivated. So in the end, the most important for us educators is

to impart the way to learn, and for the non-design background students is to grasp the inclusive design thinking to think about objects.

The model suggested that the possible route to introduce inclusive design principle to non-design background undergraduates in China. Inclusive design educators or general education educators may be enlightened by the conceptual model.

7   Conclusion and Future Work

Research is focused on design of inclusive education for non-design in the design of crossover, has carried on the literature review mainly inclusive design on one of the major publications. Gather concentrated reading related papers or chapters. Practice and view synthesis and obstacles of inclusive design in Chinese design education initiated through expert interviews and judgment. A case study is to design the core ability in the simulation on the cross-border education and explore. On this basis, the preliminary framework to generate inclusive design in the fuzzy front. Framework suggests the feasibility of the route will be inclusive design integrated into the crossover design education in China. It shows the potential of the possibility of the application design, teachers and teaching management. However, the framework is mainly based on the empirical research. More literature review and practice may happen in the future to improve the framework.

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