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A STUDY ON CURRICULUM STRUCTURE AND INDUSTRY REQUIREMENT OF DESIGN EDUCATION IN TAIWAN

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ABSTRACT

The purpose of this study is to explore practical courses that conform to industrial design, visual communication design and multimedia design. The methodology includes literature review, DACUM and interview for each design realm. The research results are as follows: (1)Industrial design: through analyzing existing courses and investigating design industry, then planning industrial design courses and amending the curriculum structure into four programs, which are including design technology program, design creation program, culture invention program and digital application program. Further, to cultivate students' secondary specialty, encourage them to participate design competition and apply for patent. (2) Visual communication design: courses can be divided into three aspects which contain nine categories. Cognition aspect includes knowledge of professional, marketing, and technological; Sentiments aspect includes design thinking, art culture, and pre-professional planning; technique aspect includes basic design, integrated design, and digital design. And the future courses are recommended to intensify marketing and technological knowledge. (3)Multimedia design: courses can be divided into three aspects which contain seven categories. Cognition aspect includes humane cultivation, basic knowledge, and professional knowledge; sentiments aspect includes attitude and value judgment; technique aspect includes basic and advanced skill. The needs of digital design industry are information software system, marketing planning and project management, art and communication designs, business sales, and script writing.

Key Words: Design Education in Taiwan, Design Industry, Curriculum Structure.

INTRODUCTION

In recent years, the Taiwan government has given every effort to encourage the development of culture and creative industry and aggressively promoted major policies, such as "Manpower Overall Cultivation and Application Plan" and "Program for Promoting Teaching Excellence of Universities", in order to reduce the gap between university education and job market, and enable higher education system to provide the human resources meeting the demand of industrial upgrade and development. (Ministry Of Education, 2006). In terms of technical and vocational colleges of higher education system, the objective of design education is to cultivate professional designers to engage in design industry, and bring their personal design expertise into full play, in

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order to increase the vitality of design industry and enhance national competitiveness.(Chu, Yuan-Hsiang, 2001).

The 21st century is the era of knowledge economy, as well as the rise of digital era. Therefore, to facilitate the subsequent development of traditional industry and to enhance its knowledge content, the combination of cultural and creative thinking with digital technology and their application are imperative in current industrial trend. In recent years, the promotion of culture and creative industry has been the focus in Taiwan. Consequently, culture and creative industry, digital industry, and knowledge economy industry should be closely combined to put into practice the development of knowledge economy in Taiwan and to enhance national competitiveness. (Council for Cultural Affairs, 2004). In terms of the development of design industry, since the 1990s, many English-speaking countries, North European Countries, and Asia's newly industrialized countries have aggressively developed "**Design industry**." Although various countries around the world define the developmental scope according to "industries," the contents of industries are not exactly the same. (Cunningham, 2001) . Moreover, with the rapid development of design technology, design capability, methods, and techniques have transformed. Therefore, a constant appeal has been made that design education should re-reflect on and amend design curriculum to cultivate students' new abilities. Moreover, teachers' teaching methods and abilities should also be increased to respond to the changes in time. (Manzini, 2009; Reimer & Douglas, 2003).

Consequently, human resource cultivation plays an indispensable role in design education if a country intends to trigger the development of its design industry to international level. The cultivation of design professionals is subject to the educational environment of design, and the factors affecting it include the predetermined direction and specific objectives of various design departments and curriculum structure, curriculum content, and curriculum process of school, which all affect students' professional knowledge and skills and further affect the human resource cultivation as required by industries. However, design field is the technical and vocational training of technological integration, and its curriculum scope includes fields such as society, humanity, nature, economy, and engineering technology. As a result, practical techniques and skills are crucial knowledge fields in education training of higher education technical and vocational colleges. Therefore, it is important to understand industrial needs, design the curriculum meeting industrial needs, and cultivate human resources meeting industrial needs.

The purpose of this study is to explore practical courses that conform to industrial design, visual communication design and multimedia design, and the industry requirement. The main purpose of this study is to understand the framework of current practical curriculum and current status of teaching of three departments, as well as the manpower and capacity needs for design personnel cultivated by them, in order to propose the amendments and suggestions on the curriculum of human resource cultivation meeting industrial needs.

METHOD

Firstly, this study investigated and analyzed the current status of curriculum planning of departments of industrial design, visual communication design, and multimedia design. This study used the educational objectives of Affective, Cognitive, and Skill proposed by Bloom (1956) as the main aspects for curriculum classification. Moreover, this study used the DACUM analysis developed by senior teachers to understand the curriculum planning and characteristics of various design-related departments in various schools. Secondly, this study used data mining techniques to collect data from the job seeking database of various design industries of "104 Job Bank." The job seeking database was the main source of samples. This study analyzed the "manpower" and "capacity" needs of various fields of design industry and used expert in-depth interviews to investigate and analyze the supervisors and experts of design industry. Lastly, this study conducted a

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comprehensive analysis on the data mentioned above as the basis for curriculum planning and amendment (Figure 1).

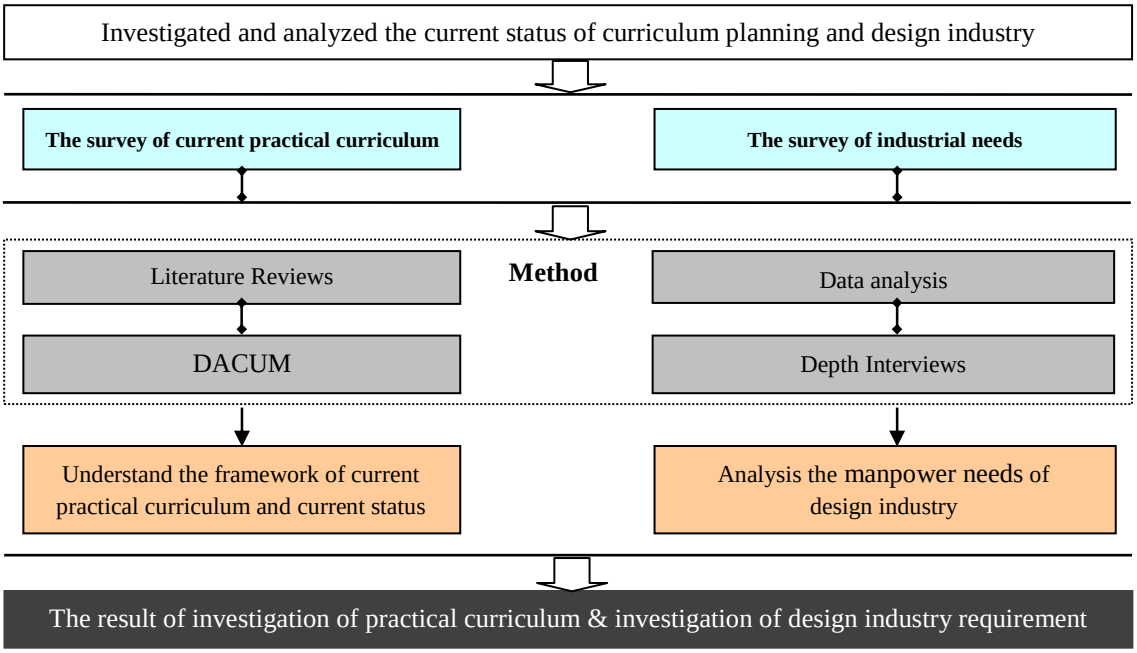

Figure 1: Research procedure

FINDINGS

1. The result of investigation of practical curriculum

Industrial design

The result of the investigation on current status of practical curriculum showed that, on average, the courses of cognition aspect were more frequently (50.96%) arranged in the curriculum structure of department of industrial design in 13 schools in Taiwan, and their main objective is to develop design concepts. However, the courses of affection (17.71%) and skill aspects (31.33%) were relatively fewer. The result is inconsistent with that obtained from the latter investigation on capacity needs in industry. It could be inferred that school education failed to meet industrial needs and should be improved (Table 1).

Table 1: The proportion analysis of the courses aspect for Industrial design

	School	Cognition aspects	%	Affection aspects	%	Skill aspects	%
1	National Taiwan University of Science and Technology, Taipei, Taiwan	24	41%	19	32%	16	27%
2	National Taipei University of Technology, Taipei, Taiwan	28	47%	8	14%	23	39%
3	National Yunlin University of Science and Technology, Yunlin, Taiwan	44	74%	8	14%	7	12%
4	National Cheng Kung University, Tainan, Taiwan	15	45%	7	21%	11	34%
5	National United University	62	57%	13	12%	33	31%

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6	National Kaohsiung Normal University, Kaohsiung, Taiwan	21	34%	11	18%	29	48%
7	Ming Chi University of Technology, New Taipei City, Taiwan	19	46%	7	17%	15	37%
8	Chaoyang University of Technology, Taichung, Taiwan	29	43%	10	15%	29	42%
9	Huafan University, New Taipei City, Taiwan	46	64%	11	15%	15	21%
10	Da Yeh University, Changhua Taiwan	52	62%	25	29%	8	09%
11	Tatung University, Taipei, Taiwan	26	46%	6	11%	24	43%
12	Chang Gung University, Tao-Yuan,Taiwan	32	59%	7	13%	15	28%
13	Tunghai University, Taichung , Taiwan	24	43%	7	12 %	25	45%

Visual communication design

In terms of the curriculum structure of department of visual communication design of 11 schools in Taiwan, according to the data collected from curriculum and the suggestions and definition provided by the in-depth interviews with four experts, the current curriculum can be divided into "three aspects and nine categories," including professional knowledge, marketing knowledge, and technical knowledge of "cognition aspect," design thinking, artistic culture, and pre-occupational planning of "affection aspect," and fundamental design, integration design, and digital design of "skill aspect." (Table 2).

Table 2: The proportion analysis of the courses aspect for Visual communication design

	School	Cognition aspects	%	Affection aspects	%	Skill aspects	%
1	National Taiwan University of Arts, New Taipei City, Taiwan	10	20%	6	11%	35	69%
2	Da Yeh University, Changhua, Taiwan	7	18%	9	23%	23	59%
3	Asia University, Taichung, Taiwan	7	14%	9	19%	32	67%
4	National Yunlin University of Science and Technology, Yunlin, Taiwan	16	22%	23	32%	33	46%
5	Kun Shan University, Tainan, Taiwan	11	24%	15	33%	20	43%
6	Southern Taiwan University, Tainan, Taiwan	5	11%	8	17%	34	72%
7	Shu-Te University, Kaohsiung, Taiwan	11	21%	12	23%	30	56%
8	China University of Technology, Hsinchu, Taiwan	9	21%	7	17%	26	62%
9	Ling Tung University, Taichung, Taiwan	12	21%	10	18%	34	61%
10	JinWen University of Science & Technology, New Taipei City, Taiwan.	7	13%	10	18%	38	69%
11	Asia-Pacific Institute of Creativity, Miaoli, Taiwan	10	26%	8	20%	21	54%

Multimedia design

As for the curriculum structure of department of multimedia design of 16 schools in Taiwan, according to the data collected from curriculum and the DACUM meeting held by 6 senior teachers, the curriculum could be divided into three aspects and 7 categories, including humanity attainment, fundamental professional knowledge, and fundamental field knowledge of "cognition aspect," attitude and value judgment of "affection

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aspect," and fundamental professional skill and advanced professional skill of "skill aspect." Moreover, core departments developed their core curriculum according to their futuristic developmental characteristics. (Table 3).

Table 3: The proportion analysis of the courses aspect for Multimedia design

	School	Cognition aspects	%	Affection aspects	%	Skill aspects	%
1	Takming University of Science and Technology, Taipei, Taiwan	5	10%	0	0%	44	90%
2	National Yunlin University of Science and Technology, Yunlin, Taiwan	11	15%	5	7%	57	78%
3	Ling Tung University, Taichung, Taiwan	13	18%	0	0%	58	82%
4	Far East University, Tainan, Taiwan	10	17%	1	2%	47	81%
5	National Formosa University, Yunlin, Taiwan	24	38%	0	0%	40	62%
6	Chienkuo Technology University, Changhua, Taiwan	7	13%	1	2%	48	85%
7	China University of Technology, Hsinchu, Taiwan	7	25%	0	0%	21	75%
8	Tajen University, Pingtung, Taiwan	18	27%	2	3%	46	70%
9	Asia-Pacific Institute of Creativity, Miaoli, Taiwan	18	22%	3	4%	60	74%
10	Chihlee Institute of Technology, New Taipei City, Taiwan	20	32%	3	5%	40	63%
11	Hwa Hsia Institute of Technology, Taipei, Taiwan	17	23%	1	1%	57	76%
12	Hsiuping University of Science and Technology, Taichung, Taiwan	16	26%	2	3%	44	71%
13	Tatung Institute of Commerce and Technology, Chiayi, Taiwan	4	11%	0	0%	33	89%
14	Fortune Institute of Technology, Kaohsiung, Taiwan	18	28%	2	3%	44	69%
15	Kao Fong College of Digital Contents, Pingtung, Taiwan	16	25%	1	2%	47	73%
16	National Taichung University of Science and Technology	27	46%	1	2%	31	52%

2. The analysis of investigation of design industry requirement

At current stage, this study mainly selected samples from the job seeking database of "104 Job Bank" in Taiwan. This study used data mining to analyze the manpower needs of design industry. Moreover, this study also used expert interviews to further analyze the graduates, supervisors, and experts of industries of industrial design, visual communication design, and multimedia design.

The results of Industrial design requirements

According to the job titles of graduates from department of industrial design in the past, there were 20 job titles totally, including product marketing personnel, industrial designer, product after-scale technical service, marketing planning personnel, product design and development personnel, project business executive, product maintenance personnel, director of project management, market research analysts, activity planning

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personnel, marketing planning assistant, design assistant, trademark/patent personnel, computer graphic designer, product planning director, director of marketing planning, junior high school teacher, exhibition window layout personnel, elementary school teacher, and art teacher. The job titles were randomly selected, and 200 job vacancies for each job title were found in the record within the recent three years. Only the job vacancies of elementary school teacher (66) and art teacher (51) are fewer than 200. The results showed that product marketing personnel were in the highest demand (267), followed by industrial designers (242). (Table 4).

Table 4: The results of Industrial design requirements

	Level	Job Category	Number of people
1	high-level manpower	director of project management	267
2		project business executive	242
3		director of marketing planning	227
4		product planning director	224
5	middle-level manpower	product design and development personnel	221
6		industrial designer	221
7		product marketing personnel	221
8		product maintenance personnel	215
9		activity planning personnel	214
10		computer graphic designer	208
11		marketing planning personnel	207
12		trademark/patent personnel	198
13		market research analysts	196
14		exhibition window layout personnel	195
15		product after-scale technical service	193
16	primary manpower	marketing planning assistant	192
17		design assistant	189
18	other	junior high school teacher	188
19		elementary school teache	64
20		art teacher	59

The results of Visual communication design requirements

According to the job titles of graduates from department of visual communication design in the past, in terms of high-level manpower, directors of advertising planning were in the highest demand (226), while directors of multimedia development were in the lowest demand. As for middle-level manpower, the manpower need (276) in entertainment business was the highest, while that in packaging design was the lowest (142). As for primary manpower, design assistants (207) were in the highest demand, while program assistants (52) were in the lowest demand. The capacity needs of high-level manpower included good marketing concept, good communication ability, good management leadership, good planning ability, and proactive, aggressive, and passionate learning attitude. The capacity needs of middle-level personnel included proactive, aggressive, and passionate learning attitude, good working attitude, good communication attitude, good problem-solving ability, ability to use Photoshop, strong sense of responsibility, good planning ability, and good editing and typesetting abilities. The capacity needs of primary manpower included aggressive learning attitude, good working attitude, good communication ability, strong sense of responsibility, basic ability to operate office software, and good recording/filming ability. (Table 5).

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Table 5:The results of Visual communication design requirements

	Level	Job Category	Number of people
1	high-level manpower	director of marketing planning	192
2		director of Media campaigns	196
3		directors of advertising planning	226
4		directors of multimedia development	120
5		Art Direction	188
6	middle-level manpower	advertising designer	206
7		art designer	200
8		commercial designer	191
9		packaging designer	142
10		multimedia animation designer	212
11		web designer	202
12		graphic designer	200
13		computer graphic designer	195
14		Film production and technical personnel	221
15		photographer	227
16		text workers	215
17		typesetters	193
18		advertising Planning	194
19		media planning	189
20		publishing	205
21		exhibition window layout personnel	188
22		entertainment business	276
23	primary manpower	design assistant	207
24		marketing planning assistant	198
25		Program assistant	52
26		photographer's assistant	125

The results of Multimedia design requirements

According to the job titles of graduates from design-related departments, such as visual design and information design, there were a total of 15 main job titles in the job seeking database. However, only five major categories were relevant to multimedia design, including the category of information software system, category of marketing/planning/project management, category of communication art design, category of business marketing, and category of paper work. This study used data mining technique to analyze 200 jobs of each category. From 2006 to 2008, the manpower need within 3 years in the category of communication art design was the highest (2,093 totally). The top three popular jobs were photographer, video production technicians, and multimedia animation designers. The manpower need in the category of marketing/planning/project management was in the second place (1,343 totally). The top three popular jobs were website marketing planning personnel, marketing planning personnel, and activity planning personnel. (Table 6). The analysis on manpower and capacity needs showed that the manpower need of primary manpower included information assistants, marketing planning assistants, business assistants, and design assistants. The manpower need of middle-level manpower included 21 jobs such as internet program designers, video game program designers, activity planning personnel, website marketing planning personnel, advertisement/planning personnel, communication media planning personnel, advertisement designer, multimedia animation designers, website designers, computer graphics designers, film production technicians, and photographers. The capacity needs of them included professional attitude, value judgment, professional knowledge, understanding, and application,

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and professional skills. The manpower need of high-level manpower was mainly directors, including directors of marketing planning, directors of internet marketing planning, artistic directors of multimedia animation, etc.

Table 6: The results of Multimedia design requirements

	Level	Job Category	Number of people
1	high-level manpower	director of marketing planning	192
2		director of web marketing planning	220
3		directors of multimedia	174
5	middle-level manpower	Internet Programmers	171
6		Game programmers	215
7		marketing planning personnel	199
8		activity planning personnel	192
9		web marketing planning	207
10		Advertising Planning	187
11		Advertising staff	238
12		Publishing	183
13		media planning	186
14		advertising design	206
15		exhibition window layout personnel	163
16		Multimedia animation designer	211
17		Graphic designer	199
18		Web designer	197
19		art designer	199
20		computer graphic designer	175
21		Program production	134
22		Video Production Technology	219
23		photographer	227
24		typesetters	191
25		other media work	81
26	primary manpower	Information Assistant	189
27		marketing planning assistant	189
28		Operations Assistant	156
29		design assistant	163

DISCUSSION AND CONCLUSION

1. Current Status of Practical Curriculum of Department of Design

The characteristics of curriculum planning of department of industrial design included: the curriculum planning met the 16 needs of industries and it integrated 4 programs (program of design technology, program of design creation, program of cultural creation, and program of digital application) to cultivate students' second expertise, to increase their future workplace competitiveness, to make them aggressively participate in design competitions and patent application, and to increase their confidence and creativity, and it put into practice the system of practical training. Such a curriculum enabled students to test and verify wheat they had learnt and get in touch with industries as early as possible. In addition, they could understand what they were deficient in and made up the deficiency through the practical training.

The characteristics of the curriculum planning of department of visual communication were summarized as follows: current curriculum planning of relevant departments in Taiwan focused on the cultivation of skill

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aspect and ignored the courses of marketing knowledge and technical knowledge in cognition aspect. However, the results of expert interview and literature analysis showed that marketing knowledge and technical knowledge were the design transformations required to be faced by department of visual communication design in the future. The effect of internet technology on the change in market was the strongest and micro-market and home economy both significantly affected the marketing and design directions of design industry. Moreover, marketing knowledge was in demand in high-level, middle-level, and primary manpower industries. Therefore, it is advised to add the courses of marketing knowledge and technical knowledge in cognition aspect, in addition to the course in skill aspect, into the curriculum planning of visual communication design. As for the cultivation of affection aspect, it is necessary to strengthen students' proactive and aggressive learning attitude and narrative ability, namely, the ability to present a briefing and communicate with people.

Both the framework and course contents of the curriculum of department of multimedia design would affect the cultivation and training of students. The literature analysis found that relevant curriculum in Taiwan seldom used the three major fields of educational objectives as the core of curriculum planning, which resulted in the unbalanced curriculum aspects and affected the learning development of students. In terms of the design of multimedia, the curriculum aspects were mainly skill-oriented, which resulted in the unbalanced curriculum distribution, inconsistency in the names of courses of fundamental skills and students' failure to identity what they have learnt from course contents. Therefore, it is necessary to return to the three major educational objectives of cognition, affection, and skills as the core properties of the curriculum to develop students' fundamental professional knowledge and skills. Other innovative and developmental courses can be designed and developed according to the characteristics of departments.

2. Manpower and Capacity Needs of Design-related Industries

In terms of the categories of companies and industries where designers work, the manpower from department of industrial design in the category of daily commodity design (37) was in the highest demand, followed by 3C products (31), household appliances products (27), and transportation tools (23). In terms of capacity need, creative thinking (4.78) was in the highest demand, followed by design expression (4.67), aesthetic literacy (4.66), product design (4.65), and modeling ability (4.62).

The results of the manpower and capacity needs from department of visual communication design showed that, the graduates from department of visual communication design mainly served as middle-level and primary manpower after engaging in industries. The investigation on the manpower and capacity needs from department of visual communication design in industries showed that middle-level manpower was in the highest demand, followed by high-level manpower and primary manpower. Therefore, the education of visual communication design at college stage should encourage students' balanced development of various abilities.

The results of the manpower and capacity needs from department of multimedia design showed that the manpower need in the category of communication art design was the highest, including photographers, film production technicians, and multimedia animation designers. In terms of capacity needs, it could be generally divided into 5 aspects, affection, cognition, skill, experience, and company/industry-oriented aspect. Among them, two aspects, experience and company/industry-oriented aspects, were consistent with the characteristics of curriculum structure. One of them was the extension of department characteristics, while the other was the company business-oriented need.

This study suggested that the cultivation of cognition can improve mutual communication and coordination, affection can cultivate students' attitude, and skill is the fundamental ability of operation. Design-related educators should focus on developing the most fundamental education for students. It was hoped that the follow-up studies can put into practice the industry-oriented learning training and technical application to amend the structure of current educational curriculum, to cultivate talents with technical practice experiences for industries, and improve the quality of design education, in order to enable students to increase their career

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development opportunities, bring their design talents into full play, and achieve the educational objectives of design and meet manpower needs of industries.

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