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An undergraduate ceramic design curriculum model for Thailand: Based on needs assessment from the country’s ceramic industry

Anuntavoranich, Pongpun, Ph.D.

The Ohio State University, 1990

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AN UNDERGRADUATE CERAMIC DESIGN CURRICULUM MODEL
FOR THAILAND: BASED ON NEEDS ASSESSMENT
FROM THE COUNTRY'S CERAMIC INDUSTRY

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of the Ohio State University

BY

Pongpun Anuntavoranich, B.I.D., M.F.A.

The Ohio State University
1990

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FIELDS OF STUDY

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Minor Fields: Ceramics (Fine Arts)
Design (Industrial) Education
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CHAPTER I
THE PROBLEM

Background

It was not clearly known when ceramic production began in Thailand. In the prehistoric period, from archaeological evidences found recently, it is believed that ceramic utensils have probably been used in the region for almost 8,000-10,000 years (Nildej, 1985). From this period on to about 5,000 years ago most of the ceramics were used largely for ritualistic purposes; however, some were used functionally in everyday life (Ban Chiang Pottery; Van Esterisk, 1985).

In 800 A.D., when towns and states were established, the Dvaravati Empire had shown traces of ceramic production. Pottery as well as artifacts, tiles, and ornaments were found in large number (Indrawuth, 1985). In the period of the twelfth to the thirteenth centuries evidence of ceramic production was found in the Ban Kruat district in the provinces of Buriram and Surin. The ceramic production of this period was the beginning of industrial production in Thailand and actually became a model for manufacturing processes in the following periods. The continuation from Ban Kraut ceramic production had made great economic and technological advances in the fourteenth and the fifteenth centuries: the Sukhothai Period. During this period, some Chinese potters immigrated and settled in the inland regions of Sukhothai and established ceramic production. Although Chinese influence on the pottery of this period can be seen (Spink, 1965) the Thais were able to develop and finally establish their own distinctive designs (Le May, 1933). Ceramic production during the late
Sukhothai Period reached its peak both in quality and craftsmanship (Frasché, 1976).

After the fall of the Sukhothai Empire in the late Fifteenth Century and the establishment of the Ayutthaya Empire, ceramic production continued at some kiln sites around Sukhothai with the Sukhothai designs and characteristics. And because of established trade routes, ceramic products of this period were exported to foreign countries such as Japan, Indonesia, and the Philippines and remained in demand for a period of years. Besides ceramic production in the old Sukhothai kiln sites, there were some new establishments in the other parts of the country but none were producing ceramics that were comparable to those produced at the old Sukhothai kiln sites. Unfortunately, in the late Ayutthaya period with the increased violence of war between the Thai and the Burmese which resulted in the defeat of the Ayutthaya Empire, a major number of Thai ceramic factories were abandoned, especially those in the old Sukhothai area (Frasché, 1976) (see Figure 1): the results of the political defeat of Ayutthaya included the termination of the production of Sukhothai ceramics.

In the seventeenth century, the Thai ceramic industry was able to restore some of its high-quality productions but the major production sites were still producing low-quality products. Although, there were some beautiful and fine quality ceramics produced in some parts of the country, the output was limited only to local customers and the quantity was not substantial enough to be exported. It was not until the late Eighteenth Century that there was a sign of the new development in the Thai ceramic industry. Slowly the number of factories were increased as well as the variety of products. In early 1960s the importance of the industry to the country's economy was noticed by the government. In 1961
FIGURE 1
KILN SITES
the government included in its first National Economic and Social Development Plan the intent to develop and support the ceramic industry (Būnrsāt Nguēn Tūn Uttasahagūm (Industrial Financing Corporation of Thailand), 1988).

In 1971 the government began its efforts to encourage large scale production through investment incentives (IFCT, 1988) which resulted in the increase in a number of large scale factories that were capable of mass production in order to supply the demands within the country and for exports. In 1978 the government introduced a regulation (Chitrabong, 1987) which prohibited the import of all ceramic products. The introduction of this regulation drastically increased the demands for the local products as well as the number of high-quality productions. Since then the industry has grown rapidly. The productivity as well as the number of large scale manufacturers with advanced production technology and equipment has increased.

Introduction to the Problem

Throughout the long history of Thai ceramic production, there have been occasional surges in the development of the industry. Thus the growth rate of the industry has been relatively unstable: the volume of production has inconsistently increased and decreased. The advancement in production techniques, quality, and identity of products has been interrupted again and again by apparently uncontrollable forces.

After the fall of the Ayutthaya Empire in the late Fifteenth Century, the evolution of the Thai ceramic industry came to a halt. Production in the latter periods was quite inferior in quality and was produced only to supply the internal market. During the Seventeenth and the Eighteenth Centuries, international
trading between the Thais and merchants from foreign countries grew rapidly (Chitrabong, 1987). Among all kinds of goods brought into the country were ceramics. These imported ceramics ranged from inexpensive pieces to those of exquisite quality. Exotic and fine in quality, imported ceramics began to pick up in popularity. Because the local ceramic industry was in a weak state, imported ceramics became even more popular within the local markets. Although there was some fine-quality production in the country at the moment, the quantity was minimal and reached only certain groups of customers. The popularity of imported ceramics over the locally produced ones further weakened the faltering local ceramic industry. Imported ceramics were sought after and had become somewhat a status symbol because of the belief that the imports were superior both in quality and design (Pantong, 1985). Deprived of their share of the local markets, the industry was unable to step up its development. Production techniques and designs of products were repeated without further improvement. And as the international trading grew stronger, more imported ceramics from more foreign countries were brought into the local markets and some local factories began to duplicate and produce imitations of imported ceramics. The preference of the local market for imported ceramics has continued well into the Twentieth Century. And from the period of 1960s on to early 1980s the Thai ceramic industry has been going through rises and falls in its development, and many of such falls came about as a result of the greater popularity of imported ceramics.

In 1986, through the launching of the Sixth National Economic and Social Development Plan, the Thai ceramic industry was again highly supported. With better governmental supports and an overall improved economic climate, the
industry for the first time in its history expanded and advanced positively.

Despite the advancement, there are still problems concerning the growth of the industry. Basically there are two problems concerning the development of the industry. First, the volume of imported ceramics that should have

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Source: Current statistics; Foreign Trade Statistics of Thailand, Department of Customs, Ministry of Finance, 1988

diminished with the increased amount of factories and annual production capacity still persistently exists with an increasing value (see table 1). In addition to the figures shown in Table 1, there is an immeasurable amount of illegal smuggled ceramics from the southern borders of Thailand (Thittawattanakul, 1988).

And second, the export volume for Thai ceramic products has been somewhat unstable and minimal. At present, the volume of export for certain types of factories (i.e., tableware, and tiles) amounts to only 10% of their total output (Bhotitapana, 1987). Through researches by government and private organizations, it has been found that one of the problems that limited the growth of the export volume of ceramic products is the problem of design (Kilkenny Design Co., 1987; Research Center, The National Institute of Development Administration, 1988).
At present, the industry has a tendency to base its design judgement on instant design packages from foreign countries or worse yet, many manufacturers settle for copying from well-received products from other countries or within the country. Also from the researches, it was found that the demand for designers from the local manufacturers is relatively low. This fact can be related to the reason that many of the manufacturers are producing their products on a sub-contracting bases. The researches also point out that designers are used mostly for designing decorative patterns, making silk-screens, arranging showrooms, and tracing or copying designs (Suwansutti, 1987). Lamchitrakusol (1989) also states that at present there are certain beliefs among the manufacturers that first, hiring designers are expensive; second, designers have no knowledge about real production, market; and third, there is no need for designers. Such beliefs or accusations can be linked to the unsuitable education that the designers received.

The design education ceramic designers receive in Thailand was first implemented in 1962. And through the period of 1962 to 1990, there have been many changes in the development of ceramic design education programs. But a ceramic design education program as a unique and independent study with broader bases and considerations about all the knowledge and practices in ceramic design has not yet emerged. Therefore such program is now pending development.

Statement of the Problem

At present there is a disharmony between the practices in ceramic design educational institutions and the practices in the Thai ceramic industry. The
The Thai ceramic design educational institutions and educators have yet to identify an organized body of knowledge, systematic concepts and schemes with regard to all aspects about the real practices and applications of design within the ceramic industry, and the development needs of the industry that can be utilized in the planning, development and implementation of an undergraduate ceramic design curriculum model. At present, the ceramic education programs in Thailand are being offered as sub-disciplines in the disciplines of fine arts, industrial design, crafts, education, and science and technology. There is not yet a ceramic education program with emphasis on the design aspects of ceramic products. Therefore, it was the purpose of this study to identify the relevant issues of real design practices and applications in the industry and to explore the development needs of the industry and the country and their effects on the ceramic design curriculum development.

With the high demand for a more suitable ceramic design education, it was the ultimate goal of this study to develop a curriculum based upon an assessment of the needs of the ceramic industry.
Objectives of the Study

The main objective of this study was to identify, organize, and structure a body of knowledge, systematic concepts and schemes with regard to all aspects about design in the real practices and applications in the ceramic industry, and the development needs of the industry which can be utilized in the planning, development and implementation of an undergraduate ceramic design curriculum model in Thailand.

Specific objectives were:

1. To establish the basis of needs for an undergraduate ceramic design program through investigation of the current practices of educational institution, the ceramic industry, and the government, plan and policy;

2. To identify the function of ceramic designers in relation to the practices of the ceramic industry;

3. To describe:
   3.1. The relationship between the Thai’s national economic development and the ceramic industry.
   3.2. The needed requirements for the improvement of the ceramic industry.
   3.3. The characteristics of an effective design and its relationship to the betterment of the ceramic industry.
   3.4. The needed requirements for the improvement of the ceramic design education program in Thailand;

4. To develop a curriculum model for an undergraduate ceramic design educational program based on the research findings.
Significance of the Study

Similar to other developing countries, industrialization is a necessity in Thailand in her development. To achieve such a goal, the successful utilization of natural resources is required. Various industries which have been deemed profitable to the nation's economy were created. Education is also vital, particularly in the specialized areas which are needed to support the industry. Since ceramic design education was first introduced in 1962, it has in many ways contributed to the growth of the ceramic industry; however its objectives and effectiveness have needed to be justified.

At present, with the rapid growth of modern technology, adjustments and changes in the educational environment are long overdue. A model for ceramic design education with proper context for the present situation will assist in the positive growth of the industry which in turn will be beneficial to the country's economy. This suitable model for ceramic design education will not only produce a capable workforce for the industry, but it will also train knowledgeable personnel for the educational institutions. It will also become a strong foundation for the graduates who wish to further their education in the field. Since it is carefully structured on the basis of needs within the country, these students will have more useful information about what is needed in the country and will be able to pursue their higher education in the more constructive ways.

In addition, there are immediate demands within the country for designers since Thailand is presently forced to accept its status as a Newly Industrialized Country (NIC) (National Economic and Social Development Board (NESDB), 1987). It means that the country will face stricter requirements in the international markets. The requirements are stricter quality control, patent bills, copyright and
infringement law, fair trade, tighter quotas control, etc. These requirements will eventually force the industry to give up copying. The requirements will also force the industry to pay a higher premium for design packages; since Thailand has become a NIC, the country is less eligible for foreign financial and technical supports.

Limitation of the Study

Since this study was aimed at developing an undergraduate ceramic design education model for Thailand, this model was based primarily upon the assessment of needs of the ceramic industry within the country. The referred ceramic industry was comprised of five different types of manufacturers. The development of the ceramic design education model was therefore, based on the information obtained from the use of questionnaires from the five types of manufacturers listed as follows:

1. Tableware manufacturers;
2. Tiles (wall & floor) manufacturers;
3. Sanitaryware manufacturers;
4. Novelties, decorative items, souvenir manufacturers;
5. Industrial ceramics (refractories, insulators) manufacturers.

Additional information about the practices and implementation of ceramic design education at present were also obtained from the use of questionnaires. Therefore, the information used in this study reflects only the descriptive data received from the subjects who completed the questionnaires. However, this study has also identified related information from documents, literature, and
publications in the field of ceramic design, curriculum development, industrial design, and design in general.

In addition, it was also the intent of this study to utilize information from a literature search in the development of the ceramic design curriculum. The scope of the related literature was intentionally limited to only the areas that were deemed important to the development of such a program. It was recognized that there were details and areas which are beyond the scope of this study for example, the effect of the economic and social changes on Thai society; the public demand for design; cultural aspect of design; curriculum evaluation; ceramic production techniques; and so on. It was also recognized that the related literature in the area of ceramic design was limited, the designing of ceramics was commonly incorporated into the design practices in the field of industrial design. Therefore, significant parts of the information about ceramic design practices described in this study, derived from the delineation of the design practices in the field of industrial design and were not to be considered conclusive.

**Assumption of the Study**

The study was conducted and developed under the following assumptions:

1. Ceramic production of all types involve the processes of design. By developing a ceramic design education with broader emphases in research and development practices, as well as marketing, manufacturing, systematic planning and so on will result in the producing of more capable designers who will eventually help in
developing the industry.

2. The practices in the discipline of ceramic design is similar to design practices in the other disciplines of industrial design. To design ceramic products, one must understand about human factors, problem solving, design principles, manufacturing, and so on. Ceramic products are industrial products because they involve a manufacturer and an end user as well as other industrial products.

3. Through an appropriate ceramic design education program, capable designers will emerge. These designers will have important roles in the development of the ceramic industry and the country.

4. Through design improvement, the Thai ceramic industry will progress and become more competitive in the international market.

Definitions of Terms

The following are the operational definitions used in this study:

- Ceramic Design Education A unification of scientific, systematic and artistic principles, technology, and methodology to interpret ideas for ceramics with required function and purpose from both manufacturer and consumer.

- Ceramic Design Practice To develop the idea for clay products, production systems with concern for functional, aesthetic and economic aspects (Costales, 1959).

- Ceramic Activities A production process in the following steps:
  - Design of products
  - Preparation of Materials
  - Forming
- Design Activities

Procedures in achieving the solution to a problem through the following steps:
- Planning
- Research
- Investigation
- Construction of Ideas
- Development and Communication

- Ceramic Industry

Manufacturer of clay products in the following categories:
- Tableware
- Sanitaryware
- Wall, Floor & Mosaic Tiles
- Novelty, Household decorative items, Souvenir
- Industrial Ceramics

- Industrial Design Practices

Structural elements in the field of Industrial Design. The elements are:
- Systematic Planning Practices
- Research and Development Practices
- Communication Practices
- Visualization Practices
- Marketing Practices
- Manufacturing Practices
- Material Processing Practices
- Human Relation Practices
(Gysler, R.L. et al., 1972)
The degree of success in developing the proposed ceramic design educational program is based upon the degree of attention given to the details in the development of such a program. Besides the issues of how thoroughly the program has been conceived and structured and how carefully the considerations have been made about the discipline of ceramic design itself, the specific requirements regarding the environments and conditions of the society in which the program will be implemented is also very important especially in a developing country like Thailand.

Educational development in Thailand has been intricately tied (Weirawatchanakul, 1989) with its national economic and social development. With the development of the first National Economic and Social Development Plan in 1960, the National Scheme of Education was launched and geared toward the needs in the nation's economic and social development. In 1962 a design education program which included ceramic design education was initiated at Chulalongkorn University (Pantong, 1985). Although it was implemented under the Fine and Applied Arts based (Klangvhisai, 1981) the program was developed to serve the country's demand for skilled manpower in the technical and professional areas for the development projects in the industrial sector. In the following years, under the constant changes in the country's development strategies, governments' objectives, and social and economic needs, and the country's demand for particular products and services
and its implication in the industrial sector, ceramic design education as well as others in the design fields related to industrial development applications have been changed, adjusted, and refined to suit the country and the industries’ development needs.

**Needs: The Term Requiring Further Clarifications.**

It is generally agreed that as human beings we have needs for certain things which are essential to our development. These needs can be categorized roughly as biological, physical, or psychological. We need food, shelter, clothing, and medical care for our physical and biological development, meanwhile in order for us to develop and become productive, responsible population of a community, a society, or a country, there are certain psychological elements such as love, comfort, affection, appreciation, and so on, necessary for such development.

For a country in its development the needs are far more extensive and complicated. In an individual's development, one needs certain kinds of nutrition to promote the growth of the body, or certain kinds of medication to maintain the physical well-being of the body. Meanwhile, for a country, national assets and resources are very crucial to the well-being of its development. Comparable to the biological mechanism of the human body, a country is comprised of various mechanisms (educational institutions, economic institutions, cultural institutions, religious institutions, etc.). To promote or maintain the growth, a country has the needs to oversee that these mechanisms are working at their best in providing the country with assets and resources needed in its development.
In a developing country like Thailand where policy making is centralized and is mainly the responsibility of the government, much of the development plans and strategies are intricately structured and concern institutions of all levels (Hughes, 1978). Therefore, the well-being of each institution or developmental unit is pretty much affected and influenced by one another. In structuring development plans and policies, the government has to make sure that such plans and policies will be successfully carried out by certain governmental and private units or institutions. Under the circumstances in which there is no appropriate unit or institution responsible for such plans and policies, such units or institutions are needed to be established. On the other hand, when there are problems or hindrances that limit the growth in the development, the government needs to find out the sources of those problems and resolve them so that the country’s development can be advanced. The government or private units and institutions responsible for such problems need to improve themselves.

At present as the Thai government’s development plan has called for development through industrialization and export (NESDB, 1987), strength in the industrial sector is desired (described further in details in this Chapter). Industrial institutions are at the moment receiving great attention from the government. In accommodating the government’s interests, the industrial sector needs to strengthen itself. Production technology, techniques, equipment and tools, products, as well as production strategies need to be justified and adjusted so that greater productivity could be achieved. Besides technology, techniques, equipment and tools, products, and production strategies, consideration is needed to be made about personnel, the most important element in all industrial
production. Educational institutions (higher education) in Thailand have played significant roles in the preparation of personnel for the industrial sector and have been the backbone in providing educated and capable personnel for all sectoral components of the country. They have also been offering education which, in many ways conformed to the industry's practices and conditions. The industry's improvement needs have constantly placed demands for adjustment and change upon these institutions. Also, from the fact that industrialization is relatively new to the country, many of its implications and influences upon the country's educational as well as the industrial systems have been slow to emerge. Thus, there are many areas within the educational and industrial systems that need to be adjusted in relation to the change in the processes of the nation's development. As has been pointed out, there are strong relationships among the nation's social and economic development plans and policies, the practices and conditions of the industrial sector, and the educational institutions. The nation's development needs have placed certain demands on the industrial sector and have created certain needs among the industries to improve themselves. At the same time, the needs for improvement among the industries have created the demands which in turn created the needs for adjustment among the educational institutions. From these considerations this study referred to the term "needs" as "the development needs" which are generated by and concerned:

1. Thailand's social and economic development plans;
2. The current Thai ceramic industry's conditions in relation to the nation's social and economic development plans;
3. The Thai ceramic higher education institutions' current practices and conditions.
This study also established the guidelines for the proposed ceramic educational program and conducted a study corresponding to the development needs aforementioned.

In dealing with the particular issues of the nation's development needs and their relationship to the development of the proposed ceramic design program, related literature in the following topics was examined:

1. Historical background of Thailand's National Economic and Social Development;
2. Thailand's development needs;
3. The Thai ceramic industry and its development needs in relation to the country's Economic and Social Development needs;
4. Historical background of ceramic design education in Thailand and its relationship to Economic Development;
And to further add the breadth of information to the development of the proposed ceramic design program, attention was placed on the findings of supplemental information about:

5. The ceramic design field; and
6. Curriculum development.

1. **Historical background of Thailand's National Economic and Social Development**

Prior to the launching of the First National Economic and Social Development Plan in 1961, Thailand was basically an agricultural society. The country's main source of income was from the export of rice, sugar, rubber, and other agricultural products. During the period of 1950s to the 1960s, the income...
from agricultural product was approximately 50% of the GNP (of the other 50% were from fishery, mining, wholesale, retail trading, jewelry, and so on) (Moore, 1974). During the late 1960s with the problems of fluctuating international markets, strong competition among other agricultural countries, and the exhaustion of land for potential agricultural cultivation, the Thai government at the moment was unavoidably forced to seek economic diversification. As a result the country yielded to economic development based upon industrialization and international trade.


The introduction of the First National Economic and Social Development Plan (1961-1966) in 1961 was at all means aimed at improving the country's economy. In doing so, the government invested significantly in the building of infrastructure systems for example, irrigation system and dams, public transportations, and other public utilities. The goal of the First Plan was to boost the productivity of the country's agricultural sector as well as the industrial sector. Although the Plan had included economic policies which aimed at encouraging industrial investments from the private sector and from foreign countries, industrial expansion during this period was not mainly emphasized. On the other hand the government prioritized agro-industry, and agri-business expansion.

The result of the First Plan was as the National Economic and Social Development Board (1987) stated: "Thailand, for the first time, entered the real developing era". The GNP grew from 59,000 million baht in 1960 to 89,000 million baht in 1967 which amounted to the growth rate of 8% per annum. Major
public utilities projects such as electrical power plants and dams were initiated and built. The national highway systems were also built and for the first time many areas of the country become accessible. The volume of export, especially agricultural products such as rice and rubber, increased rapidly as well as the volume of imports. Despite the problem of the international trade deficit, the Thai government at the moment was able to maintain the positive balance of payments which in turn, not only brought the nation's foreign exchange reserves up to 800 million U.S. dollars but also created stability in monetary value of the Thai currency (baht) (NESDB, 1987). The country's image as a trading country became respectable in the worldwide markets.

The Second National Economic and Social Development Plan (1967-1971).

In 1967 with the change in the duration of the development plan from six years to only five years, the Thai government introduced the Second National Economic and Social Development Plan. From the initial success, the government decided to maintain the general scheme of the First Plan and to include in the Second Plan the establishment of various government enterprises and the rural administrative organizations. In addition, the Second Plan clarified and emphasized economic and social development activities that were not clearly specified by the First Plan. The Second Plan was targeted at creating the economic and social development expansion in the more remote areas of the country. About 75-80% of the development budget was put into regional development. With such goals, the government hoped to establish a more stable economic structure which was not limited to the urban areas.
The country's economic growth rate during the Second Plan was 7.5% per annum which was lower than that of the previous plan and was much lower than what was expected by the government because prior to the period of the last two years of the Second Plan there had been at least ten consecutive years of positive economic expansion and eventually such expansion had come to a halt. The decrease in the national economic growth rate during the Second Plan period was due to three important factors (NESDB, 1987). First, the shift in demands for particular types of products that resulted in the decline of the prices of certain agricultural products for example, rice and rubber which were accounted for most of Thailand's export volume. The second factor was the decline in the United States' military expenditure that followed the withdrawal of the U.S. troops in the Vietnam War. The third factor was the decline in foreign investments that were successfully encouraged during the previous First Plan period. However despite such declines, the Second Plan moderately succeeded in increasing the per capita income of the people in some rural areas. Other successes during the Second Plan period were the progress in the building of the communication, transportation, and irrigation systems, and power plants that brought accessibility and development to many rural areas of the country.

The Third National Economic and Social Development Plan (1972-1976).

Experienced and recognized from the results of the First and the Second Plans, the government stated its interests in the Third Plan: the reduction of the income differences as well as the differences in the standards of living between the population in the urban and the rural areas. Industrial establishments were encouraged especially in the rural areas of the country. Traditional products,
agro-industrial products, were given priorities. In addition, the government stated its interests in birth control and the promotion of the export of goods and services.

Facing more difficulties than ever, Thailand’s economic development was stalled during the Third Plan period because of several problems resulting from the worldwide financial situations. Starting in 1971, Thailand’s economy was hard hit by the devaluation of the American dollar because Thai currency was heavily dependent on the value of American dollar. The result of the American dollar devaluation was higher and uncompetitive prices of export goods from Thailand. In the following year, with the increase in the pricing of food products and raw materials worldwide, food products and raw materials prices from Thailand were even more uncompetitive in the world markets. However the hardest hit to Thailand’s economy came from the worldwide Oil Crises. During the first 3 years of the Third Plan petroleum prices quadrupled and created a worldwide recession especially in the developed countries. International trading value decreased significantly, followed by rampant inflation and the problem of increased unemployment in most of the industrial countries. The effects of the Oil Crises on Thailand’s economy were the loss of economic stability, the highest inflation ever, setbacks in economic and social development, and the decline in financial expansion both in the government and the private sectors. Investments were minimized, many construction projects were delayed, export volumes and prices for rice, corn, rubber, and textiles declined, unemployment rate soared. But with the government’s tremendous efforts during the last two years of the Plan, most of the economic problems were resolved and the overall economic growth rate went up to 7.1% per annum. Nevertheless, setbacks and delays in many of the governmental initiated projects still prevailed.

The Fourth Plan was targeted at the restructuring of the nation's economy. The government's main interests in this Plan were first, to further expand the productivity of the agricultural sector, to establish a suitable structure for the export industries, to revitalize faltering industrial investment, and to create confidence among the industrial investors. In addition, the government stated its interest in the area of the import substitution industries and in boosting export volumes with the hope that all the measurements introduced would help in reducing the problem of trade deficits to the level that the nation's economic stability could be well maintained. Another significant measurement introduced by the government during the Fourth Plan was the improvement and the systematization in the utilization of the country's natural resources. Mineral resources, forests, lands, sea, and water resources were protected, conserved and planned to better serve the development projects. Explorations in the Gulf of Thailand for petroleum and natural gas resources were sponsored by the government.

By the end of the Fourth Plan period, the government's efforts in the restructuring of the country's economy had made a slight improvement in the country's economic development. The growth rate amounted to 7.1% which was .1% higher than the 7% projected for the Plan. The growth rates of both the industrial and agricultural sectors were much lower than the targeted rates. This was largely due to the fact that 75% of energy supplies came from foreign countries which had many times increased in prices therefore, most of the incomes were spent on energy supplies rather than on the development needs. The problem of trade deficits during this period rose to 45,000 million baht or
7.6% of the GNP. This figure was much higher when compared to the value of trade deficits of 13,000 million baht during the more problematic Third Plan period. Much of the blame for the increase in the trade deficits was placed on the restructuring of the country's economy (NESDB, 1987).

The Fifth National Economic and Social Development Plan (1982-1986).

In 1981 or at the end of the Fourth Plan period, Thailand and her government furnished with at least 20 years of knowledge and insight from the four previous Development Plans, introduced the Fifth Plan with a new direction for the nation's economic and social development. The Fifth Plan spelled out the idea of self-reliance because during the past 20 years the country's economic stability had been subjected to the upward and downward changes in the world financial environments. In doing so, the Plan came up with 6 major guidelines for development as follows:

1. To create developmental projects in a number of limited and specified targeted locations so that the cooperation between the government and the private units can be optimized. Such targeted locations were the Eastern Seaboard and major provincial city areas.

2. To maintain financial and economic stabilities of the country first, by encouraging population saving, economic and financial disciplines. Second, by increasing industrial and agricultural productivities. Third by adjusting the structure of the exports of goods and services industries and spreading more industries into the regional parts of the country. Fourth, by adjusting the structure of the country's international trading. Fifth, by reducing the country's energy consumption and
controlling of the economic expansion.

3. To create balance in the solving of economic and social problems by emphasizing the spreading of incomes and development to more distant regional areas of the country.

4. To solve the poverty problem in the undeveloped countryside areas by creating more jobs in those areas and by encouraging low cost and simple productions of goods which could be done and managed by local people.

5. To make sure that all guidelines in the Plan were followed and transferred into actual and practical working orders in all levels of the government administrative units in all areas of the country.

6. To encourage the private sector to collaborate in the development of the country.

Once again during the Fifth Plan Thailand had to face unexpected problems and limitations. Due to the severe vicissitudes of the world financial and economic environments and the rise of oil prices in 1982 and 1983 (the Second Oil Crises) economic difficulties and recessions in many countries especially the industrialized ones were created. Such difficulties had in turn caused these countries to reduce their national expenditures which intensified the international trade competition. Furthermore many nations had resorted to protectionism in order to protect and maintain their own economic stability. Thailand's export industries found more difficulties than ever.

Similar to the situations during the Third and the Fourth Plans, the Thai government during the period of the Fifth Plan put tremendous efforts in the solving of the problems. Economic measures were introduced and varied from
investment incentives, tax breaks, exports boost, to the devaluation of the Thai currency, none of which would have worked if it wasn't for the improved worldwide economic situation during the end of the Fifth Plan period. Oil prices were on the decline as well as the world interest rate. These factors had helped bring about economic relief for Thailand's economy. Many of the government's initiated projects were completed and met the expectations. One important project was the Eastern Seaboard Development project which had actually brought new hopes for Thailand's economy. Investment rates had risen as well as the number of newly established industries. Construction industries boomed and so did the related industries. Inflation which began during the Fourth Plan period came under control. The inflation rate decreased from 11.6% during the previous Plan period to only 2.8% in the Fifth Plan period. Trade deficits were reduced to about 5.6% of the GNP (compared to 7.7% during the Fourth Plan period). One significant success of the Fifth Plan was the increase in the distribution of incomes and development that had actually covered more areas than before.

However, the Fifth Plan had also failed when it came to speculations about the economic growth rates of the country and the industrial and agricultural sectors, both of which were the most important revenues generators of the country (45% of the GNP). The agricultural sector grew about 4.1% annually which was lower than the 4.5% targeted by the government. The industrial sector grew 5.2% annually, much lower than the 7.6% targeted by the government. The overall economic growth rate of the country amounted to only 5.3% annually, also much lower than the 6.6% targeted by the government. The unemployment rate on the other hand, increased from 0.9% during the previous
Plan to 3.5% in the Fifth Plan period. The boosting of national saving during the Fifth Plan also failed to meet the government expectation and caused the problem of insufficient funding for the nation's development. A great deal of funds were borrowed from foreign countries which resulted in the furthering of the trade deficits and the balance of payment problems.


In 1987, the Sixth National Economic and Social Development Plan was launched. Although there were no major changes in the direction of the Plan, the Sixth Plan revealed a relatively modest nature. In the Plan, the government aimed moderately at the maintenance of the economic growth rate of 5% per annum. As well as the other Plans, the Sixth Plan states the intention to develop the country through industrialization. The Plan also emphasizes the pattern of growth that would ensure economic stability and assist in solving the economic problems which occurred during the Fifth Plan.

The Sixth Plan comprises two directional development targets: first, the economic development target and second, the social development target. To carry out the tasks in both directions, 10 major areas plans were drawn. Those plans are as follows:

1. Mass economic development: to create financial stability by;
   1.1. encouraging the increase in the saving of the population;
   1.2. conserving and reducing the government' expenses;
   1.3. increasing the role of the private sector in the development;
2. Population, society, and culture: to improve skill and quality of life;
3. Natural resources and the environment: to increase the roles of local
population organizations in the rural areas;

4. Science and technology: to create a long term plan on the national scale by;
   4.1. improving the connection among the development of science and the development in production technology, marketing, and jobs creation;
   4.2. increasing the effectiveness of the management and proceeding of activities in science and technology;
   4.3. encouraging the increase in the usage of science and technology for production development in the private sector;

5. Government: to adjust and evaluate the roles of government in the development of the country;

6. Government enterprises: to improve the administration;

7. Production, marketing, and employment: to improve the structure by;
   7.1. improving the agricultural sector;
   7.2. developing new export industries, import substitution industries, small scale industries, regional industries, and industrial engineering;
   7.3. encouraging more services in finance, insurance, public relation, advertising, communication, packaging, tourism, transportation, and etc.;

8. Basic services system: to improve the quality;

9. Cities and targeted locations: to distribute development to more regional areas by;
   9.1. incorporating investments in basic service systems into the
planning of cities to optimize the growth of the cities and the effectiveness of land use;

9.2. reducing the government's responsibilities by encouraging investment of private and local organizations;

9.3. improving administration in cities and specific areas;

10. Rural areas: to broaden the development to all areas of the country in the areas of;

10.1. economic: by solving the problem of primitive agricultural production techniques to increase the productivity and income;

and

10.2. social: by providing increased services in living, profession, and security.

All the plans were in effect and carried out immediately after their introductions in 1987. At present (1990) the final results of the Sixth Plan have not yet been uncovered but, as some statistics the compiled by NESDB (1988) revealed in accordance to the overall development pictures of the country at present, the Sixth Plan seems to be very successful. The NESDB (1988) reported that the results of the Plan between the years of 1987 to 1988 were more than satisfactory. The country's economy expanded rapidly. In 1987, the economic growth rate was 8.5%. The growth rate in 1988 was 11%, far exceeding the 5% targeted by the government at the beginning of the Plan. The inflation rate declined to 2.5% in 1987. Meanwhile the country's monetary reserves were up from 3,800 million U.S. dollars to 7,200 million U.S. dollars in 1988, and up to almost 10,000 U.S. dollars by the end of 1989 (Uyyananda, 1990). The boosting of population savings was also successful and amounted to
24.9% of the country's GNP. Uyyananda (1990) also states that in 1989, Thailand had the highest expansion rate in the world (10-11%). The most exciting of all was the problem of trade deficits which rapidly decreased from 5.6% of the GNP during the Fifth Plan to 2.6% in 1987 and has further declined. The overall projected economic growth rate for the year 1990 is 10.4% (Research Division, Bangkok Bank, 1990). Also Uyyananda (1990) refers to international publications, states that Thailand's economy is successfully developed and the country is eventually going to become a new industrial country in the immediate future.

2. **Thailand's Development Needs.**

**The Problem of the Past.**

It has been 30 years since Thailand launched the First National Economic and Social Development Plan in 1961. Despite the ups and downs in development, the country has progressed reasonably. Up until the last year of the Fifth Plan period (1986), the per capita income of the population increased 9 times from 2,200 baht in 1961 to 20,300 baht in 1986. The country's GNP increased from 60,000 million baht in 1961 to 1,099,541 million baht in 1986. The export volume has also increased from 9,900 million baht to 231,481 million baht in 1986. However satisfactorily the growth rate of the country was, it was rather slow when compared to other developing countries in the region. Yet one might say it takes time for any nation to develop itself especially when such development direction is of something new to the country, its people, and its culture.
Thailand has for many years tried to ease herself into change. Starting off as an agricultural society, industrialization of the country was rather inevitable. Besides the aforementioned problems of the fluctuation in the world markets for agricultural products, the strong competition among other agricultural countries, and the exhaustion of land for potential agricultural cultivation, there was one more hidden factor that contributed to the shift to industrialization -- the presence of the U.S. military bases in Thailand during the Vietnam War (1954-1975) (Sarawut, 1977). In addition to financial aid the Thai government received from the United States during such period, the demand for particular products and services that came from the U.S. troops had created establishments of various goods and services industries in many areas of the country. The industrial establishments had also created the demand for labor allocation. A large number of laborers were moved from the agricultural sector to supply the demand. The labor force reallocation caused the people in the countrysides to migrate into the cities. The migration of population in turn brought about the demand for consumer goods and services, shelters, transportations, etc. Therefore it was obvious that manufacturing or industrialization was unavoidable.

However, when the nation launched its First Development Plan, regardless of the government's interest in the industrialization of the country, major development emphases were still placed on the productivity improvement of the agricultural sector. The country's desire for the improvement of the agricultural sector can be seen in the statements made by the Ministry of Education for the planning of the nation's educational scheme which has been
known to be based on the rationale of the country's development policies. The
Ministry of Education (1966) conceded:

If Thailand is to develop rapidly, it is absolutely essential that large
numbers of people are given new vocational and technical skills, for
without skilled agricultural manpower, the agricultural sector will not be
able to develop as fast as is needed...

Essentially the First Plan turned the country's status from basic crops
producer to agro-industrial or agribusiness country (Moore, 1974). So it was not
until the Third Plan period (1971-1976) that industrialization in Thailand became
more prominent. With the debts created during the First and the Second Plans in
the building of the infrastructure system and other public utilities, the problem of
trade deficits and the balance of payments became stagnant. Meanwhile,
outside influences such as, the Oil Crises, and the devaluation of the U.S. dollar
severely affected Thailand's economy. With the gradual withdrawal of the U.S.
troops from Thailand from 1971 to 1975, Thailand's economic stability was
shaken. Therefore, industrialization through government incentives, tax breaks,
and other economic measures were the immediate attempts by the Thai
government to solve the economic problems. Exports of goods and services
were prioritized (Board of Investment, 1976) meanwhile, existing industries and
the agricultural sector were boosted. Table 2 displays the GDP of the country
from 1972 to 1977. From the statistics shown in Table 2, it can be clearly seen
that income from the agricultural sector continued to be higher than the income
from the industrial (manufacturing) sector and remained a major source of
income for a long period of time. This trend of higher income from agriculture
has continued well until the period of 1980s, and it was not until recently that the
income from the industrial sector has succeeded that from the agricultural sector.
Veerawan (1990) describes that income from industry has doubled that from agriculture during the late 1980s.

It is important to point out here that the patterns of development from the First, Second and the Third Plans indicate the problems and the development needs in Thailand economy. As mentioned earlier, the growth rate of the country during the First Plan period was 8% then declined to 7.5% in the Second Plan period and further declined to 7.1% during the Third Plan period. Such declines in the growth rates represent the country dependence upon outside influences. Although it is very important to understand that the Thai government during the First and the Second Plans periods deserved every credit for the successes in the development of the country (during 1960s to 1970s, Thailand was recognized as one of the fastest growing and most successful developing countries in the world (U.S. Federal Research Division, 1989), it is also important

<table>
<thead>
<tr>
<th>TABLE 2</th>
<th>Thailand Gross Domestic Product</th>
<th>1972-1977</th>
<th>(Millions of Baht at 1978 prices)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>49,919</td>
<td>73,233</td>
<td>84,735</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>27,864</td>
<td>35,614</td>
<td>49,539</td>
</tr>
</tbody>
</table>

Source: Bank of Thailand, 1979

to understand that such successes were partially due to the fact that the Thai government at the moment had received tremendous financial support from the United States and other foreign countries and in addition, the worldwide
economic situation during 1960s and 1970s also complimented such economic growth. Rice, maize, rubber, minerals, and raw materials were in demand in the world markets.

The building of the infrastructure system created employment and made accessible many agricultural productive areas of the country. The demands for goods and services generated by the U.S. military expenditure created establishments of various industries. Overall, the development climate was very good, therefore, it was understandable that all the government needed to do was to supply the demands that came from the world markets and from within the country. Klangvhisai (1981) pointed out that the government did not make a serious attempt to establish industrial targets in terms of productive capacities, nor did the government recommend specific programs or measures to accelerate industrialization beyond those which already existed.

The country's economic dependence upon outside influences became evident during the Third Plan period. With the withdrawal of the U.S. troops, the Oil Crises, the devaluation of U.S. dollar, and the shift in demands and pricing for agricultural products in the world markets, Thailand's economic development was in jeopardy. Volume of imports was staggering, the balance of payments was in the red and then there was the loss of financial supports that came with the withdrawal of the U.S. troops. The drive to boost the exports of agricultural products, industrial services and products began to go wrong and added further problems to the country's economic development.

Weirawatchanakul (1989) critically pointed out the problems and the disadvantages in the trading. He first stated that the export volume of agricultural products were heavy and required a lot of cargo spaces, therefore, the freight
costs were high. To make profit, the volume has to be very large. To create large volume required manpower, fertilizer, and vast areas of land for cultivation. Cultivation deteriorates soil quality, therefore the export of agricultural products was not only cost-ineffective, it also shortened the lifespan of land for cultivation. Weirawatchanakul also pointed out the similar problem in the exporting of raw materials which has in additional ways stripped the country from the future uses of its own raw materials.

Using industrial exports as an example, Weirawatchanakul pointed out the very essence of the problems. First of all, he stated that Thailand was not ready when it entered the process of industrialization. The country had to import machineries, know-how, technologies, and almost every other thing required in industrial production and these items were very expensive. Besides the lack of production technology and so on, Thailand also lacked the facilities for raw materials preparation. Although the country was richly endowed with all kinds of raw materials, these raw materials were somehow useless because there were no ways to suitably prepare them for production. On the other hand, many manufacturers had to depend on the processed-materials which were bought, purified, and then sold back to Thailand at a higher prices by foreign companies. The results of the money spent on expensive production technology and raw materials were the uncompetitive prices of the goods produced by these industries. The inability to provide facilities for raw materials preparation is more damaging for the industries in the rural areas because they will have to spend more money on the transportation of raw materials. On the other hand, if they use their own ways of raw materials preparation, they have to face the problems of impurities, inconstant quality, and so on.
Furthermore, the promotions of some of the manufacturing industries initiated by the government were the results of the temporary demands for some particular types of manufactured products or services from either the international markets or the local markets. Therefore, when there were the changes in the markets demands some of these industries found no more outlets. This was very damaging especially for the ones that dealt with the demands from the U.S. troops. Similarly, various crops that were encouraged to grow by the government according to the demands from foreign countries also found difficulties when such demands had changed.

The inability to produce capital products within the country also contributed to the instability of the country's economic development, almost all of the vehicles as well as tools, equipments, machineries used in transportation, agriculture, communications, construction, etc., have to be imported into the country. Often these items are very expensive and as they were critically needed in the development, the government had to spend a great deal of money obtained from the nation's income, taxes, loans and financial support from foreign countries. Thus, while the economic institutions in Thailand were growing, the nation's debt had also rapidly outgrown the country's ability to keep the balance of payments steady.

Another problem that worsened the problem of trade deficits was the excessive consumption of imported consumer products. Burepakdi (Burepakdi in Pantong, 1985) pointed out the population's conspicuous demands for imports.

Up to this point (the end of the Third Plan period) it was obvious that these were major problems: 1) the country's dependence on the world economic and
financial situations; 2) the country's dependence on the short-term demands for particular types of industrial and agricultural products from the world markets; 3) the uncertainty in the planning for the development strategies; 4) the inability to effectively utilize the natural resources within the country; 5) the country's dependence on technology, know-how, machineries, and energy supplies from foreign countries; 6) the inability to effectively distribute economic development into more potential areas of the country; 7) the inflexibility in the management of the development policies; and 8) the excessive volume of imports.

The Fifth Plan period created a new development direction, but most of the previous problems had not been solved. Again with the second Oil Crises in 1983 which created a recession in the world economy, Thailand's economy was once again depressed. Finally after passing two economic crises, first the Third Plan period and second the Fifth Plan period, the Thai government has cast some light on a sound development scheme. The Eastern Seaboard Development Program (ESDP) introduced during the Fifth Plan period, the creation of the developmental projects in a number of limited and specified targeted locations in major provincial cities, and the encouragement of development collaboration given to the private sector were carried out successfully and differently this time because of the government and the private sectors' ability to handle such projects. The success of the ESDP project owed much to the government's efforts in the sponsoring of the explorations for potential natural resources during the Fifth Plan. The explorations have resulted in the findings of natural gas resources in the Gulf of Thailand, petroleum resources at Lan Krabue, and so on; and eventually the findings of these natural
resources have given opportunities for the Thai government to lay out its suitable development policies.

**Economic Development Priorities in the Sixth National Economic and Social Development Plan.**

Basically, the Sixth Plan has in every aspect the same direction as the other five previous plans. Its main goal is to raise the country's level of development through the industrialization of the country. However, in practicality the Plan aims at utilizing without risk the nation's existing resources and it also will not initiate any projects that will create economic difficulties for the present situation. At the same time the Plan is aimed at creating the country's economic independence from external influences. In the Scheme for Industrial Development, the direction of the Scheme is targeted to:

1. Develop production of goods and services that increase the balance of payments;
2. Develop production of goods and services that create employment and distribution of income;
3. Develop production of goods and services that support the development in technology and long term profits.

To follow such directions, the government aims at supporting potential industries in the three following categories:

1. Export industries that use raw materials within the country as their main source of supplies.
2. Smaller scale industries and rural industries.
3. Specific industries such as industrial products, agro-industrial products
and some large scale industries.

To further assure the country's independence from the external influences, the government asserted in the Plan its interest in advanced technology and science. In the Plan the government concedes:

Little importance was given to the role of science and technology in development in the past. Only in the Fifth Plan was the issue emphasized and some activities implemented. However, since science and technology are becoming increasingly important in development, the Sixth Plan considers it as a high priority issue to establish the base for production and manufacturing capability. Also this will help improve the standard of life of the general population and enable the country to compete effectively in the world market, leading to increased employment and labor efficiency in activities concerning exports and domestic economic revitalization...

In practice, the government has developed seven measures to carry out the tasks of such goals. The seven measures are as follows:

Encourage science and technological systems to play an increasing role in the development of the country by developing science and technology in major sectors which are the bases of development in the future and by developing human resources in science and technology consistent with future economic structure.

Develop the basic structure for science and technology including institutional development and the amending of laws and regulations which have created problems and barriers.

Develop human resources in science and technology by emphasizing the improvement of their quality and effective utilization and by increasing the supply of human resources in areas where they are lacking and in high demand.

Encourage national research and development to be efficient, through appropriate policies: try to allocate the budget in support of necessary research in sectors that should be developed immediately such as genetic-engineering and bio-tech, metallic and electronics, etc.

Develop data and information systems in science and technology, especially to support the planning of appropriate policies.

Increase efficiency in technology transfer.
Support the role of the private sector in development and utilization of technology, especially by providing tax incentives for the private sector to encourage science and technology investment.

As the Sixth Plan still has two more years before completion, the overall development results have not yet been summarized. Thus further development needs cannot yet be analyzed and identified. But as it is primarily reported by the NESDB in 1989, the Sixth Plan has successfully created economic growth which amounted to 11% in the fiscal year of 1988. Therefore it would be very reasonable to speculate about the government policies in the Sixth Plan so that some traits of development needs can be identified. From operations of the Sixth Plan to date and assuming a continuation of its recent successes, the following problems have been solved or at least have been dealt with:

1. The uncertainty in the planning for the development strategies;
2. The inability to effectively utilize the natural resources within the country;
3. The country's dependence on technology, know-how, machineries, and energy supplies from foreign countries;
4. The inability to effectively distribute economic development into more potential areas of the country;
5. The country's dependence on the short-term demands for particular types of industrial and agricultural products from the world markets; and
6. The inflexibility in the management of the development policies.

For the problems of the country's dependence on the world economic and financial situations, it is not known yet whether the country has already achieved its independence as there have not been any worldwide economic and financial
difficulties. In addition, there have been some factors which have contributed to the unusual economic growth in Thailand. The factors are first, the incoming of industrial and financial investments from Japan and Taiwan and some other foreign countries, second, the manufacturing contracts or orders from some industrialized countries that have recently been moved from South Korea to Thailand due to the rising of labor costs and unpredictable and frequent strikes in South Korea, and third, the lower oil prices (see Table 3). At present, the volume of imports has not yet been reduced (see also Table 3) but it does not impose any problem on the country’s economic stability because serious trade deficits have begun to show a surplus since 1988.

This study has identified priorities in Thailand’s economic development needs. Based on the review of related literature, the country’s priorities in economic development needs can be identified as follows:

1. The government has to establish or at least maintain its strength in controlling the utilization of natural resources;

2. The government and the private sector have to expand the scope of industrialization to cover more areas of the country especially in the areas that have suitable natural resources;

3. The industrial sector has to diversify its productions to produce more types of goods and services. Meanwhile it has to create its own flexibility and adjustability in order to be less dependent on the external markets;

4. The government has to put more effort into research for the possibilities of establishing more capital industries so that the country is able to produce its own tools, equipment, machineries, etc., that are necessary
in the development of the country;

5. The government and the private industrial sector have to encourage and promote the importance of research and development for new and innovative products with the goal of maximizing the utilization of the available resources;

6. The government has to establish its own research facilities that are capable of analyzing, forecasting, evaluating, and suggesting up-to-date trends and directions for all the economic institutions in the country;

7. The government has to make sure in the practical sense, that all the development policies have been carried out and practiced accordingly to the guidelines of the development plan and at the same time, to be more flexible and adjustable to the changes of such policies in order to make them more appropriate to the demands of the current situation; and

8. Some of the industries have to upgrade their status from sub-contractors to independent producers so that they can survive when the labor costs become higher or when there is competition from other low labor-cost countries such as Vietnam and Laos which recently have began their economic reforms.

The Demand for Manpower

At present with rapid economic expansion, Thailand has never before had such demand for manpower especially in the high-level technical and
TABLE 3

Thailand's Imports 1987-1988 (million of baht)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil</td>
<td>8,650</td>
<td>10,750</td>
<td>21,577</td>
<td>19,400</td>
</tr>
<tr>
<td>Crude Oil: Quantity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(million litre)</td>
<td>1,785</td>
<td>2,500</td>
<td>4,504</td>
<td>4,285</td>
</tr>
<tr>
<td>Price</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(baht/litre)</td>
<td>2.79</td>
<td>2.68</td>
<td>2.89</td>
<td>2.72</td>
</tr>
<tr>
<td>($U.S./bar.)</td>
<td>(17.54)</td>
<td>(16.91)</td>
<td>(17.72)</td>
<td>(17.23)</td>
</tr>
<tr>
<td>Value</td>
<td>4,973</td>
<td>6,690</td>
<td>13,002</td>
<td>11,663</td>
</tr>
<tr>
<td>Petroleum Prod.: Value</td>
<td>3,677</td>
<td>4,060</td>
<td>8,575</td>
<td>7,737</td>
</tr>
<tr>
<td>Non-Oil Imports</td>
<td>98,450</td>
<td>100,000</td>
<td>133,136</td>
<td>198,450</td>
</tr>
<tr>
<td>Consumer Products</td>
<td>8,250</td>
<td>8,500</td>
<td>15,205</td>
<td>16,750</td>
</tr>
<tr>
<td>Raw Material &amp; Semi</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raw Material</td>
<td>39,100</td>
<td>40,000</td>
<td>44,977</td>
<td>79,850</td>
</tr>
<tr>
<td>Investment Products</td>
<td>39,850</td>
<td>12,000</td>
<td>17,327</td>
<td>23,350</td>
</tr>
<tr>
<td>Other</td>
<td>11,250</td>
<td>12,000</td>
<td>17,327</td>
<td>23,350</td>
</tr>
<tr>
<td>Total Imports</td>
<td>107,100</td>
<td>110,750</td>
<td>154,713</td>
<td>217,850</td>
</tr>
</tbody>
</table>

Source: Preliminary statistic, Ministry of Commerce, 1988
professional areas. In order to simplistically display the demand for manpower at present in Thailand economic development, statistical data adopted from the study done in 1987 by the Thai University Research Association (TURA) and the Canadian International Development Agency (CIDA) were utilized. Such statistical data are the population growth rate, distribution of economically active population by age group, projections for the labor force, population groups by educational attainment, and employment elasticity.

According to the study, there has been a sharp drop in the population growth rate (see Table 4). The population growth rate has declined from 2.74% between 1960-1970 and declined further to 2.68% between 1970-1980. The estimation (TURA, CIDA, 1987) bases on this trend have pointed to a population growth rate of 1.5% by the end of the year 1990. At the present population growth rate, there has already been a clear reduction in the number of economically active people between age 11-14 (from 4.57% between 1960-1970 to 3.35% between 1970-1980) and 15-19 (from 3.50% between 1960-1970 to 1.52% between 1970-1980) (see Table 5). The reduction of population in the 11-14 and 15-19 age groups means that there will be fewer numbers of students entering higher education in the very near future. Although the statistics in Table 5 have displayed an increased number between 1970-1980 for the population in the age groups of 20-24 and 25-29 which represent in most developed countries the groups of higher education graduates, the situation is very much different in Thailand. Between 1970-1980, there was only 2.3% of the total population who have obtained higher education (see Table 6). With the decline in the population growth rate to 1.5% by the end of 1990 consequently, it is very possible that there will be an acute shortage of higher education students in the near future.
Another indication of the demand for manpower can be seen in the employment elasticity approach, the responsiveness of employment growth to

TABLE 4

Distribution of Population by Age Group:
1960, 1970 and 1980

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Number ('000)</th>
<th>Percentage</th>
<th>Cumulative Annual Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 10</td>
<td>8232</td>
<td>10944</td>
<td>11330</td>
</tr>
<tr>
<td>10-14</td>
<td>3088</td>
<td>4562</td>
<td>5904</td>
</tr>
<tr>
<td>15-19</td>
<td>2499</td>
<td>3718</td>
<td>5408</td>
</tr>
<tr>
<td>20-24</td>
<td>2416</td>
<td>2683</td>
<td>4521</td>
</tr>
<tr>
<td>25-29</td>
<td>2071</td>
<td>2242</td>
<td>3554</td>
</tr>
<tr>
<td>30-39</td>
<td>3126</td>
<td>4035</td>
<td>5043</td>
</tr>
<tr>
<td>40-49</td>
<td>2109</td>
<td>2737</td>
<td>4061</td>
</tr>
<tr>
<td>50-59</td>
<td>1463</td>
<td>1752</td>
<td>2625</td>
</tr>
<tr>
<td>60 and over</td>
<td>1208</td>
<td>1681</td>
<td>2445</td>
</tr>
<tr>
<td>Total</td>
<td>26258</td>
<td>34397</td>
<td>44825</td>
</tr>
</tbody>
</table>


GDP (TURA, CIDA, 1987) (see Table 7). The current employment elasticity is 0.64 which means that if the GDP growth rate is 10% the employment growth rate will be 6.4%. In comparing the employment elasticity of 0.64 with the current GDP growth rate of approximately 8% (NESDB, 1987) the current employment growth will be approximately 5.1% annually. To see that there is the demand for manpower, the calculated employment growth rate is compared with the rate of growth of the labor force (see Table 8).
TABLE 5
Distribution of Economically Active Population by Age Group

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Number ('000)</th>
<th>Percentage</th>
<th>Cumulative Annual Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-14</td>
<td>1079.5</td>
<td>1688.2</td>
<td>1200.3</td>
</tr>
<tr>
<td>15-19</td>
<td>2017.1</td>
<td>2874.3</td>
<td>3341.7</td>
</tr>
<tr>
<td>20-24</td>
<td>2112.4</td>
<td>2253.7</td>
<td>3137.8</td>
</tr>
<tr>
<td>25-29</td>
<td>1873.2</td>
<td>1944.6</td>
<td>2902.6</td>
</tr>
<tr>
<td>30-39</td>
<td>2868.9</td>
<td>3544.8</td>
<td>4206.5</td>
</tr>
<tr>
<td>40-49</td>
<td>1953.5</td>
<td>2413.5</td>
<td>3276.8</td>
</tr>
<tr>
<td>50-59</td>
<td>1282.2</td>
<td>1414.8</td>
<td>1957.2</td>
</tr>
<tr>
<td>60 and over</td>
<td>618.6</td>
<td>710.8</td>
<td>885.2</td>
</tr>
<tr>
<td>Unknown</td>
<td>31.6</td>
<td>5.3</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>13837.0</td>
<td>16850.1</td>
<td>21088.4</td>
</tr>
</tbody>
</table>

Source: Same as Table 4

In Table 8, we can see that the current annual rate of growth is at 3.0% -- 2.1% lower than the 5.1% calculated by the employment elasticity factor. This number clearly demonstrated that there currently is an urgent demand for manpower in the development of Thailand, however there still is one question to be answered -- What kinds of manpower will be needed?. This question can be simply answered by statistical data of the sectoral composition of employment growth in the Sixth Plan period demonstrated in Table 9. In Table 9, we can see that in the Sixth Plan period all the non-agriculture sectors have displayed an average growth rate of 4%, when combined with the government's objectives about the promotion of science and technology, it seems that the kinds of
manpower needed must be in the areas science and technology which definitely will supplement the employment growth rate of all the sectors.

Another significant issue concerning the demand for manpower is the failure in the planning for higher education in Thailand. In the study, TURA and CIDA (1987) have pointed out one mistake that was made in the planning for higher education in Thailand -- the over-supply of students with degrees in social-science, humanities, and education. The over-emphasis on the production of students in social-science, humanities, and education has made educational institutions allocated their budget away from scientific areas,

**TABLE 6**

Population Age Six and Over by Educational Attainment

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Number('000)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Education</td>
<td>7974</td>
<td>7145</td>
</tr>
<tr>
<td>Completed School</td>
<td>13174</td>
<td>20450</td>
</tr>
<tr>
<td>Lower primary</td>
<td>11549</td>
<td>17185</td>
</tr>
<tr>
<td>Upper primary</td>
<td>635</td>
<td>1337</td>
</tr>
<tr>
<td>Secondary</td>
<td>635</td>
<td>1337</td>
</tr>
<tr>
<td>Higher</td>
<td>95</td>
<td>186</td>
</tr>
<tr>
<td>Others &amp; Unknowns</td>
<td>210</td>
<td>552</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>21148</td>
<td>26596</td>
</tr>
</tbody>
</table>

**Source:** same as Table 4


### TABLE 7

Employment Elasticity by Sector, 1980-83

<table>
<thead>
<tr>
<th>Sector</th>
<th>Employment Elasticity/a</th>
<th>Contribution to Employment growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricul.</td>
<td>0.33</td>
<td>0.753</td>
</tr>
<tr>
<td>Mining</td>
<td>0.98</td>
<td>-</td>
</tr>
<tr>
<td>Manufact.</td>
<td>0.38</td>
<td>0.574</td>
</tr>
<tr>
<td>Construc.</td>
<td>1.07</td>
<td>0.471</td>
</tr>
<tr>
<td>Public U.</td>
<td>0.25</td>
<td>0.856</td>
</tr>
<tr>
<td>Commerce</td>
<td>0.21</td>
<td>0.537</td>
</tr>
<tr>
<td>Transport</td>
<td>0.80</td>
<td>0.575</td>
</tr>
<tr>
<td>Service</td>
<td>0.79</td>
<td>0.607</td>
</tr>
</tbody>
</table>

Total         | 0.41      | 0.557     | 0.636     | 0.584    | 100.0   | 100.0   | 100.0   |

### Notes:

/a Employment Elasticity is calculated as \( \frac{dN}{dY} \) where \( N \) is employment and \( Y \) is GDP at 1972 prices.

/b Estimate from 3 year moving average data, i.e., 1971-73, 1976-79

/c Estimate from 3 year moving average data, i.e., 1976-79, 1981-83

/d Estimate from regressions. For agricultural sector, the equation is \( \ln N = a + b \ln Y + cR + d \text{TOT} \) where \( R \) is dummy for drought; \( \text{TOT} \) is agricultural term of trade relative to GDP deflator; \( Y \) is GDP and \( N \) is employment. For other sectors, the equation are \( \ln N_i = a + b \ln Y + c \text{TOT}_i \) where \( \text{TOT}_i \) the GDP deflator in sector \( i \) relative to the average GDP deflator \( \text{Yi} \) is GDP from sector \( i \).


2. NESBD, National Income of Thailand, Various issues.

### TABLE 8


<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Population of Working Age (15 yr. and above)</td>
<td>14,938</td>
<td>20,053</td>
<td>23,583</td>
<td>27,795</td>
<td>32,650</td>
<td>37,770</td>
</tr>
<tr>
<td>Labor Force (Age 15 and above):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Projection 1</td>
<td>12,757</td>
<td>16,163</td>
<td>18,753</td>
<td>21,829</td>
<td>25,303</td>
<td>28,933</td>
</tr>
<tr>
<td>Projection 2</td>
<td>12,757</td>
<td>16,163</td>
<td>18,632</td>
<td>21,548</td>
<td>24,808</td>
<td>28,170</td>
</tr>
<tr>
<td>Projection 3</td>
<td>12,757</td>
<td>16,163</td>
<td>18,154</td>
<td>21,268</td>
<td>24,327</td>
<td>27,412</td>
</tr>
<tr>
<td>Annual Rate of Growth</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working age popul.</td>
<td>3.0</td>
<td>3.3</td>
<td>3.3</td>
<td>3.3</td>
<td>3.0</td>
<td></td>
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<tr>
<td>Labor Force:</td>
<td>Proj. 1</td>
<td>2.4</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
<td>2.7</td>
</tr>
<tr>
<td>Proj. 2</td>
<td>2.4</td>
<td>2.9</td>
<td>2.9</td>
<td>2.9</td>
<td>2.6</td>
<td></td>
</tr>
<tr>
<td>Proj. 3</td>
<td>2.4</td>
<td>2.8</td>
<td>2.8</td>
<td>2.7</td>
<td>2.4</td>
<td></td>
</tr>
</tbody>
</table>

Source: World Bank, 1988

### TABLE 9

Sectoral Composition of Employment Growth in the Sixth Plan Period

<table>
<thead>
<tr>
<th>Sector</th>
<th>Projected Employ. Level Jul.-Sep. '86</th>
<th>Projected Annual Sec. Growth Rate %</th>
<th>Elasticity of Employ. %</th>
<th>Projected Employ. Growth Rate %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>18,466</td>
<td>2.6</td>
<td>0.8</td>
<td>2.1</td>
</tr>
<tr>
<td>Mining</td>
<td>93</td>
<td>4.8</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>2,471</td>
<td>5.4</td>
<td>0.7</td>
<td>4.4</td>
</tr>
<tr>
<td>Construction</td>
<td>625</td>
<td>4.1</td>
<td>0.8</td>
<td>3.3</td>
</tr>
<tr>
<td>Utilities</td>
<td>98</td>
<td>6.7</td>
<td>0.7</td>
<td>4.7</td>
</tr>
<tr>
<td>Commerce</td>
<td>2,897</td>
<td>5.9</td>
<td>0.7</td>
<td>4.1</td>
</tr>
<tr>
<td>Transport</td>
<td>464</td>
<td>5.7</td>
<td>0.6</td>
<td>3.4</td>
</tr>
<tr>
<td>Other Services</td>
<td>2,935</td>
<td>6.6</td>
<td>0.6</td>
<td>4.0</td>
</tr>
<tr>
<td>Total</td>
<td>28,049</td>
<td>5.1</td>
<td>0.58</td>
<td>2.8</td>
</tr>
</tbody>
</table>

Source: 1. NESDB, August, 1985  
therefore there are very limited number of students in the technical and scientific areas such as engineering and other technical related areas which are necessary for the industrialization of the country.

At present, the shortage of scientific and technical personnel is strongly evident especially in some areas for example, industrial engineering and other engineering field, architecture, science, design, etc.

3. The Thai Ceramic Industry and its Development Needs in Relation to the Country's Economic and Social Development Needs.

The Thai Ceramic Industry

At present, the Thai ceramic industry is comprised of approximately 134 factories (Bhotitapana, 1988). Of all the 134 factories, 30 are large scale factories. These factories have more than 300 employees and operate with advanced machineries. Most of them are located in the area of Bangkok, Sara Buri, and Samutra Sakorn. The types of product being produced by these large scale factories are Wall & Floor tiles, Mosaic tiles, Tablewares, Sanitary wares (Toilet bowl, etc.), and Industrial Ceramics.

The other 104 factories consist of small to middle scale factories with production technology varied from simple hand-making to basic inexpensive machineries. The types of products being produced by these small to middle scale factories are Novelties, Decorative Items, Souvenirs, Tablewares. These small to middle scale factories have the number of employee ranges between 10 to 200. About 40 factories are located in the area of Bangkok, 50 in the area of Lam Pang, and another 14 in the area of Chiang Mai.
From the data above ceramic production in Thailand can be divided into five major types.

1. Wall, floor & mosaic tiles. At present there are approximately 12 factories that produce this type of ceramics. The annual output of these factories can be divided into two categories - wall and floor tiles, and mosaic tiles. The output for wall and floor tiles is about 240,320 metric tons per year (Division of Industrial Economic, 1986) and the output for mosaic tiles is about 57,990 metric tons per year (DIE, 1986). The production status of this type of ceramic factory is largely dependent on the construction industry within the country. At present, the quality and appearance of the tiles produced in Thailand have been widely accepted in other foreign countries. The export markets for mosaic tiles are largely in the United States and other European countries. For wall and floor tiles, the potential markets are in Asian countries. The total export value for this type of ceramic is approximately 400 to 500 million baht per year (Department of Customs, 1986). The methods of production using by these manufacturers range from primitive hand-making (slab-forming) to fully automated machine-production.

Although there are possibilities that this type of ceramic product will expand further in terms of export volume, such possibilities are limited by the high cost of freight. Therefore the markets for this type of products are largely limited to the nearby countries. Another problem that limits the possibilities for this type of ceramics is the strong competition from other countries such as Japan, Italy, Taiwan and Korea which have been producing and exporting ceramic tiles long before Thailand.
2. Sanitary wares - sink, toilet bowl, bath tubs, bathroom accessories. At present, there are about seven to ten factories, which are producing this type of ceramic products. The overall annual production capacity amounts to about 30,300 metric tons per year (DIE, 1986). Markets for this type of products are mainly within the country. With the fact that production for this type of product began relatively late (in 1961), there have been many limitations in production techniques and capability. For this reason, there is a considerable demand within the country for importing of this type of product. Export volume for this type of ceramics is quite moderate, about 40 to 60 million baht per year (DC, 1986). Foreign markets are Malaysia, Hong Kong, Taiwan, Sri Lanka and Saudi Arabia.

The general method of production among these manufacturers is casting (slip-casting, multiple-casting, solid-casting, etc.)

3. Tablewares - Porcelain, Stoneware, and Earthenware. There are approximately 55 tablewares factories, among these are 9 large scale factories with the annual production capacity ranging between 1,000 to 3,000 metric tons per year per factory (DIE, 1986). Most of the tableware factories are located in the area of Lam Pang province. Fewer than eight factories are located in Bangkok and the nearby areas.

The total annual production capacity for tableware factories is about 38,000 metric tons per year (DIE, 1986). Markets for this type of product are within the country. Although, the internal demand amounts to only 23,000 to 27,000 metric tons per year (DIE, 1986) which is substantially lower than the annual production capacity of all the factories within the country, there is still a considerable demand for imported tableware from foreign countries such as, West Germany, Japan, China, England, Korea, and Italy. The annual import
volume ranges from about 45 metric tons in a year to some 5,000 metric tons in another (DC, 1986) with the unknown figure of illegal smuggled products from the southern borders. Export volume for tablewares products is about 15 million baht (approx. 46 metric tons) per year (DC, 1986). At present, there is very strong competition in the worldwide market for this type of ceramics. The production techniques among these manufacturers also range widely from simple hand-making to fully automated machine-production.

4. Novelties, Household Decorative Items, and Souvenirs. There are approximately about 100 factories for this type of products located around the country. About 30 to 40 located in Bangkok, 50 in Lam Pang, and 14 in Chiang Mai. Most of the factories are operating on relatively small scale with a few exceptions of middle scale factories. It is also known that the factories which produce tablewares often produce this type of products. Markets for this type of products mostly are in the country. Export volume is about 50 million baht per year (DC, 1986). Due to the scale of production and the nature of products, these manufacturers' method of production is limited to hand-making and sometimes casting (simple slip-casting).

5. Industrial Ceramics - Refractory Bricks and Electrical Insulator. At present, there are 7 factories that produce refractory bricks with the overall annual production capacity of approximately 49,000 metric tons per year (DIE, 1986). Of this amount about 47,000 metric tons (DIE, 1986) were used within the country and about 2,000 (DC, 1986) metric tons were exported, therefore, markets for refractory brick are definitely internal. The production of this type of manufacturers is largely mechanized.
For electrical insulators, there are 8 factories with a total annual production capacity of 9,900 metric tons per year (DIE, 1986). The type of electrical insulator being produced is a low resistant variety. The markets for this type of product are the three Divisions of the Department of Electrical Works. For the high resistant type the country still has to import from foreign countries.

The Industry's Development Needs.

The Thai ceramic industry was officially supported by the Thai government in 1961 (Chittrabong, 1987). Seen by the government as a potential income producing industry, the ceramic industry was encouraged to increase its production capacity. During the period of 1960-1970 there was a substantial expansion in the Thai ceramic industry. In the early 1970s, with the intensification of economic problems, the Thai ceramic industry was again promoted. During this period of time the promotion of the ceramic industry as well as some other industries derived from the government's intention to boost the import substitution industries in order to cut down the trade deficits. Without much attention on quality improvement, the industry was encouraged to expand only in production capacity as it was previously encouraged during the 1960s.

With minimal success in the boosting of import substitution industries, the volume of imports of all kinds of consumer products still enlarged even with those kinds of products that the country was already able to produce. This was because of the popularity of imported products among the Thai people. The imported products had in many ways damaged the existing industries in the country. The Thai ceramic industry was among others harmed by the imports.
It was not until 1978 that the government began to realize the problems the imports had upon the industries. The government promptly introduced a regulation to prevent the further growth of import volume. Hundreds of imported items were barred from entering the country especially the items that could be produced within the country, and ceramics were among those items. After the introduction of the regulation, the Thai ceramic industry developed substantially. Production techniques, quality of products as well as variety of products improved progressively. However, even with the regulation on its side, the industry was not at all freed from hindrances. From the undying demand within the country for imported ceramics, an unidentified amount of ceramic product was smuggled into the country from the southern border of the country and through other channels (Thittawattanakul, 1988).

Another problem that had been slowly coming was the saturation of the local markets for ceramic products. Much of the problem had to be blamed on the speedy expansion of the ceramic industry caused by the promotion during the 1960s and 1970s by the government and the government' emphases on the import substitution. The saturation of the markets brought to light the strong competition among the Thai ceramic manufacturers themselves. Strong competition led to cost-cutting, cost-cutting led to poor quality of the products, and poor quality products eventually led to the decline in customer loyalty.

In 1982, concurrent with the difficulties in the country's economic environment, the weakling Thai ceramic industry confronted another tough situation. Accused of being shoddy in production, and quality control, locally produced ceramic products were disapproved for use in the services of the hotel industry. The reasons for the dismissal of the locally produced ceramics were
their unsatisfactory quality and their unacceptable appearance. Due to the importance of the hotel industry to the country's tourism industry, the government had unavoidably deregulated the import prohibition. Hardest hit by the deregulation were the large scale ceramic factories whose outlets were hotels. One example was the case of Satienrapharp Industrial Group (Prachachat Thurakit Business News Quarterly, 1986). The Group was the major supplier of tablewares to the hotel industry. After the deregulation, the Group lost its largest outlets, the hotel industry, went bankrupt and was taken over by debtors.

With the changing in the government policy from the promotion of the import substitution to the promotion of export industries during the late 1970s to the early 1980s, the Thai ceramic industry was encouraged again to shift its production toward export. The Board of Investment (BOI) gave out financial supports, tax breaks, investment incentives to manufacturers that met the tough criteria for eligibility. Manufacturers whose net investment valued more than 5 million baht and 96% of the total production devoted to export will be supported (BOI, 1984). Only a handful of manufacturers were eligible or capable of receiving such supports (Nimmanheminda, 1987). However, the condition of the industry was quite stable during the end of the Fifth Plan period. Occasionally, there would be some companies going out of business and some new ones would enter (Phleekram, 1987). In 1987, with the introduction of the Sixth National Economic and Social Development Plan, the total shift toward industrialization or the manufacturing mode of the country has become the main development scheme. Export industries were prioritized.

The ceramic industry among others, met the government's criteria of eligibility for supports by being an export industry that uses raw materials within
the country as the main source of supplies, and operating mostly on the small scale and in the rural areas. Added to the government interest in having science and technology play the bigger parts in the development of the country, the ceramic industry can definitely be improved by the utilizing of advanced technology. Through various government offices, for example, the Board of Industrial Promotion; BOI, the Scientific Services Information Center, Ministry of Industry; etc., the Thai ceramic industry is at present highly promoted and supported. With supports given by the government in the areas of scientific and technical improvement, marketing information, and a more relaxed criteria of eligibility for financial support; the industry is being expected to generate more income through export for the country. However, such expectation has not been met. Besides the unsolved problem of the hidden demand for imported ceramics, the volume of export for ceramic products from Thailand is relatively low. The research done in 1987 by Kilkenny Design Co. pointed at the productivity ratio of 1:2 between the Thai ceramic factories and the factories in other developed countries such as Italy, England, Japan and Taiwan. While the Thai ceramic factories have the export value of 4-500 million baht in 1987, Italy export volume for ceramic tiles products alone valued at about 27,750 million baht. Others countries for example West Germany and Spain, had the export volume for ceramic tiles products valued at 7,940 million baht and 6,500 million baht respectively. Japan, Taiwan, and South Korea each had the total export volume for ceramic products valued at more than 10,000 million baht (Bhotitapana, 1988).

During the year of 1986 to 1988, the government offices that supported the ceramic industry had initially sponsored or by themselves conducted
investigative researches about the problems that existed in the Thai ceramic industry. Prachachat Thurakit Business News (1986) analyzed the case of the Satienrapharp Industrial Group and found that unprofessional management, unsystematic production, poor quality standards, uncompetitive appearance, and the influences from strong competition within the market to be the causes of the failure for the Group.

From other researches, The National Institute of Development Administration (1987) found the inconsistency in the quality of the products to be the major contributor to the ups and downs in the export volume of the Thai ceramic products. Bünrsät Nguën Tūn Uttsahagüm (IFCT, 1988) and The National Institute of Development Administration (NIDA, 1987) found similar causes for example: poor design, insufficient quality control, outdated production technology, unsystematic planning for production, and the lack of interest among the manufacturers for the research and development of their products. Invited by the Department of Trade and Commerce Promotion, a group of Japanese industrialists through their observation of the Thai ceramic factories, pointed out unsystematic production, poor quality control, unpurified raw materials, lack of product identities, poor designs, and the uncertainty in the production line to be the causes that hindered the growth of the export volume for Thai ceramic products. And, as their findings indicated, all the problems have to be effectively solved especially in the area of design improvement (Bhotitapana, 1988; IFCT, 1987; NIDA, 1987; Kilkenny Design Co., 1987; Pantong, 1985; Rojanapenkul, 1984) in order for the Thai ceramic industry to be able to compete further in the world market. Responding to the researches, the Board of Industrial Promotion initiated the building of the services and information center for the ceramic
industry. The center will assist the industry in giving suggestions about market
trends and channels, production technology, improvement strategy and
furthermore it will help the industry (in the rural areas) in setting up facilities for
purifying the raw materials. The problem of design however, was left to the
industry to improve itself. Therefore, at present the industry has the needs to
resolve the design problem (among others, i.e., management, production
strategies, and so on).

4. Historical Background of Ceramic Design Education (university level) in
Thailand and its Relationship to the Nation's Economic Development.

Followed the introduction of the First National Economic and Social
Development Plan in 1961, and as the direction of the Plan pointed toward
industrialization of the country. Ceramic design education (university level)
under the mainstream of industrial-related design education was first introduced
in 1962 as an integrated program in the Department of Fine and Applied Arts,
Faculty of Architecture at Chulalongkorn University. Miska Petercham
(Urasayananda in Pantong, 1985) a scholar from Kent State University
sponsored by the Fulbright Foundation developed the program which included
ceramics as well as other industrial-related design disciplines such as textiles,
wood working, products design, and interior design. The program was designed
to urgently produce designers which were needed in those areas in the
industries. Through the lack of specialized personnel (Pantong, 1985) the
program was offered only in the last two years of the five year courses in
Architecture. Students were given freedom to choose their area of specialization
under the specified areas guideline. The number of students attending the Fine
and Applied Arts program were minimal due to the fact that the employment opportunities in the field of (industrial) design were not as promising as the field of architecture.

However with the increasing demands for specialized designers from industries, the program at Chulalongkorn University was revised and expanded in 1972 with special emphasis on design and technology for industrial products. Later, a similar program of industrial-related design education was introduced at Silpakorn University, and King Mongkut’s Institute of Technology Chaokhuntaharn Ladkrabang (KMIT Ladkrabang). King Mongkut’s Institute of Technology Chaokhuntaharn Ladkrabang was the first to revise and develop a program based on the previous industrial-related design program, a full five years industrial design program in 1975.

Followed the KMIT Ladkrabang, in 1979, Chulalongkorn University revitalized the Department of Fine and Applied Arts and the program of industrial-related design. It also changed the name of the Department of Fine and Applied Arts to the Department of Industrial Design. The design curriculum at Chulalongkorn University took the form of a program where the first two years were devoted to the development of design foundation in architecture and the last three years to the five areas of ceramic design, product design, interior design, graphic design, and textiles design (see Appendix D). At KMIT Ladkrabang, the program was different. The first year of the program was devoted to general design foundations and the four following years to the studies of the four areas of ceramic design, furniture design, metal design, textile design; all of which consider to be materials and products design in the field of industrial design (see Appendix D). At the Silpakorn University, a four year program was
used instead of five years. The University divided its Bachelor of Fine Arts education (under the Department of Decorative Art) into three different areas: Visual Communication Design, Applied Arts and Interior and Decoration Design; and ceramics was offered as an elective area of study in the Applied Arts area. With the increased demand for skilled manpower in various industrial-related art and design areas, the industrial arts education curriculum with ceramic craft as an elective area of study was included in the Institute of Technology and Vocational Education (ITVED) schools circuit which granted a Bachelor degree in Education. Following the inclusion of industrial-related arts in the ITVED circuit, industrial-related ceramic education with ceramics as one major area was added into the curriculum of the Teacher's Colleges because it had become more and more evident that there was a shortage of qualified educators among the industrial-related design educational institutions.

In 1986 as the ceramic industry was highly promoted, Silpakorn University took a significant step in revising its Bachelor of Fine Arts curriculum. The University offers five major areas of studies; Interior Design, Visual Communication Design, Product Design, Applied Art Studies, and Ceramics with all areas using the first year and the second year for the building of general foundation in Art and Design and other required courses, thereafter the students begin their studies in the major area (see Appendix D). During the same period, the ITVED and the Teacher's College with the upgraded status from certificate-granting institutions to degree-granting institutions had concurrently introduced a full four years ceramic education program. The ITVED offers ceramic education as a craft program under the programs of studies in Education (Bachelor of Education), and the Teacher's College offers a program in ceramic education.
with emphasis on ceramic technology which grant a Bachelor degree in Science (see Appendix D) instead of the Bachelor degree in Education which was granted previously before the change. The emphasis of the ceramic education program at the ITVED is placed on the development of teaching personnel and educators in the field of ceramic craft. Also in 1987 the Rangsit University, has introduced a four year ceramic education program under the Department of Fine Arts (see also Appendix D).

Until the present there have been changes in the development of ceramic education in Thailand. Each development took a different direction and most of them were the outcomes of influences from the different steps in the country's economic and social development needs. Each step of the development also represents improvements and modifications of allied knowledge basic to the other fields, for example, arts and crafts (vocational), architecture, industrial design, fine arts, applied arts, and education.

5. The Field of Ceramic Design:

Design in ceramics parallels human development because even in prehistory man had found and knew how to use clay as material in the making of simple products to satisfy the needs in his struggle to survive. At first, the act of design may be described as the efforts put into the forming of material in response to whatever the need or the function of such a product might be. Later, as man learned to master the techniques in the making of such products and the material itself, the purpose of design became more and more sophisticated. Gomez (Gomez in Klangvhisai, 1981:21) explains that man, in his struggle for subsistence, has evolved through the processes of adapting himself to the
environment and adapting the environment to his necessities. During the processes of adapting, his condition gradually changed and so did his requirements for existence (Lindbeck, 1972). Additional to the physical need of the utilitarian products was the growth in psychological, emotional, aesthetic, and spiritual needs. As a result, the purpose of design was to add to the function of the product the given elements which would serve those needs. And with the fact that people tend to live with each other in a group or in a society, the purpose of design grew even more extensive and encompassed other needs such as cultural, communications, and so on. In the other word design has become what Gasson (1974) defined: "a cross-disciplinary process through which man seeks to satisfy himself but also seeks to satisfy the needs of others." On the other hand, the status of the products themselves (all kinds of materials) have gradually changed from objects of personal use, to objects of exchange, and finally to objects of commercial and/or industrial use.

In days of old, it used to be the craftsman producing the objects who designed the objects him/herself. Or it can be said that the design practice went along with the process of making, but as soon as machine or industrial production was invented, the design practice and the process of production were separated. Design practice especially for consumer products became totally different. During the Industrial Revolution, with new requirements in machine or mass production, the product had to be designed in such a way that it could be produced repeatedly in quantities by machines. Subsequently, the machine produced-products were unacceptable even though they were functional because they lacked "aesthetic values" (Haskett, 1980). Also during the Industrial Revolution, there were people like Henry Dresser, Josiah Wedgwood
and others who attempted and successfully incorporated aesthetic values as well as function into machine produced products. Wedgwood in particular had obtained tremendous success in his ceramic production as he commissioned leading artist-designers of the time such as John Flaxman, George Stubb, and Joseph Wright (Read, 1953) to design several lines of ceramic products for his factories.

Following this period, a design discipline in a new context which was later called industrial design emerged. In addition to functional, aesthetic, and other aspects of design, a manufacturing aspect was included. Designers were required to transmit not only artistic creativity but also some understanding about the production processes and the material itself. This in turn, marked the forthcoming of the discipline of industrial design. Van Doren (1954) in his book "Industrial Design" stated the discipline of industrial design has been recognized as a specialized pursuit probably in the early 1900. Since then there were many movements in the development of the field of industrial design such as the Bauhaus, the Institute of Design, the Hochschule für Gestaltung at Ulm. In each movement, industrial design discipline embarked on the different but growing emphases on artistic expressiveness (form generation); arts and crafts techniques; art and technology; art, technology and engineering; art, technology, engineering, and commerce; and art, technology, engineering, commerce, and culture.

Since its first development, the field of industrial design encompassed design practices for all kinds of materials and products. However there are some exceptions for some kind of materials and products, for example glass, ceramic, furniture, and textiles which were traditional products and involved in both
primitive and industrial production (Sparke, 1987). The design practice for each of these materials and products has been separated as independent from the discipline of industrial design in some countries as the design practices for these products have gradually changed. The responsibilities of designer have developed from form-giving, decorating, and become more and more involving in the manufacturing aspects of these products. Part of the reason was the change in production technologies; new production techniques and new materials have constantly emerged. The designers themselves also have to associate with professionals from other fields (engineering, marketing, etc.) along the production line of works. It is understandable that there is the need to separate these fields (ceramics, furniture, textiles design, and so on) since there are details in production techniques and materials that have to be recognized and emphasized in order for the designers to be able to successfully design the products. For ceramics, Costales (1959) explains that in ceramic production, there are techniques and skills that have to be learned from practices both manually and theoretically in the real ceramic production at all levels (simple hand making to mechanized production) so that design excellences in ceramics can be achieved. Ceramic designers besides knowing how to design have to be able to distinguish the characteristical differences between products made by hand-throwing, casting, jiggering, and/or other methods, and in order to be able to do so, extensive practices for each production technique are needed. Seely and Thompson (1956) stated additionally that the ceramic designer must know the limitations and characteristics of and must be familiar with all the various processes of the ceramic industry. However, as design studies for ceramic products have been incorporated into the field of industrial design in different
schools since the Bauhaus, and as ceramic products involve manufacturers (in some cases craftsmen, and artists) and end or prospective user(s) (consumers or art patrons) it is quite acceptable to use the practices within the field of industrial design as the base for drawing the descriptions of the design practices for ceramic products.

Archer (1963) in describing the process of design stated that designing is a systematic process which consists of three different phases: the analytical phase, the creative phase, and the executive phase which are relevant to the design of any product. Lindbeck (1972) on the other hand, described "industrial design is a broad, generic term encompassing a multitude of the products of industry. It is a process of analyzing, creating, planning, and developing articles for mass production - articles ranging from rowboats to refrigerators, from teakettles to toys, from adding machines to automobiles." From Archer's definition of designing and Lindbeck's definition of industrial design, there is general agreement upon the process of design (industrial) which can be identified as a process involving analysis, creation, and development (execution) of products. Gysler (1972: 16) in establishing the rationale and structure for the discipline of industrial design which were utilized in the development of the industrial design curriculum for implementation in the Division of Design (Department of Industrial Design at present) at the Ohio State University, interpreted the field of industrial design as a field concerned with the practice of analyzing, creating, and developing products (material products and services) through systematic planning for manufacturer. More importantly Gysler asserted that "the field (industrial design) has not been limited to a single product or
Gysler stated that the goal of the field seems to be to produce products (in response to particular defined problems) which are assured of acceptance by the prospective user(s) before an extensive capital investment has been made. These products must be produced at a price permitting wide distribution and reasonable profits. In obtaining the goal, the field focusses upon both the material-manufacturing and the human environment to develop problem solutions which fulfill the needs of humans (a client, group, society) and things (a material product, system, establishment)." Thus, the (industrial) designers are the creative and systematic planners who resolves problems (affecting humans and things) through the development of material products and services. On the basis of these premises, Gysler categorized eight structural elements of the field of industrial design as follows: 1) systematic planning practices, 2) research and development practices, 3) communication practices, 4) visualization practices, 5) marketing practices, 6) manufacturing practices, 7) material processing practices, and 8) human relation practices. Through close examination, Gysler found duplication and overlap within and between categories however after the processes of restructuring the "research and development practices" were incorporated into the "systematic planning practices" and became the "industrial design systematic planning practices." The "visualization practices" were merged in with the "communication practices" and became the "industrial design communication practices." Finally the "marketing, management, material processing, and human relation practices" were combined to form the "industrial design manufacturing practices." In addition,
Gysler indicated that the common knowledge shared by all industrial designer may be ordered into the structural elements of systematic planning practices, communication practices, and manufacturing practices.

This study, on the grounds that the design practices in the field of ceramics involve the considerations about manufacturers, consumers, manufacturing, distribution, profits, industrial production and so on, found that it is reasonable to summarize that the field of ceramic design as delineated from the field of industrial design as described by Archer, Lindbeck and extensively by Gysler, is concerned with the practice of analyzing, creating, and developing ceramic products through systematic planning for manufacture, and the goal of the field is to produce ceramic products which are assured of acceptance by the prospective user(s) before an extensive capital investment has been made. These ceramic products must also be produced at a price permitting wide distribution and reasonable profits. Furthermore the field must focus upon the material manufacturing, the human environment, and in some situations aesthetic and cultural values to develop problem solutions which fulfill the needs of human (client, patron, group, society) and things (a material product, systems, establishment). From the delineation, it was found that the field of ceramic design comprises three major areas of practices: systematic planning practices; communication practices; manufacturing practices; with different concepts in each area of practices in the field of ceramic design as applicable to the development of the ceramic design curriculum as follows:

**Systematic Planning Practices (Designing):**

The concept of problem delineation:
- Identifying demands
- Defining variables and relationships
- Hypothesizing and deriving strategies
- Developing quantitative and qualitative specification
- Proposing, evaluating, and selecting alternatives problem solution

The concept of structuring and experiment or investigatory plan

- Developing the research design
- Developing the sample design
- Developing data instruments, means of collection, and analytical procedures
- Validating and providing reliability measures

The concept of information and data collection

- Specifying/selecting sources, procedures, and instruments
- Organizing by coding, ordering, storing

The concept of information and data analysis

- Specifying procedures and means
- Manipulating statistically and non-statistically
- Comparing, contrasting, correlating results

The concept of information and data synthesis

- Determining findings by presenting, examining, and analyzing
- Drawing conclusion by translating, critiquing, projecting
- Deriving requirements by value judgements

The concept of preliminary designing

- Identifying design concepts
- Formulating analogous and archetypes
- Proposing idealization
- Testing, evaluating, simplifying, and elaborating
- Judging desirability, compatibility, and stability
- Summarizing visually and verbally
- Evaluating and communicating

The concept of detail designing

- Establishing design systems
- Developing design components
- Deriving design parts
Preparing verbal and visual (graphic) specifications
- Constructing prototypes, models
- Evaluating and redesigning

The concept of specifying design production

- Planning manufacturing processes and facilities
- Planning production and quality control
- Planning communication and information flow

Communication Practices:

The concept of encoding the communicative act and/or product

- Formulating
- Reviewing
- Analyzing
- Synthesizing

The concept of transmitting
- Verbalizing
- Visualizing
- Generating
- Evaluating

The concept of structuring as applied to the channel, code, and element

- Selecting
- Ordering
- Evaluating

The concept of decoding

- Perceiving
- Interpreting (analytically, synthetically)
- Responding

Manufacturing Practices:

The concept of production

- Pre-processing (by purchasing, receiving, unpacking, testing, preparing, storing, protecting)
- Processing (by refining, mixing, forming, finishing)
- Post-processing (by altering, maintaining, inspecting, rejecting)
6. Curriculum development.

Zais (1976) describes that "curriculum" is used by specialists in the field in two ways: 1) to indicate a plan for the education of learners; and 2) to identify a field of study. In the first case the plan for the education of learners is referred to as "a curriculum or the curriculum". In the case where curriculum is used as an identification of a field of study, the curriculum is defined by 1) the range of
subject matters with which it is concerned (the substantive structure), and 2) the procedures of inquiry and practice that it follows. Under these two schemes, curriculum has six different concepts which are being used differently. Zais identifies the six concepts as follows:

1. Curriculum as the **program of studies**. In this case curriculum means a list of subjects offered (or required) by the school, or a listing of the titles of the courses offered by the school.

2. Curriculum as **course content**. Curriculum under this concept is the content of particular courses in a program.

3. Curriculum as **planned learning experiences**. This concept refers to curriculum as "all the means employed by the school to provide students with opportunities for desirable learning experiences (Krug, 1956)

4. Curriculum as **experiences "had" under the auspices of the school**. This concept refers to the aspects of the curriculum that are unplanned or invisible. The effect of this type of curriculum happens as the counter-experiences of the planned curriculum experiences. Zais explained that while planned curriculum teaches the student to learn how to read it may also teach the student to dislike reading. The dislike of reading therefore must be counted as part of the curriculum.

5. Curriculum as **a structured series of intended learning outcomes**. Under this concept curriculum is a guide for instruction or a prescription of the results of instruction (instruction is referred to as content, learning activities, and evaluation procedures).

6. Curriculum as **a (written) plan for action**. In this case curriculum is a
plan which guides instruction (teaching and learning activities).

According to this concept Beauchamp (1968) explains that curriculum is a written document which many contain many ingredients, but basically it is a plan for the education of pupils during their enrollment in a given schools.

In designing curriculum, Zais indicates that there are four important elements or components to be included in a curriculum, the four components are 1) aims, goals, and objectives; 2) subject matter or content; 3) learning activities; and 4) evaluation. In reviewing other literature about curriculum development, this study found that these four components of curriculum design indicated by Zais were generally agreed upon. However for the purpose of this study, it was found that Gysler (Gysler, et al, 1972), in the development of the rationale and structure for the discipline of industrial design, provided the appropriate organizational guidelines for the development of ceramic design curriculum.

Gysler through examination of literature in curriculum development has identified six common steps in curriculum development: 1) identifying and structuring the body of knowledge appropriate to course content; 2) stating objectives -- general program to terminal behavior objectives; 3) developing learning experiences and activities; 4) writing instructional materials; 5) constructing measurement and evaluation devices; and 6) training instructors. Gysler found that these steps are difficult to follow and time consuming, and suggested the answering of Tyler's (Tyler, 1966:25) four questions as relevant to the attempt in curriculum development. The questions are as follows:

1. What educational purposes should the school seek to attain?
2. What educational experiences can be provided that are likely to attain
these purpose?

3. How can these educational experiences be effectively organized:

4. How can we determine whether the purpose are being attained?

Further, from writings in curriculum development, Gysler specified four considerations needed in making sound and deliberate curriculum development decisions. The four considerations are 1) an analysis of the subject matter domain; 2) a study of learner characteristics; 3) the construction of instructional procedures and materials, and 4) the evaluation of learner performance as compared with established criteria. Gysler conceded that when these four considerations are met, they provide the information and data which is appropriate, necessary, and sufficient to the six common steps in curriculum development. In detail, Gysler explained the four considerations as follows:

1. The subject matter domain: structure of the body of knowledge

   In curriculum development there have been employment of three major methods as the conceptual bases for the organization and presentation of instructional content. The three different methods are:

   1.1. The subject-centered approach which is generally characterized as an attempt to analyze a particular intellectual field by translating its essential components, attributes, etc., into "school subjects." In this approach the acquisition of the knowledge of these "subjects" becomes the reluctant end products. The subject-centered approach then, assumes that it is the schools' function to fit the student to the subject matter.

   1.2. The problem-centered approach which derived its content from the lives of the students, the contemporary scene, and traditional instructional
material (subject matter). It may also be characterized by the emphasis it places upon the whole person, as opposed to the almost exclusive emphasis upon the acquisition of knowledge (subject-centered approach). The end product or the solution to the problem in the problem-centered approach can sometimes become more important than the developmental component parts or the actual learning process involved.

1.3. The discipline-centered approach which can be described as the teaching and learning of a process of inquiry through an instructional program. The instructional program focuses on directing the students to the discovery of the principle concepts of a discipline, and the interrelationship of those concepts. In the process of examining the discipline's domain, the student can employ the methods or tools of the discipline, and also apply these methods when confronting new aspects of the discipline.

In favor of the discipline-centered approach, Gysler asserted that discipline-centered approach provides the opportunities to overcome the lack of contemporary concern for the student in the subject-centered approach, and the lack of an in-depth search for fundamental truth in the problem-centered approach. He also indicated the four major advantages (Bruner, 1963: 23-26) to be gained from using the discipline-centered approach. The four major advantages are:

1. A subject becomes more comprehensible if fundamental principles are stressed.
2. Facts are easily forgotten, but principles remain and provide the vehicle needed to reconstruct details.
3. Adequate transfer of training appears to have understanding of
fundamental principles and a pre-requisite, and

4. The knowledge lag or gap in a field is reduced when principles in the field are examined and re-examined, since principles stand the test of time better than do facts.

However Gysler also stated that the balance and interaction between facts and principle must be stressed in the discipline-centered approach. Too much emphasis on "facts" could turn the discipline-centered approach into a subject-centered approach. And too much "principle or the methods of acquisition" could turn it into the problem-centered approach.

In addition, Gysler indicated the relationship between the subject matter domain and other fields or disciplines as a major concern. The relationship has effects on the selection of learning experiences and activities within the boundaries of the particular discipline. Gysler explained that "a discipline is composed of a structured body of knowledge which is derived from, or represents a portion of a domain of knowledge. Other disciplines may directly or indirectly draw upon the same domain of knowledge. Therefore, emphasis should be placed upon the manner in which a particular discipline treats the data within the domain." Gysler provided an example of such case, in the example he explained that several disciplines may involve the same practices, for example, systematic planning, communication, and manufacturing but they may treat the respective data in different ways. Therefore, the development of a curriculum could possibly become a study of one unique discipline with other two disciplines as components or it could possibly become a study of three different disciplines. Gysler rejected both possibilities and suggested that the
interrelationships should be examined by using data from allied fields to clarify and reinforce the problem in the major field of study.

2. Learner characteristics.

Gysler conceded that the description of learner characteristics is an important factor affecting the selection of learning experiences and activities. Gysler in referring to writings of Alexander, Alberty, Frymier, Goodland, Van Til and Smith, Stanley, and Shores, discusses learner characteristics under two topics of: psychobiological characteristics, and learner variables.

Psychobiological characteristics: are psychomotor, cognitive, and affective and social development.

Psychomotor development: The developmental growth of the nervous, muscular, skeletal, and glandular systems all of which represent a combination of interacting elements which can greatly affect the student's ability to perform neuro-muscular and cognitive acts. As there is differential growth rate among the students, a variety of inter- and intra-individual performance patterns exist therefore, in planning for or selecting manipulative learning experiences it is important to consider how the students' psychomotor development and the sequence of neuro-muscular actions necessary to carry out a task should be determined.

In addition to Gysler's description of psychomotor development, Harrow (1972) illustrated level of psychomotor behavior as shown in Table 10.

Cognitive development: The ability of the learner to perform mental acts evolving from the acquisition (selection and organization), the comprehension
(analysis and synthesis), and the application (utilization and evaluation) of information and data. Among learners there is the variability of individual performance and achievement, and the individual's capacity for various level or forms of mental activity may also be different from time to time as a result of variables. The variables affecting the individual's capacity for mental acts are for example, 1) prior knowledge and experience, 2) physical and mental interference, 3) motivation and interest, 4) meaningfulness and readiness, and so on. Gysler explained "while some individuals are adept at gathering and applying basic information to particular problems; others, may excel in the manipulation and extension of basic knowledge to higher level of achievement, therefore, many forms of mental activity (in relationship to cognitive development) should be included in the instructional sequence of learning activities and experiences." In addition to Gysler, a model (see Table 11) demonstrated levels of cognitive behavior by Bloom (1956) provided detail about each level (knowledge, comprehension, application, analysis, synthesis, and evaluation) of cognitive behavior.

**Affective and social development:** The individuals' ability in receiving, responding, valuing, organizing, and characterizing knowledge (information, experiences, etc.) in the formation of interests, attitudes, values, appreciations, adjustments, and modes of behavior within the individuals. Gysler indicated that the individual's lack of success in affective and social development may largely effect the quality and quantity of his psychomotor and cognitive learning thus it is important to consider students' affective and social development in the planning for the instructional program. In Table 12, Krathwohl (Krathwohl et al., 1964) illustrated levels of cognitive behavior.
Gysler also presented the relationship of student behavior and the development in each domain (psychomotor, cognitive, and affective) as shown in Table 13. These forms of student behavior are also important in the selection of learning experiences and activities. From the three psychobiological characteristics, Gysler summarizes the learner characteristics pertinent to curriculum development for college-level education as follows:

**Psychomotor development:**

1. Physical development within young adults is fairly complete and generally stabilized between individuals. However, differences in ability to perform motor skills must be realized and care must be taken to adjust psychomotor learning activities to these differences.

2. Complex manipulative activities should be preceded by a cumulative sequence of less complicated skill building acts. When this is not possible, the task at hand should be "illuminated" by a thorough explanation, demonstration, and/or trial of the required component performances.

3. Manipulative activities should be selected, planned, presented, and evaluated through the use of student behavioral objectives; i.e., specification of psychomotor (cognitive, and affective) learning or performance.

**Cognitive development:**

1. The learning activities and experiences within the instructional program should be varied to encourage the continuous development of many cognitive dimensions.
<table>
<thead>
<tr>
<th>Levels of Psychomotor Behavior</th>
<th>Adapting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observing</td>
<td>(makes individual modifications &amp; adaptations in the process to suit the worker and/or the situation)</td>
</tr>
<tr>
<td>Imitating</td>
<td>(follows directions; carries out steps with conscious awareness of efforts, performs hesitantly)</td>
</tr>
<tr>
<td>Practicing</td>
<td>(repeats steps until some or all aspects of process become habitual, requiring little conscious effort, perform smoothly)</td>
</tr>
<tr>
<td>Adapting</td>
<td>Requires practices</td>
</tr>
<tr>
<td></td>
<td>Requires imitation</td>
</tr>
<tr>
<td></td>
<td>Require imitation</td>
</tr>
</tbody>
</table>

Harrow, Anita J. (1972)
<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Comprehension</th>
<th>Analysis</th>
<th>Application</th>
<th>Synthesis</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ability to recall; to bring to mind the appropriate material)</td>
<td>(ability to comprehend what is being communicated and make use of the idea without relating it to other ideas or materials or seeing fullest meaning)</td>
<td>(ability to break down a communication into constituent parts in order to make organization of the whole clear)</td>
<td>Requires comprehension</td>
<td>Requires comprehension</td>
<td>Requires comprehension (ability to judge the value of ideas, procedure, methods, using appropriate criteria)</td>
</tr>
<tr>
<td>Requires knowledge</td>
<td>Requires knowledge</td>
<td>Requires knowledge</td>
<td>Requires knowledge</td>
<td>Requires synthesis</td>
<td>Requires analysis</td>
</tr>
</tbody>
</table>

Bloom, Benjamin S., et al., 1956
TABLE 12

LEVELS OF AFFECTIVE BEHAVIOR

<table>
<thead>
<tr>
<th>Receiving</th>
<th>Responding</th>
<th>Valuing</th>
<th>Organization</th>
<th>Characterization</th>
</tr>
</thead>
<tbody>
<tr>
<td>(attending; becomes aware of an idea, process, or thing; is willing to notice a particular phenomena)</td>
<td>(makes response at first with compliances, later willingly and with satisfaction)</td>
<td>(accepts worth of a things, an idea or a behavior; prefers it; consistent in responding; develops a commitment to it)</td>
<td>(organizes values; determines inter-relationships; adapts behavior to value system)</td>
<td>(generalizes certain values into controlling tendencies; emphasis on internal consistency; later integrates these into a total philosophy of life or world view)</td>
</tr>
</tbody>
</table>

Krathwohl, David R., et. al., 1964
2. The level of learning activities and experiences should be varied in difficulty to insure that the lower fourth of the class will not be lost, nor the highest fourth of the class will be bored by lack of challenge.

3. Learning activities and experiences cannot be entirely pre-planned for the needs of all individuals, therefore flexibility through options or alternatives is mandatory. The general instructional program plan should establish the overall plan of activities, but must allow for adaptations for individual differences within the realm of practicality and feasibility.

**Affective and Social development:**

1. The interrelationship between social and intellectual development must not be disregarded.

**TABLE 13.**

CLASSIFICATION OF LEARNING DOMAINS IN RELATIONSHIP TO STUDENT BEHAVIOR

<table>
<thead>
<tr>
<th>Cognitive Domain</th>
<th>Affective Domain</th>
<th>Psychomotor Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Knowledge; recall and recognition</td>
<td>1. Receive</td>
<td>1. Observe</td>
</tr>
<tr>
<td>2. Application</td>
<td>2. Respond</td>
<td>2. Imitate</td>
</tr>
<tr>
<td>5. Evaluate</td>
<td>5. Characterize</td>
<td>5. Perfect</td>
</tr>
</tbody>
</table>

Gysler, R.L., et al., 1972
2. The instructional activities should promote the use of peer leadership and the normal social patterns of young adults.

3. The instructional activities and experiences should provide healthy and congenial contact with many peers (and faculty), through a variety of roles.

4. In terms of the managed-design process, considerable use of role playing through activities would seem appropriate. Also, the use of socially and professionally successful individuals as examples may be helpful for the purpose of guiding self-realization.

5. In relationship to the previous discussion the following group activity may be useful to reinforce individual study; laboratory work; group projects; role playing and simulation; field trips to design offices, manufacturing plants, construction sites, etc.

**Learner Variables:** In referring to literature about "nature of the learner," "learning theory," "instructional theory," and others, Gysler indicated the outlines for selecting learner variables as follows:

1. Phases of the teaching-learning process
   1.1. Learner readiness
   1.2. Pacing and individualizing
   1.3. Goal-setting and goal-seeking
   1.4. Affectivity and learner aspiration
   1.5. Transfer
   1.6. Evaluation

2. Factors of learning
   2.1. Rate of learning
   2.2. Amount to be learned
   2.3. Mode of learning
2.4. Interpersonal relationships to learning
2.5. Motivation to learn

3. Categories of learning

3.1. Stimulus-response connections
3.2. Discriminations
3.3. Motor chains
3.4. Verbal chains
3.5. Concepts
3.6. Principles
3.7. Strategies

4. Variables of Learning

4.1. External variables of:

4.1.1. Disinterest
4.1.2. Daydreaming
4.1.3. Physical discomfort

4.2. Internal variables of:

4.2.1. Referent confusion
4.2.2. Imperception
4.2.3. Verbalism

4.3. Interviewing variables of:

4.3.1. Prejudice
4.3.2. Experience
4.3.3. Cognitive knowledge

From these outlines Gysler identified four contributions concerning learner variables as 1) meaningfulness, 2) interference, 3) reinforcement, 4) readiness. And in referring to literature in the area of behavioral sciences (education, psychology, sociology, etc.) he explained each contribution as follows:

Meaningfulness: The meaningfulness of the subject matter depends on the organization and presentation of the subject matter in such a manner that it promotes learning as a continuous and cumulative process. The materials present to the learner must relate to each other respectively so that they build
readiness for further learning through continuity, otherwise the subject matter became nonsense and breed inefficiency and learner frustration. Gysler emphasized that the organization of materials as they are presented to the learner is one of the most significant variables in learning.

**Interference:** The blockage to the completion of the learning process. It can be described as a stimulus: for example, predisposition, mental and/or physical distraction, etc., which attracts the student's attention and reduced his concern for the materials to be learned. Interference also happens when new and old materials are not related in a meaningful way, for instance, the new material is less competitive than the previous one so that the effectiveness of learning activities in the new material is reduced. Gysler asserted that "it is most satisfactory to move from general (board) ideas to more specific ideas through a process where the logical "whole" is first presented. In addition the new material should be presented in relationship to past and/or pre-requisite materials."

**Reinforcement:** The positive or the negative influences upon the outcome of the learning activity. Positive reinforcement promotes learning activity and can take form of the acquired knowledge of results from the learning activity itself, or an additional form of reward. In some case negative reinforcement discourages learning activity but in some cases in may create desire for learning (Gysler exemplified the learning of "corrective behavior").

**Readiness:** The learners' condition of physical and/or psychological set. Readiness means the learners' acquisition of positive expectation toward the desired goal of learning and their ability to perceive the relationships of between the goal of learning and the variety of available learning techniques. Readiness also means that the transfer of teaching-learning activity has been prepared so
that the learning experiences and activities will direct the learner through the learning process.

In addition to Gysler's learner characteristics, Tyler (1956) suggested the consideration about the condition of living and the society in which the learner resides to be important to curriculum development. The condition of living and the society in which the learner resides to be considered in this case is therefore, the present condition of Thai society which can be described in its relation to curriculum development as follows:

1. The present education system in Thailand requires the students entering college education to complete high school education or equivalent and pass the national entrance examination in order to be admitted to the public universities. As for other private universities and colleges, the entrance examination or the admission are administered by the particular university or college under the regulation of the Bureau of State Universities. Through the screening of the national entrance examination or the examination privately administered, the students are screened according to their academic performance and admitted to the universities, colleges, and departments of their choices therefore, the students' psychobiological development, ability, and readiness are insured at a certain level.

2. It is the belief among the Thais that higher education provide better opportunity for good jobs, and, it is also prestigious for most of the students to be able to enter universities or colleges (especially the ones operated by the government) therefore, the students are very much self motivated.
3. Thai society is basically an agricultural society which is gradually changing to become industrialized society. Industrial production, manufacturing of many kinds, and design for industry are still new to the population, as Weirawatchanakul (1989) described, many students are not quite familiar with most aspects of industrialization and its implications to their living conditions and the society, therefore, it is very important to develop fundamental understanding about important aspects of industrialization.

3. The construction of instructional procedures and materials.

Gysler, from reviewing writings of Brown (1969), Carpenter (1968), Kaufman and Corrigan (1967), Knirk and Childs (1968), Tucker (1967), and Towers, et al. (1966), developed the instructional system development model which is summarized into three phases: 1) program development, selection and organization of subject matter, the statement of overall program, and terminal behavior objectives; 2) planning and developing instructional methods and means; and 3) creating assessment instrument and devices to measure output performance of the student and the instructional program. Gysler's instructional system model is shown in Figure 2.


Adapted from Buffer (1971), Gysler indicated two independent but interrelated forms of assessment in the evaluation, first the "Formative Evaluation," and second the "Summative Evaluation" which form a schema for the evaluation. The formative evaluation assesses the quality of the
development and revision phases of the curriculum development. The summative evaluation assesses the attainment of the instructional materials, sequence, and teaching methods under the established educational specifications. The assessment criteria in the formative evaluation are, 1) the appropriateness of educational specification, 2) the validity and accuracy of subject matter coverage, 3) the operational adequacy of the proposed structure and organization, and 4) so on. The assessment in the summative evaluation involves the testing of the finished product (instructional program) (see Figure 3 for details). The tests' data in the summative evaluation will be used in 1) the recommendations for changes in teaching strategies and program design, and 2) the corrections and modifications of software (e.g., objectives) and hardware (e.g., visual aids). The model for the schema is presented in Figure 3.

Summary

From the studies of related literature in the six topic areas, it is clearly seen that the country's economic and social development needs have played very important roles in the development and in turn have generated the needs for improvement for both the ceramic industry and the ceramic design educational institutions. The country's economic strength depends upon the well being of its economic institutions such as its industries. The industries themselves need input from skilled and capable manpower. Mistakes in the country's development strategies and policies as well as mistakes in the development of the industries and the educational institutions must be attended to and evaluated with the mutual efforts from the government, the industries and the educational
institutions themselves. Without the cooperation from all of them it is obvious that such mistakes are prone to repeat themselves again and again.

In addition, it was found that ceramic education in Thailand is unique and deserved to be investigated in its own right. Although the programs were developed through references to ceramic education in the Western societies, ceramic education in Thailand has fundamentally been shaped by the nation's development needs and the practices germane to the Thai ceramic industry itself. From these facts, it was found that besides the necessary steps and issues such as the analysis of the subject matter, in curriculum development, other constraint must be taken into consideration e.g. the country's economic and social development plan and conditions, as well as the needs from the industry in relationship to its practices in ceramic design.

In the area of the discipline of ceramic design, the relationship between designers, manufacturers, and user(s) (customers) was interconnected. Ceramic designers, while creating designs reflecting their artistic and expressive creativity, must systematically incorporate relevant information from manufacturing, commercial production, management and so on into the creations so that the benefits for his clients (manufacturers, consumers, etc.) will be optimum. Furthermore, ceramic designers have to have the understandings about the ceramic production at all levels as well as the skills in order for them to be able to design ceramic products. Therefore, it is important that the ceramic design curriculums provide the students with balanced knowledge about design and ceramic production techniques.
FIGURE 2
THE INSTRUCTIONAL SYSTEM MODEL
(R.L. Gysler et al., 1972)
FIGURE 3
CURRICULUM DEVELOPMENT EVALUATION MODEL
(GYSLER, ET AL., 1972)
CHAPTER III
DESIGN OF THE STUDY

This study developed an undergraduate ceramic design curriculum designed especially for implementation in Thailand. The current practices as well as the perceived needs from the ceramic industry and the ceramic design educators were gathered and assessed so that the most suitable undergraduate ceramic design curriculum could be developed. Information obtained from an extensive literature search (see Chapter II) about the historical background of the nation's economic and social development, the nation's economic development needs, the ceramic industry, the historical background of ceramic design education in Thailand, the fields of ceramic design, and curriculum development, information about the existing ceramic education curriculums in Thailand were used to provide guidelines in the development of this curriculum. The information about the existing ceramic education curriculums was gathered from program documents from the six universities and colleges in Thailand (see Appendix D). These program documents were also used comparatively with the information from the questionnaires in order to assure the correctness of the information received. In addition, course content descriptions from catalogues published by some universities and colleges in Thailand and foreign countries (the U.S., England) were used to provide the subject matter outlines in the structuring of instructional elements in the ceramic design curriculum. This study also utilized documents about industrial design curriculum development from the Division of Design, at The Ohio State University and furthermore, publications in
the areas of design, industrial design, design education were also consulted. However, the information specific to the profile of the Thai ceramic industry as well as the Thai ceramic design education was gathered through the use of questionnaires (see Appendix B). The data from the questionnaires were assessed to provide major guidelines for the ceramic design curriculum development.

**Population and Sample**

Samples were selected from two groups of the target population: the ceramic design educators and instructors in the major universities and colleges which offer ceramic design education; and the management personnel of ceramic factories.

**Group I:** All 28 accessible members from the target population of ceramic design educators and instructors from universities and colleges in the Bangkok metropolitan areas. The names were secured from the lists of faculties provided by the Department of Industrial Design, Chulalongkorn University; the Faculty of Architecture, King Mongkut's Institute of Technology Chaokhuntham Ladkrabang; the Department of Arts and Crafts, Institute of Technology and Vocational Education at Poh-Chang; the Faculty of Decorative Arts, Silpakorn University; the Department of Decorative Arts, Rangsit University; and the Phra Nakhon Teacher's College. This group provided appropriate information about the current practices in ceramic design education in Thailand and the relationship between the ceramic design educational institutions and the Thai ceramic industry.
Group II: This group consisted of 65 (48% of the total population; approx. 134 factories, Bhotitapana, 1987) subjects randomly selected from the target population of management personnel in the Thai ceramic industry. The names and addresses of factories were secured from the Department of Factories. The names listed were checked for duplication and the repeated names were crossed out. The list was also checked to make sure that each manager was still in business. After the checking was completed, there were 96 names left. By using the method of simple random sampling, each of the 96 names was given a number ranged from one to ninety-six. Respectively the numbers of one to ninety-six were written on 96 pieces of papers and were placed into a drawing box. From the drawing box 65 subjects were randomly selected, one at a time and without replacement. The numbers picked out from the drawing box were then compared the numbers on the list which thereafter provided 65 names of subjects to be included in the sample Group II. This sample provided information specific to the current design practices in the ceramic industry.

Instruments

This study developed two sets of questionnaires, one designed for gathering information about the current practices in ceramic design education in Thailand and the relationship between the ceramic design educational institution and the Thai ceramic industry, and the other to assess the needs and desires of the Thai ceramic industry. The questionnaires can be described as follows:

Questionnaire I: A set of 16 questions (see Appendix B) was developed. The contents of the questions and the answers were selected through the review of ceramic education curriculums at six universities and colleges in Thailand,
publications about ceramics, ceramic education, and the ceramic industry. Specific research findings about the problems of the ceramic industry were also used. Additional information that could be arranged in the form of addressable questions was also obtained from a researcher at the Research and Development Ceramic Center, Department of Science Service, Ministry of Science. The final arrangement of the questions was then presented to and judged for the content validity by a panel of experts which consisted of three members: the researcher from the Research and Development Ceramic Center, Department of Science Service, a ceramic design instructor, and a researcher from the Department of Export Promotion. Two pilot tests (Test-Retest method) were administered to a group of five subjects (designers, chosen on voluntary bases from the list of the researcher's professional colleague) on two different occasions (due to the different working schedule for each subject, the test was given to each subject individually on different occasions but the interval between the tests for each subject was one week). The scores from the two administrations were compared and revealed a reliability scale of $r=0.7$ which was acceptable. Questionnaire I was divided into three sections. The first section contained five questions concerning general information about the subject completing the questionnaire and about the current practices in ceramic design education being offered at the subject's institution. The second section consisted of six questions which provided information about the subjects' opinions about the relevant issues pertinent to the developing of the ceramic design education and the selection of course titles or educational subjects in the area of ceramic design education. The first question in section two asked the subjects for their opinions about the current practices in ceramic design
education. The second question in section two asked the subjects to identify the problematic areas of the current practices in ceramic design education. The third question asked the subjects to choose course titles which they thought important to the new ceramic design curriculum. The fourth question was sequential to the third and asked the subjects for additional course titles. The fifth and the sixth questions were about the duration of the ceramic design education program and the requirement for degree of completion. The third section of questionnaire I contained five questions concerning the subject's opinion about first, the desired roles of ceramic designers, second, about the areas needed to be improved in the Thai ceramic industry and third, about the subject's comments and suggestions.

Questionnaire II: A set of 16 questions (see Appendix B) was developed through the review of research findings about the problem of the ceramic industry, articles about the ceramic industry in the Ceramics Thai magazines, published by the Thai Ceramic Society. Additional information was compiled from the information obtained from the interviews with researchers from the Research and Development Ceramic Center, Department of Science Service, Ministry of Science (also used in the development of Questionnaire I), two senior officers from the Department of Industrial Promotion, one at the Bangkok branch and another at the Chiang Mai branch. Publication about ceramic design, industrial design and ceramics in general were also utilized. The final arrangement of the questions was then presented to and judged for the content validity by a panel of experts which consisted of four members: the researcher from the Research and Development Ceramic Center, Department of Science Service, a ceramic design instructor (also the owner of a ceramic factory), a
research personnel from the Department of Export Promotion, and a senior officer from the Department of Industrial Promotion. Two pilot tests (Test-Retest method) were administered to a group of the five subjects (same as in Questionnaire I). The scores from the two sets were compared and revealed an acceptable scale of reliability of $r=0.6$. Questionnaire II was divided into two sections. The first section contained nine questions concerning general information about the subject completing the questionnaire, general information pertinent to the subject's factory, and the information about the subjects' companies' employment of designers. The second section of questionnaire II contained seven different questions concerning the subject's opinion about ceramic designers at present, the improvement of design in regard to the development of the industry, the ideal qualifications of ceramic designers, and general comments and suggestions.

**Procedures**

Questionnaire I was personally delivered to all 28 subjects in the Group I population. Appointments for pick-ups were set with an assigned subject at each institution. 25 completed questionnaires were returned. The reason for the three unreturned questionnaires was a retirement for one subject and the leave of absence for further study for the other two.

Questionnaire II was mailed to the subjects in the Group II population. 21 questionnaires (32%) were returned during the first two weeks. A follow-up was sent out to non-respondents during the third week in order to obtain more responses. One week after the follow-up 13 (20%) questionnaires were returned. Thereafter, the second follow-up or reminder was sent out to the
remainder of the non-respondents. After the second follow-up, there were seven questionnaires (11%) returned (These were considered to be late respondents). Altogether were 41 questionnaires returned which amounted to 63% of the total questionnaires mailed out. The percentage of returned questionnaires was considered acceptable (Iamchitrakusol 1990), Head of the Research Group at the Center of Research and Development for Ceramic Industry at The Research and Development Ceramic Center, Department of Science Service, Ministry of Science, stated in according to his research experience that the percentage of returns in previously conducted researches done about ceramic industry in Thailand amounted to approx. 20% to 40%) and was close to the suggested adequate rate of 70% (Gay, 1987). Fowler (1988) on the other hand, suggested no universal accepted percentage and indicated that the percentage of returns could range from 5 % to 95 %. Fowler also suggested that the higher percentage of returns could be achieved by reducing the sample size and by devoting more saved resources to obtaining responses from a higher percentage of the sample. As this study concerns the representativeness of the samples was the most important issue therefore a slightly lower rate of responses from a larger or more representative groups of subjects is accepted. To check the representativeness of the subjects who completed the questionnaire, the late respondents were compared to the early respondents. It was found that there was almost no difference between the early respondents and the late respondents (the obtained data revealed that a significant percentage of early respondents were those who employ designers) therefore the sample was considered to be representative.
CHAPTER IV
DATA COLLECTION AND ANALYSIS

The data collection process took approximately four months (January - April, 1990) and was conducted in Thailand. The responses from subjects in Group I were 89% and all questions were completed. 32% of questionnaire II which was mailed to the subjects in the second group was returned within the first one and a half months of the data collection. After the follow-up was sent out during the last half of the second month, 20% was returned. The other 11% of questionnaire II was mailed to a correspondent in Bangkok during the end of the third month and was mailed to the researcher in the United States the following month. The responses from subjects in Group II were 63% (n=65) and also every question in each questionnaire was completed. The completed answers in both questionnaires were tabulated. It is important to note that the total of responses in some questions was more than one hundred percent because the questions requested all the applicable answers.

The data are presented into two separate parts: the data from Questionnaire I from the ceramic instructors in the Bangkok metropolitan area and the data from Questionnaire II from the management personnel from factories in different areas of Thailand.

Data from Questionnaire I

Questionnaire I consisted of 16 questions which can be divided into three parts. The first part contained five questions asking about the subject's general
personal information, the background information of the subject's institution, and the current practices of the ceramic education at the subject's institution. The second part of Questionnaire I consisted of six questions asking the subject's opinions about the relevant issues for developing the ceramic design curriculum. The last part of Questionnaire I comprised of five questions asking the subject's opinions about the ceramic industry, the roles of ceramic designers, and the subject's comments or suggestions.

From the first question, it was found that the ages of the subjects (n=25) completed the question can be divided into four different age groups 20 to 29, 30 to 39, 40 to 49, and 50 and over. 16% of the subjects age between 20 to 29, 48% between 30 to 39, 24% between 40 to 49, and 12% between 50 and over. 56% of the subjects were male and the other 44% were female. In the category of educational background, it was found that 8% (n=2) of the subjects received certificates of higher education, 64% (n=16) received a bachelor degree in the areas related to art education (industrial arts, ceramics) (32%), fine and applied arts (20%), architecture (4%), and architecture (industrial design) (8%). The other 24% of the subjects (n=6) received a masters degree in ceramic engineering (33%), industrial engineering (33%), and industrial design (33%). The remaining 4% (n=1) of the subjects received a doctoral degree in art education (ceramics).

Of all the 25 subjects who completed the questions in Questionnaire I, five (20%) came from Phra Nakhon Teacher's College; three (12%) from the Department of Industrial Design, Chulalongkorn University; three (12%) from the Rangsit University; four (16%) from the Department of Industrial Design, King Mongkut's Institute of Technology Chaokhuntaharn Ladkrabang; five from the
Arts and Crafts Division, the Department of Fine Arts, Institute of Technical and Vocational Education at Poh-Chang Campus; and five (20%) from the ceramics division, the Department of Decorative Arts, Silpakorn University. All subjects teach or are responsible for ceramic education at the institution indicated. As for the subjects' years of teaching experience, 24% have 1 to 5 years of teaching experience; 28% have 6 to 10 years of teaching experience; 24% have 11 to 15 years of teaching experience, 8% have 16 to 20 years of teaching experience, and 16% have 21 to 30 or more years of teaching experience.

It was also found that 48% of the subjects are working in the ceramic industry or participate, more or less, in the activities related to the ceramic industry, the remaining 56% are only involved in academic activities or teach. The data indicated some degree of difference in the opinions relating to working or non-working status. Therefore this study divided the responses into two groups according to the respondent's working and non-working status. Group I represented subjects who have working status and Group II represented the non-working subjects.

In question three, the subjects were asked to indicate the major emphasis of their institutions' ceramic education curriculums and it was found that each subject indicated different emphases of teaching. 16% of the subjects indicated that the major emphasis of their curriculum was crafts-based; another 16% of the subjects indicated that the major emphasis of their curriculum was fine art-based; 32% indicated industrial design as their major emphasis; 8% indicated ceramic skills and technologies as major emphasis; 20% indicated a mixed emphases between fine art and industrial design, 4% mixed emphasis between ceramic technology and industrial design, 4% a mixed emphases between crafts and
industrial design; and the remaining 4% indicated mixed emphases of crafts, industrial design, education, and fine art.

In question four, the question asked about the setting of each institution's ceramic education curriculum and it was found that ceramic education at the Industrial Design Department at Chulalongkorn University and the King Mongkut's Institute of Technology Chaokhuntaharn Ladkrabang are being offered as a sub-discipline in the discipline of industrial design. The ceramic education at the Phra Nakhon Teacher's College is being offered as an independent discipline in ceramic technology. The ceramic education at the Rangsit University is being offered as a sub-discipline under the Department of Fine Arts. The ceramic education at the Silpakorn University is being offered as a sub-discipline under the Department of Decorative Arts. And at the Institute of Technical and Vocational Education (Poh-Chang Campus) it is being also offered as a sub-discipline in the Department of Fine Arts. Ceramic education at Chulalongkorn University and the King Mongkut's Institution of Technology Chaokhuntaharn Ladkrabang are both a five-year program granting a bachelor degree in industrial design. Ceramic education at Silpakorn University, the Teacher's College, the Institute of Technical and Vocational Institution (Poh-Chang Campus) and the Rangsit University are all four-year programs. The Teacher's College grants a bachelor degree in Science, while Rangsit University and Silpakorn University grant a bachelor degree in Fine Arts. ITVED on the other hand, grants a bachelor degree in Education.

In question five all the institutions indicated contact with the ceramic industry.
However the contact was rather one-sided since it seems at present that the institutions are using the industry only as the source for their students to obtain practical training during certain periods of time. There were however, some subjects who indicated other levels of contact, for example the exchange of information and resources.

**TABLE 14**

**IN YOUR OPINION, THE CURRENT CERAMIC EDUCATIONAL CURRICULUM AT YOUR INSTITUTION... (IN RELATION TO THE PRACTICES IN THE INDUSTRY**

<table>
<thead>
<tr>
<th>Choices of answer</th>
<th>Group I (n=12)</th>
<th>Group II (n=13)</th>
<th>Total for both (n=25)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. sufficiently serves the design demands from the industry</td>
<td>-</td>
<td>23.0</td>
<td>12.0</td>
</tr>
<tr>
<td>b. requires minor revision to better serve the design demands from the industry</td>
<td>50.0</td>
<td>46.3</td>
<td>48.0</td>
</tr>
<tr>
<td>c. requires major revision to better serve the design demands from the industry</td>
<td>9.0</td>
<td>-</td>
<td>4.0</td>
</tr>
<tr>
<td>d. unsuitable to serve the design demands from the industry</td>
<td>41.0</td>
<td>23.0</td>
<td>32.0</td>
</tr>
<tr>
<td>e. Other, please comment</td>
<td>-</td>
<td>7.7</td>
<td>4.0</td>
</tr>
</tbody>
</table>

Total 100.0% 100.0% 100.0%

From question six on to question eleven represented the second part of Questionnaire I which aimed at obtaining pertinent information about the
development of the ceramic design curriculum. The data obtained from question number six is presented in Table 14. The majority of the subjects (48%) expressed the need for minor revision in their curriculum so that they would better serve the demands from the industry. A large percentage of subjects (40%) (see Table 14) also stated that the current educational curriculum were not suitable for the demands from the industry. And as mentioned earlier, the subjects in the working group expressed higher responses to the unsuitability between the ceramic educational curriculum and the practices in the industry.

In question seven, the subjects who responded to answer b, c, and d in question six were asked to indicate the areas which they thought would need revision. 84% (n=21) of the total subjects who responded to answer b, c, and d in questions six suggested the revision and adjustment in the following areas (the percentage numbers displayed were the percentage of the subjects' responses) (n=21)

1. There are too many courses in too many areas (1.8%).
2. Courses are too basic and reveal only elementary knowledge about the field (5.4%).
3. There is a limitation of time, therefore a lot of materials in the courses could not be covered (1.8%)
4. The content of some courses are impractical in real application (5.4%)
5. The equipments, facilities, and techniques being taught are obsolete (8.9%).
6. Insufficient information about design applications in the real industrial settings and/or system (25%).
7. Insufficient information about the marketing aspects of design for
In question eight a list of subjects relevant to the ceramic design education were arranged by sorting through current curriculums being offered at various universities and colleges in Thailand, the United States, and other countries in ceramic education, industrial design, and other related areas in art and design. Subjects were asked to check the subject headings which they thought should be included into the ceramic design educational curriculum. The responses were presented in Table 15 in the following page:

In addition to question eight, question nine asked the subjects to indicate the unlisted subjects which pertain to the ceramic design curriculum. As was suggested in question nine the subjects to be included additionally in the curriculum were; design criticism (8%), ceramic production processes (12%), and
experimental ceramic plant (12%), practical training (32%), and industrial field trips (24%).

**TABLE 15**

**IF A NEW CERAMIC DESIGN CURRICULUM IS TO BE DEVELOPED, WHAT SUBJECTS DO YOU THINK SHOULD BE INCLUDED IN THE CURRICULUM SO THAT THE EDUCATION THE FUTURE CERAMIC DESIGNER RECEIVE WILL BE DIRECTLY RELATED TO THE DESIGN PRACTICES IN THE CERAMIC INDUSTRY? LISTED BELOW ARE THE SUBJECTS BEING OFFERED IN VARIOUS CERAMIC EDUCATIONAL INSTITUTIONS, PLEASE CIRCLE THE SUBJECTS YOU THINK SHOULD BE INCORPORATED INTO THE CERAMIC DESIGN CURRICULUM.**

<table>
<thead>
<tr>
<th>Choices of answer</th>
<th>Group I (n=12)%</th>
<th>Group II (n=13)%</th>
<th>Total for both (n=25)%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. History of art</td>
<td>75.0</td>
<td>77.0</td>
<td>76.0</td>
</tr>
<tr>
<td>2. History of ceramics</td>
<td>92.0</td>
<td>92.0</td>
<td>92.0</td>
</tr>
<tr>
<td>3. Drawing</td>
<td>67.0</td>
<td>77.0</td>
<td>72.0</td>
</tr>
<tr>
<td>4. Technical drawing</td>
<td>92.0</td>
<td>92.0</td>
<td>92.0</td>
</tr>
<tr>
<td>5. Graphic design</td>
<td>25.0</td>
<td>39.0</td>
<td>32.0</td>
</tr>
<tr>
<td>6. Art elements</td>
<td>9.0</td>
<td>8.0</td>
<td>8.0</td>
</tr>
<tr>
<td>7. Design fundamentals</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>8. Art appreciation</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>9. Arts and crafts</td>
<td>0.0</td>
<td>0.0</td>
<td>4.0</td>
</tr>
<tr>
<td>10. Aesthetics</td>
<td>25.0</td>
<td>8.0</td>
<td>16.0</td>
</tr>
<tr>
<td>11. Man &amp; society</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>12. World cultures</td>
<td>67.0</td>
<td>54.0</td>
<td>60.0</td>
</tr>
<tr>
<td>13. 2-D design</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>14. 3-D design</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>15. Clay bodies and formu.</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>16. Glazes formulation</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>17. Kiln theory and practices</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>18. Design theories</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>19. Design workshops (problem solving)</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>20. Tools and equipments in ceramics</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>21. Ceramic workshops (hand-forming,throwing, casting, etc.)</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>22. Ceramic decorations</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Question number ten required the subjects to show their opinions about the length of times they thought would be appropriate for the ceramic design curriculum. 77% of the subjects suggested the period of four years. The remaining 28% suggested the period of five years. The differences in the suggestion between the group of working and non-working were about similar; a higher number of members in both groups suggested the period of four years as presented in Table 16. It is important to note that the selection of four-
years and five-years programs came from the requirement of the Office of the State Universities in Thailand.

Another pertinent issue in the development of the ceramic design curriculum was the requirement for degree completion. Question number eleven listed the possible requirements which were put together through the review of requirement for degree of completion from universities and colleges within Thailand and other countries. The majority of subjects (66%) suggested the completion of coursework, examinations, professional training and individual thesis work. 8% of the subjects suggested the completion of coursework, examinations, and professional training while the other 28% of the subjects suggested the completion of coursework, examinations, and individual thesis work (see Table 17).

### Table 16

In your opinion, what is the appropriate duration of the ceramic design curriculum (provided that the curriculum is being developed)?

<table>
<thead>
<tr>
<th>Choices of answer</th>
<th>Group I (n=12)</th>
<th>Group II (n=13)</th>
<th>Total for both (n=25)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Four years</td>
<td>67.0</td>
<td>77.0</td>
<td>72.0</td>
</tr>
<tr>
<td>b. Five years</td>
<td>33.0</td>
<td>23.0</td>
<td>28.0</td>
</tr>
<tr>
<td>c. Other, please specify</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
TABLE 17
WHAT SHOULD BE THE REQUIREMENT FOR DEGREE COMPLETION FOR THE STUDENTS IN THE CERAMIC DESIGN CURRICULUM BEING DEVELOPED? (LISTED BELOW ARE THE CURRENT REQUIREMENTS FROM VARIOUS CERAMIC DESIGN EDUCATIONAL INSTITUTIONS)

<table>
<thead>
<tr>
<th>Choices of answer</th>
<th>Group I (n=12)</th>
<th>Group II (n=13)</th>
<th>Total for both (n=25)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. The completion of coursework and examinations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. The completion of coursework, examinations, and professional training</td>
<td></td>
<td>8.0</td>
<td>4.0</td>
</tr>
<tr>
<td>c. The completion of coursework, examinations, and individual thesis</td>
<td>25.0</td>
<td>56.0</td>
<td>28.0</td>
</tr>
<tr>
<td>d. The completion of coursework, examinations, professional training, and individual thesis</td>
<td>67.0</td>
<td>54.0</td>
<td>66.0</td>
</tr>
<tr>
<td>e. Other, please specify</td>
<td>8.0</td>
<td></td>
<td>4.0</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Also from question number eleven, as displayed in Table 17, 4% of the subjects responded with answer e or other. The suggestion specified was the completion of coursework, examinations and an extensive practical or professional training in the industry from which the students have to cooperate with a factory in developing a set of finished products which are readied for production if the factory choose to do so.
Following question eleven was a set of five questions which represented the third part of Questionnaire I. This part of Questionnaire I questioned the subjects on their opinions about the ceramic industry, the (desired) roles of ceramic designers in the development of the ceramic industry, and their comments and suggestions. The results were presented as follows (started from question twelve):

**TABLE 18**

**IN YOUR OPINION, THE INDUSTRY'S DEMAND FOR CERAMIC DESIGNERS AT PRESENT IS**

<table>
<thead>
<tr>
<th>Choices of answer</th>
<th>Group I (n=12)</th>
<th>Group II (n=13)</th>
<th>Total for both (n=25)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Very low</td>
<td></td>
<td>15.4</td>
<td>8.0</td>
</tr>
<tr>
<td>b. Low</td>
<td>25.0</td>
<td>7.7</td>
<td>16.0</td>
</tr>
<tr>
<td>c. Moderate</td>
<td>25.0</td>
<td>23.0</td>
<td>24.0</td>
</tr>
<tr>
<td>d. High</td>
<td>16.7</td>
<td>7.7</td>
<td>12.0</td>
</tr>
<tr>
<td>e. Very High</td>
<td>33.3</td>
<td>46.2</td>
<td>40.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.0%</strong></td>
<td><strong>100.0%</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

Question twelve surveyed the subjects' opinions about the demands for ceramic designers from the ceramic industry. The level of demand was divided into five levels ranging from very low, low, moderate, high, to very high. According to the responses, the demands for ceramic designers at present is relatively high. This was indicated in the 40% of the subjects' response to answer e (very high) in question twelve. A majority of subjects by both group I
and group II displayed this trend: 33.3% of subjects from group I (n=12) and 46.2% of subjects in group II (n=13) picked this answer. On the other hand only 8% of the subjects indicated the very low demand. 16% of the subjects pointed to low demand for ceramic designers. The other 24% stated a moderate level of demand from the industry and 12% of the subjects had a high level of demand for their answer. The data from question twelve were presented in Table 18.

The following question number thirteen surveyed the subjects' opinion about the condition of the ceramic industry. Three statements varied from a positive opinion to the opinion that expressed some concerns about the development of the industry. They were arranged together with a statement of no comment and other suggestions (see Table 19).

Almost all (92%) of the subjects responded to statement in answer b which expressed an opinion that the industry needs improvement in certain areas while only 8% of the subjects which represented two subjects' answers stated no comment. A majority of subjects in both working and non-working groups agreed that there were needs for the ceramic industry to improve itself in certain areas (see also Table 19).

Question fourteen was sequential to question thirteen and was aimed at surveying the subjects' opinions about the areas which were needed to be improved by the industry in the case that their responses to question thirteen was answer b (see Table 19). From 23 subjects who responded to answer b, there were ten different areas which the subjects indicated. The ten areas for improvement were listed with the percentage of subjects' indications as follows:

1. The designs of present ceramic products (74%);
2. The production techniques and the machineries; equipments being
used (44%);

3. The quality of products (22%);

4. The quality of raw materials (18%);

5. The training and the management of personnel (26%);

6. The industry's current marketing practices (22%);

7. The design ethics or the prevailing practice of copying (69%);

**TABLE 19**

IN YOUR OPINION, THE CERAMIC INDUSTRY AT PRESENT... (IN RELATION TO ITS OWN DEVELOPMENT AND THE NATION'S DEVELOPMENT)

<table>
<thead>
<tr>
<th>Choices of answer</th>
<th>Group I (n=12)</th>
<th>Group II (n=13)</th>
<th>Total for both (n=25)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. is self-sufficient and developing rapidly in a positive direction</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>b. needs improvement in certain areas</td>
<td>92.0</td>
<td>93.0</td>
<td>92.0</td>
</tr>
<tr>
<td>c. underdeveloped</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>d. no comment</td>
<td>8.0</td>
<td>7.0</td>
<td>8.0</td>
</tr>
<tr>
<td>e. other, please specify</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Total 100.0% 100.0% 100.0%

8. The lack of interest in research and development in production (design, marketing, technology, and so on) (40%);

9. The problem of energy utilization among the manufacturers in the industry (there are at present a lot of company using wood which have
depleted rapidly as their source of fuel) (4.3%) and;

10. The problem of inadequate government support (4.3%).

Question fifteen asked the subjects' opinions about the desired roles of designers in the development of the ceramic industry. Of all the twenty-five subjects, twenty-four subjects responded to the question and denoted their opinions which can be summarized in 10 different areas of thought as follows:

1. The individual designer should by him/herself or joined together with other designers in generating awareness among the industry, the government, and the population about the importance of design and/or the designer in the development of the country (46%);

2. The designer should protest and deter from the practice of copying (some subjects suggested the creation of public condemnation against such practices) (55%);

3. The designers should consistently update themselves with new information, knowledge, and insights about design, technology, production techniques and other related areas, for example customers' behavior, market trends, cultural changes which are vital to their creativity in the field of ceramic design and in the field of design in general (39%);

4. The designers should serve the industry, the consumers, and the society's demands, needs and requirements for design (23%);

5. The designers should play the role of inventor and developer of ceramic products by incorporating in their invention, development, or creation the pertinent information in marketing, technology, and so on. The designers have also the duty to present to the public and the
industry, the design, invention, and/or the product development (14%);

6. The designers should with great effort cooperate with personnel in other fields such as engineers, technicians, material scientists, marketing researchers, and workers of all levels in the development, the design and the production of ceramic products so that the qualities of such products could be optimized (17%);

7. The designers should have the ability to adapt and adjust themselves flexibly in every working environment (5%);

8. The designers should have the ability to perform or response to works in the areas of management and administration (5%);

9. The designers should insist only on qualitative design of products (5%);

and

10. The designers should incorporate into their creativity the ability to transmit and inject the country's cultural identity in their design (5%).

The last question or question number sixteen of Questionnaire I was mainly for the purpose of getting additional information or opinion which the subject who completed the questionnaire might have in relation to the sequence of the questions. There were 13 subjects or 52% of the total subjects responded to this question. The suggestions from the 13 subjects were listed as follows:

1. The perceptions of present ceramic designers in Thailand are narrow and limited in terms of their relationship to the design events happening in other foreign countries. In turn this has prevented the Thai ceramic designers from competing with their professional colleagues in those foreign countries. Therefore there should be some ways to correct this problem;
2. The designs of ceramic products are not competitive and suitable for the push for export, designers at present have in some ways the responsible for this problem;

3. The curriculum should be directed to serve the demands from the industry;

4. The curriculum should incorporate collaboration among the government, the industry and the educational institutions as well as the public to optimize its benefits;

5. The ceramic design curriculum should be practical and equipped with more information about ceramic industrial production processes;

6. The practice of copying among manufacturers in the ceramic industry should be terminated, and designers should organize an association to provide the industry with more appropriate ways to create designs;

7. Ceramic designers should have specialized knowledge about ceramics because the design procedure in ceramics is different from other field of design;

8. The ceramic design curriculum should provide sufficient information for students to carry on their study in the field of ceramics to higher levels;

9. The industry and the educational institutions need more government supports;

10. The curriculum should be developed with industrial and technical design orientation and should be implemented throughout the nation;

11. Ceramic designers should possess the abilities of designer, craftsman, educator, and researcher;

12. The length of the program in ceramic design education should be long
enough so that the courses' materials could be delivered thoroughly; and

13. The curriculum should provide the students with broad-based design education.

Data from Questionnaire II

Questionnaire II embodied a set of sixteen questions which can be divided into two major parts: the first part consisted of nine questions concerning general information about the person who responded to the questionnaire, general information about the company or ceramic factory in which the person was working, and information about the employment of designers within the company or factory. The second part of Questionnaire II contained six questions surveying the respondent's opinion about the present ceramic designers, the improvement of design in regard to the development of the industry, the ideal qualifications of ceramic designers, and general comments and suggestions. Of all the 65 sets of Questionnaire II which were sent out to subjects in the sample group II, the total of 41 or 63% were returned. From the 41 completed questionnaires all of the questions were answered. The data were tabulated in accordance to the answers. The results from Questionnaire II were presented in details as follows:

From question number one, it was found that the subjects comprised of 36 male respondents (88%) and 5 (12%) female respondents. The age of subjects can be divided into three different age groups: from 20 to 29, 30 to 39, and 40 to 49. 32% of the subjects fell into the age group of 20 to 29, 44% in the age group of 30 to 39, and 24% in the age group of 40 to 49. In the category of employment position, 80% indicated a manager position, 17% indicated that they are both
manager and owner of the company or factory, and 2.4% or one subject indicated the position of designer-deputy manager at the present company. The number of years of experience for each subject ranged from 1 to 30 years, and can be divided into three groups: 1 to 9 years; 10 to 19 years, and 20 to 30 and over years. 63% of the subjects have 1-9 years of working experience in ceramics; 27% have between 10 to 19 years; and the remaining 10% have between 20 to 30 and over years.

The educational background of subjects or respondents of Questionnaire II ranged considerably from an elementary level of education to the master degree. It was found that 2.4% of the subjects received elementary education, 10% received secondary education, 10% received high-school level of education, 14,6% received certificates of higher-education, 54% received bachelor degree, and the last 10% received master degree.

From question number two, it was found that 17% of the factories are producing tiles; 22% are producing tablewares; 27% are producing household decorative items, novelties, gifts and souvenir; 7% are producing sanitaryware products; 12% are producing industrial ceramics and construction parts; 10% are mixed producing tableware and household decorative items; and 5% are mixed producing tiles and household decorative items. The number of employees ranged from 6 to 1,500. In addition, the number of employees in each factory was a reliable indication of the size and the productivity of the factory in which each respondent or subject is active. In order to simplify the data tabulation the number of employees or the size of the factory was divided into three isolated group types. Group A consisted of subjects from factories with employees ranging from 6 to 40 persons. Group B consisted of subjects from factories with
employee ranging from 41 to 200 persons; Group C consisted of subjects from factories with 201 to 1,500 persons. 41.5% of the subjects work in Group A type of factories, 39% in the Group B type of factories, and the remaining 19.5% in the Group C type of factories. And as revealed by the rest of the data in Questionnaire II, it seemed that there was no significant difference in the way that the subjects expressed their opinions in accordance to age groups, working experiences, educational background. Only the sizes of the factories seem to have some influences on the subjects' opinion about design.

Also from question number two, it was found that 41.5% of the subjects' factories use manual labor as their method of production, 43.9% use manual labor and machines as their method of production, and 14.6% use machines as their main method of production. In addition, 56% of the subjects' factories have local markets as their sole outlets, 2% have international markets as their sole outlet, and 42% have both local and international markets as their outlet. The type of outlet or market for the factories as well as their sizes seemed to reflect some influences in the following question number three. Question number three asked the subjects if their companies (factories) at present received any support from the government. It was found that when the data were tabulated into three groups according to their sizes, the companies (factories) that employ more than 200 persons tend to receive support of some kinds from the government. Combining this data with the data from question number two, it was also found that the bigger companies also have the tendency to have both international and local markets as their outlet which, in turn, meant that they were dealing with export. Therefore, they have received support from the government. The results from question number three were displayed in Table 20.
The supports from the government as indicated in question 4 by the companies (factories) that received the supports (n=13) varied from market channelling information (46%), technical information (31%), tax breaks (46%), to financial incentives (8%).

Question number five surveyed the employment of designers in the subjects' factories. It was found that 63.5% of the companies (factories) did not hire or employ any designers. There were only 36.5% of the companies (factories) which hire or employ designers. The percentage of the companies that did not have designers was significant especially for the companies in the Group A (88%) which tend to be relatively small with regard to their size (6 to 40 employees). The same trend was also applicable to the companies in Group B (63%) as presented in Table 21. Of all the companies (factories) which hire designers (n=15), the number of designers being hired by each company range from 1-8 persons. 22.2% hire one designer; 16.6% hire two designers; 22.2% hire three designers; 11.6% hire four designers; 5.6% hire six designers, and 5.6% hire eight designers. The number of designers being hired was mainly dependent on the production capacity of the companies.

In the following question seventeen, subjects were asked to indicate the responsibilities of designers in their companies. There were a total of 15 (36.5%) companies which at present received assistance from designers (see Table 21). Each subject indicated more than one item for the responsibilities of the designers in the subject's company.

Therefore the itemized designers' responsibilities as indicated by the subjects in the 15 factories were listed with their percentage of the subjects'
responses in the parentheses. The list of the designers' responsibilities is as follows:

1. Design decorative patterns (100%);
2. Transfer designs from customers' order (ideas) into working designs for production (53%);

TABLE 20
AT PRESENT, DOES YOUR COMPANY (FACTORY) RECEIVE SUPPORT FROM THE GOVERNMENT?

<table>
<thead>
<tr>
<th>Choices of answer</th>
<th>Group A (n=17)</th>
<th>Group B (n=16)</th>
<th>Group C (n=8)</th>
<th>Total for both (n=40)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>88.0</td>
<td>75.0</td>
<td>12.5</td>
<td>68.0</td>
</tr>
<tr>
<td>Yes</td>
<td>12.0</td>
<td>25.0</td>
<td>87.5</td>
<td>32.0</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

TABLE 21
AT PRESENT, DOES YOUR COMPANY HIRE OR EMPLOY DESIGNER?

<table>
<thead>
<tr>
<th>Choices of answer</th>
<th>Group A (n=17)</th>
<th>Group B (n=16)</th>
<th>Group C (n=8)</th>
<th>Total (n=41)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>88.0</td>
<td>63.0</td>
<td>25.0</td>
<td>63.5</td>
</tr>
<tr>
<td>Yes</td>
<td>12.0</td>
<td>27.0</td>
<td>75.0</td>
<td>36.5</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
3. Products' packaging design (27%);
4. Producing originals and prototypes of products, and making mold (33%);
5. Making printing screens (27%);
6. Design advertising, brochure, catalogue, and exhibition for products (20%);
7. Decorate showroom or storefront (13%);
8. Design ceramic products (47%);
9. Perform production quality control (13%);
10. Perform research tasks in marketing and consumer behavior (7%);
11. Sales representation (salesman) (7%).

Question eight surveyed specifically the reasons to which the subjects' companies have for not hiring designers. There were 26 companies which did not have designers, and from the 26 companies, 23 subjects from 23 companies responded to question eight. Each subject provided one or more reasons which were summarized into eight different reasons as follows:

1. There was no need for a designer because the company is small (26%);
2. There was no need for a designer because the company does not change the designs of products that often or the current lines of products are still in demand (13%);
3. The manager-owner of the company designs the products him/herself (26%);
4. The company produces construction parts, refractories, or other products that do not involve design (22%);
5. Most of the designs came from the customers with their orders (35%);
6. The company uses design packages from foreign countries (9%); and
7. Designers are too expensive and incapable as well as hard to find (18%).

Of the other three subjects who did not state their companies' reasons, there were two subjects indicated no comment about the question and one subject indicated no knowledge about the reasons.

In question nine, the subjects were asked to indicate the derivation of their companies' designs of products. Again in this questions the subjects' responded to more than one answer therefore the total amount of answers were higher than 100%. From the total of 41 subjects there were 30% who indicated that designers have the responsibility to produce the designs of their products. 25% indicated that marketing researches generated the designs of their products. Another 25% indicated the utilization of magazines and catalogues as their sources for the designs of their products. The majority of 50% indicated the customers' orders as the origins of the designs of the products being produced by them. 20% indicated the use of design packages from foreign countries as the source, and the other 35% indicated the previous or existing lines of products as the derivation of the design of their products. There were 17.5% of the subjects which selected Other as their responses. The reasons given were first -- there was no design involved in the production (2.4%) and second, the designs of the products originated from the creation of the manager-owners themselves (14.6%). The detailed data from question nine are presented in Table 22.

Question ten surveyed the subjects' opinions particularly about ceramic designers. The choices of answer given were five statements (see Table 23)
dealing with opinion about the capability of present Thai ceramic designers within the job market within the country. The statements ranged from highly capable to incapable. The fourth statement suggested the lack of understanding among the ceramic designers about the demand that the ceramic industry has placed upon them. Other, as the answer, was provided in the case that the subjects found no suitable answer expressing their appropriate opinion in the four given statements (see Table 23).

TABLE 22

THE DESIGNS OF YOUR COMPANY'S (FACTORY) PRODUCTS DERIVE FROM

<table>
<thead>
<tr>
<th>Choices of answer</th>
<th>Group A (n=17)</th>
<th>Group B (n=16)</th>
<th>Group C (n=8)</th>
<th>Total (n=41)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Designers</td>
<td>12.0</td>
<td>38.0</td>
<td>62.5</td>
<td>31.7</td>
</tr>
<tr>
<td>b. Markets researches</td>
<td>35.0</td>
<td>25.0</td>
<td>-</td>
<td>26.8</td>
</tr>
<tr>
<td>c. Magazines &amp; catalog.</td>
<td>35.0</td>
<td>19.0</td>
<td>25.0</td>
<td>26.8</td>
</tr>
<tr>
<td>d. Customers' orders</td>
<td>35.0</td>
<td>63.0</td>
<td>50.0</td>
<td>48.8</td>
</tr>
<tr>
<td>e. Design packages from foreign countries</td>
<td>-</td>
<td>25.0</td>
<td>50.0</td>
<td>19.5</td>
</tr>
<tr>
<td>f. Previous or existing lines of products</td>
<td>41.0</td>
<td>38.0</td>
<td>25.0</td>
<td>34.0</td>
</tr>
<tr>
<td>g. Other, please specify</td>
<td>35.0</td>
<td>6.0</td>
<td>-</td>
<td>17.0</td>
</tr>
</tbody>
</table>

It was found from this question that 39.5% of the subjects chose answer c or "the ceramic designers in Thailand are capable of performing a few design tasks demanded by the ceramic industry. 34.1% picked answer b or "the ceramic designers in Thailand are capable of performing some design tasks demanded
by the ceramic industry". 2.5% of the subjects stated that the ceramic designers in Thailand do not understand the demand of the ceramic industry, and another 2.5% stated that the ceramic designers are highly capable. 21.9% of the

TABLE 23
IN YOUR OPINION, CERAMIC DESIGNERS IN THAILAND ARE

<table>
<thead>
<tr>
<th>Choices of answer</th>
<th>Group A (n=17)</th>
<th>Group B (n=16)</th>
<th>Group C (n=8)</th>
<th>Total (n=41)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Highly capable of performing all design tasks</td>
<td>-</td>
<td>-</td>
<td>12.5</td>
<td>2.4</td>
</tr>
<tr>
<td>tasks demanded by the ceramic industry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Capable of performing some design tasks</td>
<td>35.0</td>
<td>38.0</td>
<td>25.0</td>
<td>34.1</td>
</tr>
<tr>
<td>demanded by the ceramic industry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Capable of performing a few design tasks</td>
<td>41.0</td>
<td>31.0</td>
<td>25.0</td>
<td>39.5</td>
</tr>
<tr>
<td>demanded by the ceramic industry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Incapable of performing design tasks demanded</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>by the ceramic industry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Do not understand the demand of the ceramic industry</td>
<td>-</td>
<td>6.0</td>
<td>-</td>
<td>2.5</td>
</tr>
<tr>
<td>f. Other, please specify</td>
<td>24.0</td>
<td>25.0</td>
<td>12.5</td>
<td>21.9</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
subjects expressed no comment, however, there was one subject who asserted that the ceramic designers at present are too artistic and emotional and do not conform themselves to the business aspects of ceramic design tasks. The data from question ten is shown in Table 23.

The following question eleven surveyed the relationship between the industry and the ceramic educational institutions. It was found that the majority or 85.4% of the subjects' companies surveyed in this study have no contact with the ceramic educational institutions. There were only 14.6% of the subjects' companies which at present provided training for students from some ceramic educational institutions (see Table 24).

Question number twelve surveyed the subjects' understanding about the benefits which they would have or in some cases already have in hiring ceramic designers. There were five given answers (see Table 25) in which this study had summarized from a vast array of possibilities of benefits which could be obtained from the aids of ceramic designers.

TABLE 24

AT PRESENT, DOES YOUR COMPANY (FACTORY) HAVE CONNECTION WITH THE CERAMIC DESIGN EDUCATIONAL INSTITUTIONS?

<table>
<thead>
<tr>
<th>Choices of answer</th>
<th>Group A (n=17)</th>
<th>Group B (n=16)</th>
<th>Group C (n=8)</th>
<th>Total (n=41)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>94.0</td>
<td>81.0</td>
<td>75.0</td>
<td>85.4</td>
</tr>
<tr>
<td>Yes</td>
<td>6.0</td>
<td>9.0</td>
<td>11.0</td>
<td>14.6</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
However, there was an extra open answer provided so that the subjects could freely express their opinions about the benefits which they thought they would have in hiring designers. The results were, 20% (see also Table 25) of the subjects stated that more variations of products was the benefit they have or would have from hiring ceramic designer; 8% indicated that they have benefited from the designers by having products which are accurately fit the demands from the markets; 15% indicated competitiveness as their benefit; 29% pointed to the

TABLE 25

WHAT IS THE BENEFIT DO YOU THINK YOUR COMPANY (FACTORY) HAVE (OR WOULD HAVE, IN CASE YOUR COMPANY (FACTORY) DOES NOT ALREADY HIRE DESIGNER) FROM HIRING DESIGNER?

<table>
<thead>
<tr>
<th>Choices of answer</th>
<th>Group A (n=17)</th>
<th>Group B (n=16)</th>
<th>Group C (n=8)</th>
<th>Total (n=41)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Products that accurately fit the markets' demands</td>
<td>-</td>
<td>6.25</td>
<td>25.0</td>
<td>8.0</td>
</tr>
<tr>
<td>b. Lower production cost</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>c. Competitiveness in the markets</td>
<td>18.0</td>
<td>18.75</td>
<td>25.0</td>
<td>15.0</td>
</tr>
<tr>
<td>d. More variation of products</td>
<td>24.0</td>
<td>12.5</td>
<td>25.0</td>
<td>20.0</td>
</tr>
<tr>
<td>e. Accuracy in customers' designs transfer</td>
<td>12.0</td>
<td>37.5</td>
<td>37.5</td>
<td>29.0</td>
</tr>
<tr>
<td>f. Other, please specify</td>
<td>46.0</td>
<td>25.0</td>
<td>12.5</td>
<td>27.0</td>
</tr>
</tbody>
</table>

accuracy in design transfer from customers' orders; and the rest of the subjects expressed different opinions which can be summarized as follows:
1. The benefit of additional opinion for decision-making (2.5%);
2. The benefit of assistance that help in reducing the workload (2.5%);
3. The benefit of increased products' quality control (2.5%);
4. No benefit whatsoever from hiring designers (2.5%);
5. No comment (12%).

The following two questions -- question thirteen and fourteen, the subjects were asked to express their opinion about the quality of their products. It was found that 51% of the subjects agreed that there were some improvements in certain areas needed to be done in case of their companies' products quality. The other 49% conceded they are presently satisfied with the quality of their products (see Table 26).

In questions fourteen which was sequential to question thirteen there were 22 subjects (51%) who expressed different ideas about how their companies' products quality could be improved. Again the results have been summarized into twelve different areas for improvement with the percentage of the 22 subjects' responses for each answer displayed in the parentheses. The twelve areas for improvement are listed below:

1. More modern (Western) and contemporary designs (27%);
2. The quality of raw materials (55%);
3. The skills and the number of skilled workers (27%);
4. The decorative patterns and colors of the products (23%);
5. Marketing and consumer researches (14%);
6. The competitiveness of the designs of the products in the international markets (23%);
7. The production costs and the high quantity of defective items (18%);
8. The quality of glazes (14%);

9. The ease of massive production in the products' designs (4.5%);

10. The outdated and inefficient machineries (18%);

<table>
<thead>
<tr>
<th>Choices of answer</th>
<th>Group A (n=17)</th>
<th>Group B (n=16)</th>
<th>Group C (n=8)</th>
<th>Total (n=41)</th>
</tr>
</thead>
<tbody>
<tr>
<td>are satisfactory</td>
<td>47.0</td>
<td>56.25</td>
<td>37.5</td>
<td>49.0</td>
</tr>
<tr>
<td>require improvement in certain areas</td>
<td>53.0</td>
<td>43.75</td>
<td>62.5</td>
<td>51.0</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

11. The marketing practices and strategies (4.5%);

12. The practices of quality control (23%).

Question fifteen surveyed the subjects' opinions about the qualification they would look for in hiring the ceramic designers or in the other words -- their ideas of the ideal designers. From the total of 41 subjects who completed the questionnaire there were 36 subjects (88%) who gave detailed answers for this question. The other 12% expressed no comment. The answers or the characteristics of the designers the industry sought after were summarized into nineteen characteristics as follows:

1. The ceramic designers should have the research capability in the areas of marketing trends, consumers' behavior, and so on (8%);
2. The ceramic designers should have the understanding of ceramic industrial production techniques and processes (39%);
3. The ceramic designers should be able to create products' designs that fit the customers' demands (8%);
4. The ceramic designers should know silk-screen printing and be able to make the screen (6%);
5. The ceramic designers should know photography (3%);
6. The ceramic designers should be cooperative with personnel from other fields, and departments of all levels (22%);
7. The ceramic designers should have the capability of performing various design tasks as well as artistic works in different nature (3%);
8. The ceramic designers should be able to speak English (11%);
9. The ceramic designers should have the understanding about marketing, production cost management, as well as competition in the markets (39%);
10. The ceramic designers should be able to perform mathematical calculations (3%);
11. The ceramic designers should have understanding about arts and culture, cultural norms, consumption behavior, and customs of people in other foreign countries (25%);
12. The ceramic designers should be creative, inventive, and artistic within the practical and commercial boundaries (19%);
13. The ceramic designers should have the business-like and respectable personalities (11%);
14. The ceramic designers should be able to perform technical and
manual skilled duties (33%);
15. The ceramic designers should be hard-working, patient, flexible, and adjustable in every working environment (44%);
16. The ceramic designers should be able to communicate with customers, workers and people in other professionals (28%);
17. The ceramic designers should be able to perform management duties in production plants, offices, and so on (8%);
18. The cost of employing ceramic designers should be lower (6%); and
19. The ceramic designers should have understanding about industrial systems (6%).

The last question or question number sixteen of Questionnaire II requested comments and suggestions from the subjects who completed the questionnaire. From the total of 41 subjects, there were 14 subjects (34%) expressed additional comments and suggestions. Once more the answers were summarized into six different main ideas as follows:

1. There is a lack of capable ceramic designers or design personnel to work (willingly) in the ceramic factories (42%);
2. The educational curriculum should have its focus on creating specialized design personnel in specific areas of production, for example, sanitaryware production, tableware production (21%);
3. The ceramic designers at present are not practical and do not understand what the markets want (14%);
4. The industry needs assistance in the improvement of raw materials quality (36%);
5. The industry needs more supports from the government (57%);
6. The ability of the ceramic designers is dependent upon the working experiences, the education or the curriculum should provide these working experiences (14%);

Data Analysis

This study analyzed the data from both Questionnaire I and II in conjunction with some of the findings in the literature review, and the analysis is presented in four different topic areas. As the main part of this analysis of data derived from the findings obtained from the questionnaire, the results may be applicable to only the groups of subjects being randomly selected by this study. The four different topic areas are listed and discussed as follows;

1. The current practices in ceramic design education in Thailand;
2. The current practices in ceramic design among the ceramic manufacturers in the Thai ceramic industry;
3. The design demand from the Thai ceramic industry and its implications on the ceramic design educational institutions;
4. The requirements (from the data collected) for the ceramic design education curriculum;
   4.1. The areas of concentration;
   4.2. The duration of the ceramic design education curriculum; and
   4.3. The requirements for the degree completion.

1. The current practices in ceramic design education in Thailand;

As the data from Questionnaire I shows, the ceramic education in Thailand varied from a sub-discipline in education (crafts), and in industrial design, to an
independent discipline in fine arts and in ceramic technology. However most of
the subjects (in this case ceramic instructors) indicated that their programs were
directed to prepare personnel who were capable of performing design tasks for
the ceramic industry. Although design courses were offered, there were
somewhat insufficient emphases on one or more aspects of ceramic design and
most often there were minimal emphases in the connection between theoretical
design courses and studio of skill developing courses. From comparing the data
from Questionnaire I with the documents (see Chapter II: Historical background
of ceramic design education (university level) in Thailand, and Appendix D)
about the ceramic education program in each institution, this study found that in
the institution which offers ceramic design education under the field of industrial
design, the education was meant to prepare the graduates or the designers to be
familiarized with basic skills, techniques and knowledge in ceramic production
with relatively more emphases on the processes of theoretical industrial design
in general. For the institution which offers ceramic education under the program
of education (crafts) the emphases were largely placed on manual skills in the
making of craft ceramics and the aspect of teaching rather than on design or
industrial production. For the institution which offers ceramic education under
the program of fine arts, the emphases were placed more on the artistic aspects
of ceramic production. And for the institution which offers ceramic education
under the program of ceramic technology, the emphases were placed mostly on
technical aspects of ceramic production. From this, it was clearly seen that
although all the institutions have somewhat contributed to supplying the
workforce for the industry, none of them have yet produced specialized ceramic
designers that suitably serve the design demanded by the industry. As pointed
out by most of the subjects in Questionnaire I, there is, in relation to the practices in the ceramic industry, the need for improvement in the current ceramic education curriculum. The responses from those subjects suggested there is not only the problem of unclear curriculum objectives (it was clearly seen from the data from question three in Questionnaire I that there was mixed understanding among the ceramic instructors about the objectives or the emphases of their curriculum) and the problem of the unsuitability of the curriculum in accordance to the practices in the ceramic industry that needs to be solved. There are other problems such as the lack of information in the curriculum about marketing, industrial production, raw materials, and other aspects of design that at present, call for re-justification and revision.

2. The current practices in ceramic design among the ceramic manufacturers in the Thai ceramic industry:

The data from Questionnaire I indicated copying as one of the current practices in the ceramic industry. On the other hand, the data from Questionnaire II pointed out that the current design practices or the design demands that were placed on ceramic designers by the Thai ceramic industry at present are involved in only cosmetic or decorative functions (pattern design, silk-screen design, catalogue and brochure design) of design in general. The reasons for the surface level usage of design or designers can be seen from the current status of the ceramic industry. At present most of the factories have the local markets as their outlet (see Data from Questionnaire II) and with the significant economic growth in Thailand during the past few years, the local markets' demand for ceramic products is relatively high. Consequently, the relative
prosperity has created high consumption for most of the products in the markets. The high level of absorption in the markets minimized the competition within the local markets; therefore there is no immediate need to sharpen the design or the competitiveness of their products for many manufacturers, there is little incentive for any change manufacturers who practice only cosmetic design for their products.

As for the near-sighted practice of copying, the industry (in this case the management personnel who responded to the questionnaire) seems to have different perspectives about such practice. At present the industry has the tendency to lean toward designs that are promising in terms of their marketabilities (as it was pointed out by many respondents that current Thai ceramic designers are not able to produce designs that sell) therefore in many ways copying seems to be the solution. Additionally, many of the manufacturers are now having the status of sub-contractors and are producing orders from customers both within the country and from foreign countries. Most of the customers for these manufacturers already have their products designed, and have them produced in Thailand because of the lower cost of labor in Thailand at present and, in some cases, it was less expensive to sub-contract than set up the production themselves. The sub-contracting manufacturers therefore have no need to design by themselves or minimally have the need for some design transfer only. Another contributive reason for the current practice of copying among the Thai ceramic manufacturers was a historical one -- the superior popularity of imported ceramics over the locally produced ones. As one subject in Questionnaire II stated, only 50% of the products that were originally designed by his designers were saleable in the markets while those that were copied from
imported products commanded almost a 100% sale for his factory. Another significant design practice of the industry was the use of design packages (see Table 22) from foreign countries. It was known that many large scale factories who bought technological know-how from foreign countries have also bought the design packages as well. The result of this practice was the limited demand for designers. As can be seen from data in Table 23 and the detailed characteristics for the desired ceramic designers, the industry has limited confidence in the capability of the present ceramic designers.

3. The design demand from the Thai ceramic industry and its implication on the ceramic design educational institutions:

From Questionnaire I and II, it was clearly seen that respondents in both questionnaire agreed on the idea that the ceramic industry has to improve itself in certain areas. One of the most needed areas of improvement was design. Nonetheless there was more than one area which could be improved with the assistance of capable designers. As it was suggested by the respondents in Questionnaire II for the areas that were needed to be improved, the following are the areas which can be improved substantially by proper design: products' design, decorative patterns and colors, competitiveness of the design of their products in the international markets, the high production cost, defective items and products' designs that are suitable for mass-production, and the quality of the products. First of all it is definite that products' design and decorative patterns and colors can be improved by capable designers who understand about design especially for ceramic products. Part of the improvement of the products' competitiveness in the international markets can be achieved by the
assistance of designers who have some understanding about consumer behavior in the end markets to which the products have to enter. However, understanding consumer behavior alone is uncertain, the designers are required to have understanding about how such markets are operating as well as what are the customs, traditions, competitors, pricing standards and so on. In the area of high production cost, defective items and products' designs that are suitable for mass-production, the improving of this area demanded knowledge about production processes, raw materials' characteristics, production and labor management, suitable designs for production, etc. In the area of the quality of products, this can be improved by a more focused ceramic design education. The designers have to have knowledge about the capability of the factories' machineries, the skills of the workers, the availability of raw materials, etc.

From the data obtained from Questionnaire II, there were a substantial number of respondents from the industry who have an understanding of what can be improved with the assistance of capable designers as they pointed out the characteristics of the desired designers. It is clear that in their improvement they need assistance from designers who can perform research functions in the areas of consumer behavior, market trends; understand industrial production processes; know silk-screen; and so on. Obviously all of the needs for improvement in those areas indicated by the industry will have substantial effect on the ceramic design educational institutions.

Aforementioned in topic number one, at present there is no specific ceramic education curriculum that fits the design demands from the industry. Thus there is the immediate need for these ceramic educational institutions to revise or change their present ceramic education curriculum. Although they have
contributed in providing workforce for the industry such workforce have somehow limited capability in one way or the other. It is anticipated by this study that the demand for ceramic designers from the industry in the near future will favor the designers who have the capabilities and characteristics that were found through the survey of this study. This study through the analysis of data from Questionnaire I and II has pointed to a ceramic design education curriculum which is hopefully to be implemented in the current ceramic education institutions.

4. **The requirements for the ceramic design education curriculum:**

4.1. **The areas of concentration:**

As this study has found from the data collected through Questionnaire I and II, there was general agreement among the two groups of subjects about the areas of concentration for the ceramic design curriculum. The areas of concentration that are most likely to fit the design demand from the ceramic industry would be ceramic design for industrial production; ceramic industrial production processes; consumer behavior; marketing; research and development; manual and technical skills in ceramics; business; communication; management; ceramic raw materials; general design theories and practices; science (chemistry, physics, etc.) and some applicable artistic skills (screen-printing, pattern and graphic design, etc.).

Of all these areas of concentration, the possible subject matter guidelines or courses to be included in the curriculum were selected by their percentage of suggestions surveyed from the ceramic instructors. The subjects are 1) history of
art; 2) history of ceramics; 3) drawing; 4) technical drawing; 5) design fundamentals; 6) world cultures; 7) 2-D design; 8) 3-D design; 9) clay bodies and formulation; 10) glazes formulation; 11) kiln theory and practices; 12) design theories; 13) design workshops (problem solving); 14) tools and equipments in ceramics; 15) ceramic workshops (hand-forming, wheel-throwing, casting, etc.); 16) ceramic decorations; 17) chemistry; 18) industrial ceramics; 19) general psychology; 20) marketing; 21) business and industrial administration; 22) consumer behavior; 23) design research and development theories and practices; 24) advertising; 25) computer-aided design; 26) quality control; 27) plant and production management; 28) packaging design; 29) silk-screen printing. Besides, these suggested subjects, the curriculum has to include subjects in the area of language, science and mathematics, social science and humanities, and others as required by the Ministry of University Affairs (see Appendix C).

4.2. The duration for the ceramic design education curriculum;

As suggested by the larger percentage of the ceramic instructors surveyed the appropriate duration for the ceramic design education curriculum would be four academic years or eight semesters of study. In addition to the eight semesters offer throughout the four academic years of study, it was recognized that professional training in the industry is essential for the students in their preparation for entering the ceramic design field and profession therefore, this study considered using one or more summer semester for such training. The total credit hours for the program is discussed together with the formulation of the program in the following Chapter V.
4.3. The requirements for the degree completion.

Again as the majority of the ceramic instructors surveyed suggested, the appropriate requirements for the degree completion for ceramic design education would be the completion of coursework, examinations, professional training, and an individual thesis. The sequence and the details of the coursework, examinations, professional training and individual thesis are discussed and presented in the following Chapter V.
CHAPTER V
PROGRAM DEVELOPMENT

In developing the ceramic design curriculum, the information from the literature search and the information obtained from the questionnaires were analyzed concurrently. Through the analysis, this study generated guidelines for translating the information into a practical program for implementation in educational institution(s) in Thailand. The guidelines for the program development are presented as follows:

The Criteria for the Program Development: The following concepts were established as the guidelines for the formulation of the instructional program in the field of ceramic design:

1. The curriculum should contain and relate to:
   1.1. Information from the body of knowledge in the field of ceramic design which consists of concepts from the following domains:
       1.1.1. Systematic planning practices.
       1.1.2. Communication practices.
       1.1.3. Manufacturing practices.
   1.2. Information about design applications in the ceramic industry, and the society in general.
   1.3. Information about the "real practices" in the ceramic industry (manufacturers of all scales and methods of production).
   1.4. Information about the relationships between human and design,
design and industry, human and industry, design and society, human and society, human and development, design and development, human and environments, industry and development, industry and society, society to development, and human and human.

1.5. Information about science and technology in the field of ceramic design.

1.6. Technical skills in ceramic production at all levels.

2. To provide the students with the so-called ceramic design training, the curriculum should cover learning through understanding, analyzing, practicing, and experiencing. More importantly, the process of learning should not be limited to the understanding, analyzing, practicing and experiencing of knowledge, technical and manual skills being imparted, but it should also cover information about the utilization of such knowledge and skills. Therefore the structure body of knowledge within the ceramic design curriculum should represent:

2.1. The concepts of ceramic design.

2.2. The utilization of its subject matter in the "real world" applications.

2.3. The application of a systematic approach to the process of systematic planning, the process of communication, and the process of manufacturing in the field of ceramic design.

2.4. The building of necessary technical and manual skills in ceramics.

3. Emphasis should be placed on the understanding of:

3.1. The interrelationships between concepts within the field of ceramic design.
3.2. The interrelationships between design, human, society, industry and the world.

3.3. The relationship between ceramic production techniques and the concepts within the field of ceramic design.

4. Information about ceramic design practices, and applications which are pertinent to the design practices within the five categories of ceramic manufacturers within the country.

Following these guidelines, this study developed the ceramic design curriculum which is presented in the two following parts:

Part I: The Program Structure

Program Objectives: Through the analysis of data obtained from the review of literature (see Chapter II), the survey (see Chapter IV), and from the criteria for curriculum development described in the previous page; a set of objectives was developed. This study divided program objectives into two levels as follows:

Philosophical Objectives: The objective of the program is to produce professional ceramic designers who, upon finishing the program, will become responsible and sensitive to their roles in the development of the Thai ceramic industry, which in turn will assist in the development (social and economic) of the country. The program aims at providing the students with balanced knowledge and skills in both academic and pragmatic aspects of ceramic design, so that the students (graduates) will be capable as well as flexible in performing their design functions as required by the industry, the society, and the country. More
important, these students (graduates) will become active and competitive in the
design communities both nationally and internationally and may take on the
roles of ceramic design educators where there is the demand from the
educational institutions.

Operational Objectives: The objectives are as follows:

1. To describe to the students, design practices and concepts in the
ceramic design field.

2. To emphasize to the students, ceramic design as an integrated body of
knowledge which comprises information from artistic, scientific,
commercial, and technical fields of study.

3. To provide the students with design training in which creativity;
innovation; commercial, economic, and business considerations;
production technological know-how and processes; material
processing and utilization; and research and development practices
are united in a design question and problem-solving process
from which the outcome of the process can be applied toward the
practices in the "real world".

4. To emphasize the interrelationships between the concepts (systematic
planning, communicating, and manufacturing) within the field of
ceramic design.

5. To acquaint the students with the diversity of raw materials, production
processes and techniques which are being used in ceramics.

6. To make the students aware of the influences, requirements, variables
and factors from the consumer, the industry, the society, and so on that
must be considered in the process of design.

7. To investigate the current practices in ceramic design employed by the ceramic industry and the current design demand generated by the ceramic industry, the consumers, and the markets (internally and externally).

8. To provide the students with opportunities to experiment, manipulate, execute, and experience, with the materials, tools, equipment, etc., in ceramics.

9. To provide the students with opportunities to exercise, utilize, and apply the knowledge and skills acquired in the learning process through design problem-solving assignments.

10. To make the students aware of the diversified approaches to design problem-solving from which the variation of design solutions could be achieved.

11. To provide the students with learning activities and exercises from which the students' individual creativity and the habit of using systematic approaches to ceramic design practices could be developed.

12. To make the students aware of the variation of designers' functions and responsibilities and its relationship to the different working requirements, environment and settings (design firms, small factories, large factories, etc.).

13. To provide the students with guidance that navigates the students to develop a sense of design ethics, appreciation, and respect toward ceramic design and other fields of profession, as well as the
professionals within those fields.

14. To impart professional ceramic design knowledge and skills necessary for the students' personal, academic, and professional development, and their transition to become professional ceramic designers capable and prepared for entering the jobs in the field.

15. To present to the students opportunities and information for employment.

16. To emphasize to the students, the importance of scientific and technological development and new information and their relationship to the design practices, production techniques, and so on in the field of ceramics and ceramic design.

17. To emphasize to the students, the learning processes which encourage the students to become active and progressive acquirers of knowledge and skills during and after their academic education.

In the following discussion, the program structure is described. And from the structure, specific recommendations concerning the organization of the program structural elements, and the teaching methods are generated and presented.

**Structural Organization**

The ceramic design education program emphasizes three integrated areas of concentration in the field of ceramic design: Systematic Planning Practices, Communication Practices, and Manufacturing Practices. The rationale behind the selection is based upon the relevant issues which are related to Thailand's economic development needs, the Thai ceramic industry's development needs,
the field of ceramic design (see Chapter II), and the findings from the survey (see Chapter IV) which jointly pointed toward the demand for a designer who is concerned with the practice of analyzing, creating, and developing ceramic products through systematic planning for manufacture with considerations about production costs, marketing, manufacturing, materials, and so on. It is recognized that the emphasis on the three areas of concentration is not yet final and further adjustment is possible, however the three areas selected are considered essential and applicable to the present condition of the Thai ceramic industry, and are within the possibilities of implementation in the existing educational settings.

Under the emphasis of the three areas of concentration, a model for the instructional program in ceramic design has been developed and presented in Figure 4.

**Descriptions of the Program Areas of Emphases**

**Ceramic Design Systematic Planning Practices:** The systematic planning practices area of emphasis within the proposed program in ceramic design are concerned with the identification of the design problem; the research and development processes; data collection, analysis, and synthesis; and the design processes and procedures; all of which relate to the ceramic design field and profession (see Chapter II for details).

The systematic planning area of emphasis will introduce to the students the overview of ceramic design practices (planning and development of ceramic products); the research and development techniques and procedures;
Major Areas of Emphasis

Ceramic Design Systematic Planning Practices
Ceramic Design Communication Practices
Ceramic Design Manufacturing Practices

18 Major Concepts of Ceramic Design Curriculum (see Chapter II)

Program Output: Ceramic Designers

Designer Output and Functions
Ceramic Products and Services

Satisfaction of Human Needs and Wants

FIGURE 4
THE UNDERGRADUATE CERAMIC DESIGN PROGRAM STRUCTURE
information resources; philosophical and psychological issues in relation to design; influential considerations (production, consumer behavior, marketing, human factors, manpower, manufacturer's capability, etc.) affecting designing; the analysis, synthesis, application, and utilization of information (obtained data) in the process of design; the translation of design concepts; and the conceptualization and the execution of the design solutions.

Ceramic Design Communication Practices: The communication practices area of emphasis is concerned with the planning and development of verbal, non-verbal, pictorial, graphical, technical, and linguistic communications in relation to the ceramic design solutions (products and services).

The communication practices area of emphasis will introduce to the students, the encoding and the decoding concepts in the ceramic design communication practices (see Chapter II for details): i.e., the identification of goals and constraints of the communication; the formulation of the communication; the structuring of the communication; the transmission of the communication; the presentation of the communication; the evaluation of the communication; and the revision of the communication.

Ceramic Design Manufacturing Practices: The manufacturing practices area of emphasis is concerned with the planning for manufacturing processes and procedures as applied to the ceramic design solutions (products and services).

The manufacturing practices area of emphasis will introduce to the students the concepts of manufacturing practices in the field of ceramic design:
i.e., the specifications of production; the diffusion and distribution of ceramic products; the evaluation for ceramic products and production processes; the production management; the production processes; and the personnel relations processes (also see Chapter II for details).

The Program Structural Framework

The ceramic design program is proposed as a four year Bachelor of Science degree program. The program has been structured into four levels which are presented as follows:

The Freshman Year Program

The major emphasis of the freshman year program is devoted to the fulfillment of academic requirements and the establishment of the foundation for ceramic design study. The prerequisites for the program of study are: English, mathematics, chemistry, history of art, drawing, technical drawing, and cultural studies.

Within the freshman year, the students take the introductory courses in design and in ceramics: two dimensional design, three dimensional design, and history of ceramics. The two dimensional design, and the three dimensional design courses familiarize the students with the design elements and principles, the rationale of design, and the systematic design processes. The history of ceramics course acquaints the students with an overall view of ceramic history from important periods and sites, and the significant evidences from ceramic production of those sites, and their relationship to design.
The emphases of the introductory courses are placed on the basic understandings about the requirements and functions of the ceramic design profession and field, and on the introduction of the design-related areas of knowledge.

Upon finishing the freshman year, the students are ready for the in-depth study about the field of ceramic design.

The Sophomore Year Program

The emphasis of the second level of the program involves the acquisition of basic knowledges and skills pertinent to the ceramic design activity. The program content of the sophomore year has been structured and organized sequentially to provide the basic information specific to the field of ceramic design. The structural framework of the program during the sophomore year stages the general introduction and the overview of: the eighteen conceptual areas of the ceramic design curriculum (refer to pages 69 through 72); the basic understanding about the relationships between the concepts; the introduction of the basic information about the materials, tools, equipment, machinery, and production processes in ceramics.

The sophomore year program of study also aims at the building of the students' motor skills in ceramic production pertinent to the production techniques within the novelties, household decorative items, and souvenir manufacturers, the wall, floor & mosaic tiles manufacturers, the tableware manufacturers (hand-making, press-mold, wheel-throwing). During this year, the program emphasis is placed on the students' acquisition of knowledge and understanding in the conceptual areas of 1) problem delineation, 2) structuring
an experimental or investigatory plan, 3) information and data collection, 4) information and data analysis, 5) information and data synthesis, 6) preliminary designing, 7) production, 8) encoding the communicative act and/or product, 9) structuring as applied to channel, code, and element, and 10) transmitting.

The program also emphasizes the application of these conceptual elements to the acquired motor skills in ceramic production. The application of conceptual elements of ceramic design practices to the production skills in ceramics provide profound insight about the ceramic design field and profession and also form the basis for further in-depth study. In addition, fundamental courses necessary for providing understandings about ceramic design and ceramic production are introduced. These fundamentals are courses about ceramic materials, tools, equipment, techniques, and material formulation. Furthermore, additional requisites in the areas of ethics, psychology, and behavioral study, have been selected to provide the students with information in those areas which are important in the design processes.

Course about ethics will be designed to acquaint the students with important issues about designer's responsibilities, the acceptable and the unacceptable design practices. Meanwhile, courses in psychology and behavioral study provide the students with information about the psychological considerations about consumers, clients, manufacturer, etc., necessary in the designing of ceramic products. In-depth studies about chemical and physical properties of materials, i.e., clay, glaze are also emphasized. Experimentations will be carried out by student groups to investigate properties, characteristics, and potentials of each ceramic materials.
The Junior Year Program

The junior year program involves the acquisition of intermediate and advanced levels of knowledge and skills common to the field of ceramic design. The junior year program presents higher levels of skills development in ceramic production especially those that concern mechanical production within the wall, floor, & mosaic tiles manufacturers, tableware manufacturers, sanitaryware manufacturers and industrial ceramic manufacturers (slip-casting, mold-making, jiggering, ram-pressing, machine-production techniques). It also emphasizes an extensive study of the eighteen conceptual elements of the ceramic design field and profession. In addition to the emphasis on the acquisition of knowledge and understanding and the application of the ten conceptual areas to the acquired ceramic production skills during the sophomore year program, the junior year program superimposes five more conceptual areas of 1) detail designing, 2) specifying design production, 3) design solution diffusion, 4) production management, and 5) personnel relations.

The course works outside the field of ceramic design are: marketing, computer knowledge, production quality control, management, and criticism. More importantly, the junior year program was arranged to provide the students with opportunities to primarily experience and try out their acquired knowledge and skills in real life settings (ceramic manufactures, design firms, etc.). Higher levels of in-depth studies about chemical and physical characteristics of ceramic materials are emphasized. Experimentations will be assigned to individual students in regard to his/her interest.

The Senior Year Program
Besides economics and research methodology courses which provide the students with a broader sense about design application and its relationship to the economic environment, and the techniques for research work; the senior year program is structured as the final extension and refinement of the common ceramic design knowledge and skills. The structural framework of the program stages the in-depth study of all the eighteen conceptual elements of ceramic design practices. The course work within and outside of the ceramic design discipline becomes interrelated. The program emphasized the application of the cumulative knowledges and skills to the problem of highest complexity (regarding the students' proposal of their individual thesis work). From this the whole spectrum of the knowledge and skills in the ceramic design field and profession can be obtained by the students. The total application of the cumulative knowledges and skills also serves as the reinforcement of knowledge and skills obtained by the students during the four years of studies.

An Undergraduate Ceramic Design Curriculum Model: The Program Structure

The structure of the ceramic design curriculum has been developed to accommodate all the standardized requirements for the Bachelor degree program set by the Ministry of University Affairs (1982) (see Appendix C). The program content includes courses in five areas with specified credit hours as follows:

1. Language 6 credits
2. Science and Mathematics 12 credits
3. Social Science and Humanities 16 credits
4. Major area 99 credits
5. Electives 16 credits

Total 149 credits
Courses in each area are listed below:

**Language required 6 (lecture/Studio) credit hours**

1. English I 3 (3-0) credits
2. English II 3 (3-0) credits

**Science and Mathematics required 12 (lecture/Studio) credit hours**

1. Mathematics 3 (3-0) credits
2. Chemistry I 3 (3-0) credits
3. Chemistry II 3 (3-0) credits
4. Intro. to Computer-Aided Design 3 (3-0) credits

**Social Science and Humanities required 16 (lecture/Studio) credit hours**

1. General Psychology 3 (3-0) credits
2. Design Ethics 3 (3-0) credits
3. History of Art 3 (3-0) credits
4. Criticism 3 (3-0) credits
5. Thai Cultural Heritage 2 (2-0) credits
6. Society and Culture 2 (2-0) credits

**Major Area required 99 (lecture/Studio) credit hours**

1. 2-D Design 3 (2-2) credits
2. 3-D Design 3 (2-2) credits
3. Drawing 3 (1-4) credits
4. Technical Drawing 3 (1-4) credits
5. Introduction to Ceramic Design 3 (1-4) credits
6. History of Ceramics 3 (3-0) credits
7. Ceramic Studio I 4 (0-8) credits
8. Ceramic Studio II 4 (0-8) credits
9. Ceramic Studio III 4 (0-8) credits
10. Ceramic Studio IV 4 (0-8) credits
11. Ceramic Materials & Processing I 2 (2-0) credits
12. Ceramic Materials & Processing II 2 (2-0) credits
13. Clay & Glaze Formulation I 2 (1-2) credits
14. Clay & Glaze Formulation II 2 (1-2) credits
15. Ceramic Tools, Equip., & Machinery 2 (1-2) credits
16. Ceramic Tools, Equip., & Machinery 2 (1-2) credits
17. Kiln & Firing Procedure I 2 (1-2) credits
18. Kiln & Firing Procedure II 2 (1-2) credits
19. Ceramic Design I 3 (1-4) credits
20. Ceramic Design II 3 (1-4) credits
21. Ceramic Design III 3 (1-4) credits
22. Quality Control 3 (3-0) credits
23. Intro. to Production and Operations Management 3 (3-0) credits
24. Marketing 3 (3-0) credits
25. Consumer Behavior 3 (3-0) credits
26. Economics 3 (3-0) credits
27. Research Methodology and Tech. 3 (3-0) credits
28. Independent Study 5 (1-8) credits
29. Ceramic Industry Field Trip 1 (0-2) credits
30. Practical Training 4 (4-0) credits
31. Safety Rules & Regulation 2 (2-0) credits
32. Individual Thesis 10 (0-20) credits

Electives required 16 credit hours. Elective courses have been arranged according to the area of study as follows:

**Language**

1. German I 3 (3-0) credits
2. German II 3 (3-0) credits
3. Chinese I 3 (3-0) credits
4. Chinese II 3 (3-0) credits
5. Japanese I 3 (3-0) credits
6. Japanese II 3 (3-0) credits
7. French I 3 (3-0) credits
8. French II 3 (3-0) credits
9. Spanish I 3 (3-0) credits
10. Spanish II 3 (3-0) credits

**Science and Mathematics**

1. Physics 3 (3-0) credits
2. Basic Geology 3 (3-0) credits
3. Physical Chemistry for Ceramics 3 (3-0) credits
4. Physical Measurement 3 (3-0) credits
5. Computer-Aided Design I 3 (2-2) credits
6. Computer-Aided Design II 3 (2-2) credits
7. Introduction to Comp. Program. 3 (2-2) credits

**Social Science and Humanities**

1. Aesthetics 3 (3-0) credits
2. Promotional strategy 3 (3-0) credits
3. Decision Techniques 3 (3-0) credits
4. Personnel Management 3 (3-0) credits
5. Basic Philosophy 3 (3-0) credits
6. Social Psychology 3 (3-0) credits
7. Industrial Organization and Mana. 3 (3-0) credits
8. Industrial Revolution 2 (2-0) credits

Related Areas of Study  (*required)
1. Advertising Design* 3 (2-2) credits
2. Graphic Design 3 (1-4) credits
3. B/W Photography 3 (1-4) credits
4. Color Photography 3 (1-4) credits
5. Painting 3 (0-6) credits
6. Sculpture 3 (0-6) credits
7. Woodworking 3 (0-6) credits
8. Plastics 3 (0-6) credits
9. Packaging* 3 (2-2) credits
10. Exhibition Design 3 (1-4) credits
11. Glass 3 (0-6) credits
12. Jewelry and Metal Crafts 3 (0-6) credits
13. Printmaking; Stencil and Silksc. 3 (0-6) credits
14. Drawing Anatomy 3 (0-6) credits

Note: See Appendix A for course descriptions:

The proposed program contents relied on the following main factors:
1. In achieving the best result possible in the students' acquisition of
   knowledge and the understanding of how to utilize and apply the
   knowledge in real life, the program's:
   1.1. Courses will be based on the study of the real life cases and
   scenarios rather than on theorized design exercises;
   1.2. Great emphasis is placed upon learning through experiencing and
   execution;
   1.3. Contents, lessons, and assignments for courses in design theory and
   studio practices will be jointly developed and delivered so that
   theoretical knowledge learned can be applied directly and
   appropriately in practices;
2. Courses in related areas, for example, marketing, management, science, economics, and so on are offered on the inter-departmental basis within the university, college, or institution. The emphases of the courses will be placed on their application to the ceramic design field and profession;

3. The process of learning is based primarily on the continuation of courses throughout the academic years.

4. Students are allowed a substantial amount of time during the course of studies to enroll in the courses (elective) which are specific to their own personal interests.

5. Upon finishing the course of studies the students will be ready for entry-level employment within the ceramic industry, or design firm, and be able to further their education in the higher level. The students (upon finishing the course) will have:

5.1. The ability to define problems, variables and design requirements;

5.2. The ability to conceptualize and evaluate design alternatives;

5.3. The ability to test and refine design solutions;

5.4. The ability to communicate effectively (with clients, consumer, manufacturers, colleagues, worker, etc.);

5.5. The ability to perform research tasks, gather and analyze information and apply the obtained data to the designing;

5.6. The skills in developing ceramic products;

5.7. The knowledge of how things work;

5.8. The knowledge of how to make things work better for people;

5.9. The knowledge of how ideas can be presented using common tools of the profession;
### TABLE 27

**A Proposed Undergraduate Program Event Plan**

<table>
<thead>
<tr>
<th>First Year</th>
<th>Hour/Week</th>
</tr>
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<tbody>
<tr>
<td><strong>First Semester</strong></td>
<td><strong>credits</strong></td>
</tr>
<tr>
<td>1. English I</td>
<td>3</td>
</tr>
<tr>
<td>2. Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>3. 2-D Design</td>
<td>3</td>
</tr>
<tr>
<td>4. Drawing</td>
<td>3</td>
</tr>
<tr>
<td>5. History of Art</td>
<td>3</td>
</tr>
<tr>
<td>6. Chemistry I</td>
<td>3</td>
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<td>7. Thai Cultural Heritage</td>
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<table>
<thead>
<tr>
<th>First Year</th>
<th>Hour/Week</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Second Semester</strong></td>
<td><strong>credits</strong></td>
</tr>
<tr>
<td>1. English II</td>
<td>3</td>
</tr>
<tr>
<td>2. Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>3. 3-D Design</td>
<td>3</td>
</tr>
<tr>
<td>4. Technical Drawing</td>
<td>3</td>
</tr>
<tr>
<td>5. History of Ceramics</td>
<td>3</td>
</tr>
<tr>
<td>6. Society and Culture</td>
<td>2</td>
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<tr>
<td>7. Elective</td>
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<tr>
<td><strong>Total</strong></td>
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</table>
TABLE 27 (cont.)

A Proposed Undergraduate Program Event Plan

<table>
<thead>
<tr>
<th>First Semester</th>
<th>credits</th>
<th>lecture</th>
<th>studio</th>
</tr>
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<tbody>
<tr>
<td>1. Ceramic Materials and Processing I</td>
<td>2</td>
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<tr>
<td>2. Ceramic Tools, Equipment, &amp; Mach. I</td>
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<td>1</td>
<td>2</td>
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<tr>
<td>3. Design Ethics</td>
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<tr>
<td>4. Ceramic Studio I</td>
<td>4</td>
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<td>8</td>
</tr>
<tr>
<td>5. Introduction to Ceramic Design</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>6. General Psychology</td>
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<tr>
<td>7. Consumer Behavior</td>
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<th>credits</th>
<th>lecture</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1. Ceramic Materials and Proce. II</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>2. Ceramic Tools, Equip., &amp; Mach. II</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3. Ceramic Studio II</td>
<td>4</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>4. Ceramic Design I</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>5. Clay and Glaze Formulation I</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>6. Kiln &amp; Firing Procedure I</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>7. Safety Rules and Regulations</td>
<td>2</td>
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<tr>
<td>8. Elective</td>
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<td>0-2</td>
<td>0-4</td>
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# TABLE 27 (cont.)

A Proposed Undergraduate Program Event Plan

<table>
<thead>
<tr>
<th>Third Year</th>
<th>Hour/Week</th>
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</thead>
<tbody>
<tr>
<td><strong>First Semester</strong></td>
<td>credits</td>
</tr>
<tr>
<td>1. Kiln and Firing Procedure II</td>
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<tr>
<td>2. Clay and Glaze Formulation II</td>
<td>2</td>
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<tr>
<td>3. Introduction to Computer-Aided Des.</td>
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<tr>
<td>4. Ceramic Studio III</td>
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<tr>
<td>5. Ceramic Design II</td>
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<tr>
<td>6. Quality Control</td>
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<td>7. Elective</td>
<td>3</td>
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<tr>
<td><strong>Total</strong></td>
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<table>
<thead>
<tr>
<th>Third Year</th>
<th>Hour/Week</th>
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</thead>
<tbody>
<tr>
<td><strong>Second Semester</strong></td>
<td>credits</td>
</tr>
<tr>
<td>1. Ceramic Studio IV</td>
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</tr>
<tr>
<td>2. Ceramic Design III</td>
<td>3</td>
</tr>
<tr>
<td>3. Marketing</td>
<td>3</td>
</tr>
<tr>
<td>4. Intro. to Production and Operations Management</td>
<td>3</td>
</tr>
<tr>
<td>5. Criticism</td>
<td>3</td>
</tr>
<tr>
<td>6. Elective</td>
<td>3</td>
</tr>
<tr>
<td>7. Practical Training (Summer)</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>23</td>
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</table>
TABLE 27 (cont.)
A Proposed Undergraduate Program Event Plan

<table>
<thead>
<tr>
<th>Fourth Year</th>
<th>Hour/Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Semester</td>
<td>credits</td>
</tr>
<tr>
<td>1. Independent Study</td>
<td>5</td>
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<tr>
<td>2. Ceramic Industry Field Trip</td>
<td>1</td>
</tr>
<tr>
<td>3. Research Methodology and Tech.</td>
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</tr>
<tr>
<td>4. Economics</td>
<td>3</td>
</tr>
<tr>
<td>5. Elective</td>
<td>2</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>14</strong></td>
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</table>

<table>
<thead>
<tr>
<th>Fourth Year</th>
<th>Hour/Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second Semester</td>
<td>credits</td>
</tr>
<tr>
<td>1. Individual Thesis</td>
<td>10</td>
</tr>
<tr>
<td>2. Elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>13</strong></td>
</tr>
</tbody>
</table>

5.10. The knowledge of what makes things look good;
5.11. The knowledge of basic professional practices in the ceramic design field and profession;
5.12. The knowledge of ceramic material processing;
5.13. The knowledge of ceramic manufacturing practices;
5.14. The knowledge of basic industrial business practices.

The program event plan which is the outcome of the structure and objectives of the proposed program is presented in Table 27.

Part II: Implementation

It is anticipated that the proposed program will be used in the development of the future ceramic design curriculum to be implemented as an independent discipline in the existing educational institutions. It was found that the ceramic industry demands more capable designers who are better-trained and well-equipped with specialized knowledge and skills within the field of ceramics and ceramic design. However, it is also intended that the proposed ceramic design education program will be used as the guidelines for the revision of the current ceramic design education in some of the existing educational institutions. The following considerations are essential to facilitate the implementation.

Consideration of the Educational Institution:

As the structure and objectives of the proposed program were established and as it was required by the Ministry of University Affair, it is important that the educational institution in which the undergraduate program in ceramic design is to be implemented provides full spectrum education in the areas of: Language, Science and Mathematics, Social Science and Humanities, and the Major Area. It is intended that the contents of the program are developed and delivered by
educators and professionals in different areas so that the students could achieve academic and professional development on the broadest bases. This study also recognized the importance of both inter-university (college) and intra-universities (colleges) collaboration in order to optimized the success of the program of study since there are limitations in many areas, for example, personnel, financial, facilities, and so on in most of the universities and colleges in Thailand.

Considerations of the Implementation:

Although the proposed program was developed to be implemented as an independent ceramic design curriculum in a new established environment, it is acknowledged that there will be occasions in which the proposed program will be offered as an extension of the previously implemented ceramic education. In such cases, it is expected there will be changes which have to be made in the current institutions to accommodate the implementation. With great concern, it is advised that the implementation is to be taken methodically and conformingly to the existing ceramic education curriculum. It is recommended that the changes in course structure are to be gradually taken place. Courses in the existing curriculum should be evaluated and adjusted for compatibility. During the first few years of implementation courses in the old and the new curriculum should be offered simultaneously. In case there is overlapping information between courses, it is advised that new information is to be added to the old courses until the previous classes of students (prior to the implementation) finish their course of studies.

Considerations at Policy Level:
Admission Policy: Applicants to the program must:

1. Have completed upper secondary (high school) education or hold educational certificates equivalent to or higher than upper secondary education as approved by the Ministry of Education and the Ministry of University Affairs;

2. Meet the requirements for entering university or college education as described in the rules and regulations mandated by the Bureau of State University;

3. Pass the entrance examination administered by the Bureau of State University or by the particular educational institution (under the rules and regulation of the Ministry of Education);

4. Pass the screening processes as required by the particular educational institution;

5. Have the qualifications specified by the particular educational institution in its criteria for admission to the program or the department.

Enrollment Policy: The number of student to be enrolled are subject to the capacity of each educational institution. However, this study considered the quality of the education or the training to be the most important issue in the policy for enrollment. It is recommended that the educational institution establishes a strictly limited number of admissions so that efficient teaching could be achieved. In order to achieve such a goal in teaching it is advisable that physical facilities, for example, tools, equipment (kilns, throwing wheels, etc.), space, and teaching personnel are thoroughly checked for availability and suitability. Due to the nature of the program which requires close personal contact between instructors
and students, the number of students should not exceed the ability of the instructors to provide attention, especially in studio courses. In the area of teaching personnel, it is advised that the existing teaching staffs are given specific guidelines for the changes; and in-service training, seminars, or conferences should be provided so that the adjustments among the teaching staffs in terms of their teaching materials, methods, and contents can be consistent and conform to the new curriculum.

Consideration of Teaching Methods: As the objectives of the proposed program are not simply to impart knowledge but also to train the students to understand how to utilize such knowledge in industries through professional applications, active participation of the students and the time allotment for courses which allow the students sufficient time for in-depth study of their subjects are the most important criteria in selecting the teaching method. The students' attention in the learning process should also be given careful consideration. Courses should be arranged in such a manner that they do not require the students to absorb too many subjects during a period of time so that the distraction causing the students to pay less attention to the learning and the acquisition of knowledge could be minimized. Therefore it is advised that a maximum of two subjects should be the arrangement for one school day for lecture courses, and a maximum of one subject for studio courses. From the stated objectives, the goal of the proposed program is to educate and prepare the students for entering the field of ceramic design from which the students or the graduates are required to work as part of a team with subordinates and/or superiors. Therefore it is important that the teaching methods allow the students to be familiarized with a team-working
environment and circumstances. From the above considerations, it is recommended that subjects or courses should be arranged in the way that each of them complement the learning process of the others. It is advised that the relationship between theoretical knowledge and its practical application is stressed and should be the basis in the development of the instructional materials or units from which the students are given or assigned projects or works.

In addition, it is also recommended that in courses where teaching requires both lecture and studio sessions, the instructors should be available during both sessions to make sure that the theoretical knowledge delivered during the lecture session has been correctly applied by the students in the studio session. Besides lecture and studio sessions, it is important the teaching methods encourage the students to view personal research and study through reading. Lecture courses should be supplemented by the study of reading materials. Furthermore, it is important that the units of instruction as well as objectives and goals of the teaching for each course are drawn and given to the students.

More importantly, it is advised that practitioners in the ceramic design field and profession from industry, design firms, marketing and advertising company, research and development firms and offices are invited to contribute their perspectives, experiences, as well as insight about the field and professions. This will increase the effectiveness of the program and will benefit students tremendously as sources of inspiration, employment opportunities information, guidelines, etc.
Consideration of the Supervision of Students’ Achievement: It is one of the proposed program’s objectives to prepare the students for their future functions in the ceramic design profession and in the ceramic industry. It is vital that the knowledge and skills imparted were absorbed by the students at a measured level of performance which is acceptable and applicable for entrance and practice in the ceramic design field and profession (it is recommended for studio courses that criteria for evaluation are set in accordance to the nature of each project or assignment (i.e., research work, problem solving procedure, communication and presentation (drafting, model making, etc.) of work, end products). As for lecture courses, comprehensive examinations reflecting contents, concepts and subject matter should be arranged and given the students from which the students’ understanding and ability will be evaluated). This means that the students’ capability, achievement, and works are constantly tested throughout their academic life. Written examinations must be held at the end of each semester or upon the completion of each subject or course which requires this type of examination. In addition, for some courses (lecture/studio or studio types), written examinations and the evaluation of students’ performance in their project or assignment works are to be supplemented or even replaced by close supervision of teaching staff. In courses where students’ achievement is to be measured on their capability to utilize, apply, and manipulate both theoretical and practical knowledge and skills in the execution of assignments, projects, and works; the teaching staff should establish the criteria of standards (i.e., the ability to apply theories in to practices, originality, imagination, creativity, ability to solve design problem, the ability to diversify design solutions, motor skills, etc.) for measuring the students’ performance. By using such criteria for the students to
monitor their performance, the students must work constantly and effectively. And such criteria will create working discipline from which the students are encouraged to steadily improve and update their ability, knowledge, and performance.

It is advised that the criteria of standards are strictly followed and at any time the students whose performance do not meet the criteria of standards must be required to finish, perform, or take extra work or examinations. And from the outcome of the extra work or examinations, the students will be allowed to continue with their course of studies. It is also considered by this study that both the methods of measuring by using written examinations and the supervision of students' achievement be finalized into the grade system (to be used as the descriptive report of the students' performance). Finally, it is very important that the results of the measurement of the students' performance are to be used in the evaluation and revision of the program objectives, content, and instruction.

**Further considerations of Program Evaluation** This study also proposed a more formal evaluation schema as presented by Gysler (1972). The evaluation involves two interrelated forms of independent assessment: "the formative evaluation" and "the summative evaluation" (for details see Chapter II, Figure 3).
CHAPTER VI
GUIDELINES FOR FUTURE RESEARCH
AND CONCLUSION

Guidelines for Future Research

It was acknowledged that the presentation of research findings and their results in this study should not be considered to be final or complete. Following are the recommendations for topics that have been identified as demanding further development and requiring advanced knowledge.

Evaluation of the physical facilities: The proposed program was developed based on the estimated availability of the current physical facilities for undergraduate programs in ceramic design in the existing educational institutions which, in most cases, seem to be adequate. However, there was a lack of in-depth study about the effectiveness and the appropriateness of such physical facilities in terms of their functions as demanded by the educational contents of the ceramic design curriculum. As there is constant improvement in production technology and equipment in the ceramic industry, the effectiveness and the appropriateness of the currently available facilities will be questioned; therefore, future research about the types, amounts, etc. of the physical facilities is required as well as the research about the appropriate amount of budget, finances, and supplies.
Evaluation of the education of the teaching personnel: As the data from Questionnaire I indicated, at present, the teaching personnel in ceramic educational institutions have various educational backgrounds; from art education, architecture, industrial design, fine arts, to ceramic engineering (see page 81). It is recognized that each area of education these instructors received in many ways have different emphases (scientific, artistic, crafts, etc.) regarding their relation to ceramic production. From this it is assumed that each instructor has a different approach to the subject matter of ceramic design, it is also assumed that the educational background each instructor received affected significantly the effectiveness of the ceramic design education program. Therefore it is recommended that research about the education of the personnel (for recruitment purpose) is to be done so that greater program effectiveness can be achieved.

Assessment of design needs: The design needs presented in this study were based largely on the assessment of design needs from the manufacturers surveyed. A more extensive survey is deemed necessary. More of such surveys should be taken on a regional basis, covering widespread areas of the country. Such surveys should also be conducted on the detailed basis specific to the type, scale, and capacity of ceramic production.

Assessment of job opportunities and level of labor absorption of the ceramic industry: Job opportunities as well as the level of absorption for design manpower among the ceramic manufacturers need to be estimated so that the
employment qualifications of ceramic designers can be established in further detail.

**Evaluation of program contents:** The proposed program development was based largely on the research findings through the surveys and the literature search. Contents of the program were structured as deemed necessary and appropriate from these findings. It was understood that there may be courses which are redundant and unnecessary for education in the ceramic design field and profession, and there also are many courses or subjects in other areas which are applicable to the ceramic design field and profession. Therefore, an on-going evaluation of the contents for ceramic design educational program should be conducted to further determine and adjust the effectiveness of such programs.

**Conclusion:**

**On the issue of influences:** The proposed program was developed to be implemented in Thailand and was based largely upon the need assessment of the Thai ceramic industry. The structure of the program was designed to be compatible with the current demands from the ceramic industry, the National Economic and Social Development Plan, the current condition of the educational institutions, and the Ministry of University Affairs' guidelines for undergraduate education, all of which are subject to changes due to involving influences in the foreseeable future. Even with the great concerns that were put into the development of the proposed program so that its flexibility, adaptability, and
compatibility to changes could be optimized, it is recognized that Thailand's educational development has been closely tied to the changing social and economic development strategies. As it was found in the review of literature, the changes in the ceramic education curriculum contents have been significantly shaped, directed and derived from the economic and social development needs of Thailand. At present, productive and capable manpower is called upon to serve the industrial expansion, therefore it seems that ceramic design programs which are geared toward producing such manpower is appropriate. But under the circumstance of such changes which may occur in the future and may change the direction of development of Thailand, assessment, evaluation, and the re-structuring of the proposed program will be needed to ensure its effectiveness.

Other important influences on the success of the proposed program are the changes in scientific and technological development, and the economic and social development strategies. This study concluded that as Thailand is developing toward greater industrialization, scientific and technological development is becoming a more important component in the nation's economic and social development strategies. Therefore, ceramic designers must play an active role and be readied for the changes in these scientific and technological developments as well as the economic and social development strategies. It is very important that the ceramic design curriculum prepare the designers for such an active role.

Furthermore, under the circumstance in which the proposed ceramic design education program is to be implemented it is fully comprehended that it (the curriculum) will become subject to scrutiny. Examinations, assessments,
evaluations, will be done by the Bureau of State Universities, the Ministry of University Affairs, as well as universities and colleges in which the curriculum will be used. Therefore, the outcomes of the examinations, assessments, and evaluations from these responsible offices will be influential in pointing out new directions and guidelines for changes and revisions for the proposed program.

On the importance of design and the role of the ceramic designer: At present, ceramic designers are playing a very small role in the well-being and the development of the ceramic industry and the nation's economy. The importance of design in ceramic production and the functions of ceramic designers are not being recognized. As suggested by ceramic design educators surveyed in this study (see pp. 92-93), there are specific improvements which are needed:

1. The public and the industry's awareness about the importance of design has to be raised. Consumer as well as producer (the industry) alike must be educated or notified about their benefits obtainable from greater attention on design (better products, salability, cost-effective, and so on).

2. The ceramic designers must increase their commitments to the process of design and production. The welfare of the consumer is to be prioritized as well as the well-being of the producer (the industry). The ceramic designers must take pride in their profession and make an effort in encouraging the public and the industry to state their demands for better designed products.

3. The ceramic designers must make an effort to gain recognition of their
profession by the industry and the public at large.

**On the history of ceramic design education in Thailand:** Throughout the rather short history of ceramic design education in Thailand, the trend is evolving toward a more demanding curriculum (see Chapter II; pp. 46-50). Since its first implementation in 1962, ceramic design education (college level) has slowly changed from a program with crafts, and/or the fine and applied art bases, to a program with greater relationship to scientific and technological areas of study. From the growing and the changing demands (from the industry and the economic development needs) of the country that were placed on the future ceramic designers, it is clearly seen that future ceramic design education will be developed further as a rational and systematic area of inquiry and there will be a constant demand for changes in the development of objectives for each ceramic design education curriculum.

**On the field of ceramic design:** In developing the proposed ceramic design program, this study made a rather cursory delineation of the ceramic design practices from the industrial design practices. Through literature review, this study found that there has not yet been a general consensus about the practices within the field of industrial design. Therefore the ceramic design practices as delineated from the field of industrial design and described in this study should not be considered as definitive. This study also fully recognized the diversified interpretations and definitions about the field of industrial design and has made a careful attempt to identify the very basic practices which are deemed acceptable, applicable, and suitable for the ceramic design field and profession.
And as the significant parts of the proposed ceramic design program were developed according to the opinions of practitioners within the ceramic industry and the ceramic educational institutions which expressed their views in regarding to the development and well-being of the Thai ceramic industry, it was further recognized that the ceramic design practices described in the proposed program structure were appropriate and applicable only to this study. Nevertheless, it has been demonstrated that ceramic design field and profession is an integrated discipline which embodies practical and theoretical information about design, science and technology, and other related areas of studies (marketing, business, psychology, etc.). At present, design education for ceramics is not structured in ways to recognize the strengths of the discipline. Some of the ceramic design education curriculums lack emphases about material processing aspects of ceramic design, some ignore concerns about the commercial aspects of ceramic design practices and focus only on the building of manual skills in ceramic production. From these it has been seen that as the production practices within the industry become more and more complex, the present ceramic design education curriculums will become more and more ineffective. The curriculum created in this study is meant to address current and future needs. However, it is also recognized by this study that the generation of the so-called "effective ceramic design curriculum" is not at all feasible, and/or achievable if there is no shared effort and mutual agreement among the design educators, design theorists, designers, industrialists, economists, technicians, and concerned government officers.
On the fields of ceramic education: As this study began with the fact that ceramic production has begun as early as 10,000 years ago, ceramic products will continue to be an important part of human civilization. Ceramics as material at present can be made into a wide variety of products ranging from tiles, plates, art objects, engine components, to protective shields for space crafts, etc. From the ceramic products of the Ban Chiang period to ceramic products of the Sukhothai period, and to the present day, ceramic products of Thailand and other countries of the world involve a wide array of processes, styles, techniques, methods, tools and equipment. It is true that ceramic production techniques have been developed and advanced tremendously, but it is also true that the primitive techniques used by people of the Ban Chiang period are still in use in Thailand and in many areas around the world. It is true that automatic and mechanized ceramic production techniques can efficiently produce a massive amount of ceramic products each day, but it is also true that such production can not be viewed as necessarily better than the hand production. It is recognized by this study that each piece of ceramic product no matter how it was produced, has its own integrity and deserves to be valued in its own right. Such a piece of ceramic product should be valued in terms of the effective executions of material, shape, form, decoration, function, design, etc. The type of production technique at the same time also needs to be judged and determined in terms of its appropriateness and suitability to the seeking end results (products).

Besides the diverse types of ceramic production and products, ceramic education in the world today also varies significantly from programs in the fine arts, art education, industrial design, to scientific and engineering areas. Each type of ceramic education delivers different information about ceramics. Each
type of ceramic education covers different portions of knowledge and understanding about ceramics as a general field of studies. Each type of education also has different goals for producing graduates for different areas of work in the field of ceramics. And as each piece of ceramic product, and each type of production technique are being valued in their own rights, ceramic education in each different form should also be evaluated in terms of its own objectives and purposes. Ceramic education curriculums in different countries in different parts of the world differ from each other based on the fact that each curriculum is developed on the basis of what has been called for by needs, requirements and goals for the country and the educational institution in which such curriculum is to be implemented. Therefore, it is very important that the ceramic education curriculum of different types are to be valued by their effectiveness in the serving needs and requirements of their people.
BIBLIOGRAPHY


Course Descriptions: Descriptions of courses presented below are obtained from current ceramic education curriculums in Thailand and are not considered finals. These descriptions are used to provide the guidelines for which each course is to be developed. It is fully recognized that content of each subject may be different from what described below for the reason that the subject must be developed in such a way that it compliment the learning and the acquisition of knowledge in the field of ceramic design and profession.

1. English I: 3 (3-0) credits
   Basic reading and writing in English. Training in reading and writing designed to prepare students for communicating in English, and their future program of studies.

2. English II: 3 (3-0) credits
   Sequence of English I with additional emphasis on basic conversation skills in English.

3. Mathematics: 3 (3-0) credits
   Basic course in mathematics discussing sets; in equalities; relations and functions; graph; limit; continuity of function; differential; integration; deterrment; and matrices. Training designed to prepare students for the calculation of clay and glaze formulation, and other calculation.

4. Chemistry I: 3 (3-0) credits
   An overview of chemical properties of ceramic raw material with emphasis on clay.

5. Chemistry II: 3 (3-0) credits
   Sequence of Chemistry I with emphasis on chemical properties of glazes, slips, and other decorative materials.

6. Physics: 3 (3-0) credits
   An overview of physical properties of ceramic material such as structure, surfaces, atomic mobility, grain growth, sintering, vitrification, molecular formation.

7. Society and Culture: 2 (2-0) credits
   A study of man in relation to his social environment with specific implications for social structure and cultural identity. The study covers communication technique, the routine activity, the social orders which comprise of educational, economic, and political systems.
8. General Psychology: 3 (3-0) credits
   An overview of information pertaining to man's psychological and
   behavioral contents and his reactions based on the effect of perception
   and learning through period of living.

9. History of Art: 3 (3-0) credits
   An exposure to whole range of art history from prehistoric period to
   modern and contemporary periods. Study will cover the meaning of art,
   reason for artistic productivity, influences from environments, aesthetics
   qualities of different art works.

10. History of Ceramic: 3 (3-0) credits
    An overview of world ceramic history from prehistoric period to
    modern and contemporary periods. Study will cover the origins, characteristics,
    materials, techniques, functions, cultural influences, and aesthetics
    qualities concerning selected ceramic products from various times and
    places.

11. Thai Cultural Heritage: 2 (2-0) credits
    An overview of historical contexts of products, materials, cultural
    development with emphasis on Thai traditional art works such as
    Architecture, Crafts, and Classical Arts.

12. Industrial Revolution: 2 (2-0) credits
    A descriptive study of the scientific and technological changes that marked
    the beginning of modern civilization. Specific historical evidences of
    revolution in ceramic industry, crafts and arts. Cases study of European,
    American, Japanese as well as Thai changes in the courses of their
    industrial revolution.

13. Basic Philosophy: 3 (3-0) credits
    Main problems of philosophy in epistemology, metaphysics and ethics.
    Classical work of Plato, Descartes, Hume, and others. Study also covers
    modern philosophy, for example, positivism, pragmatism, existentialism,
    and so on.

14. Ethics: 3 (3-0) credits
    Study of nature of morality, the meaning of right and wrong, and the
    grounds of moral obligation. Include in the discussions are the problem of
    free will and determinism and the relation of science, business and the
    professions to ethics. Cases study, as well as classic and contemporary
    texts are used.

15. Criticism: 3 (3-0) credits
    Emphasis is placed on looking at and analyzing design of ceramic
    products with the idea of developing critical ability.
16. 2-D Design: 3 (1-4) credits
Comprehensive study about the principles of design by using point, line, shape, texture and color in a variety of media. Course is designed to focus the students on the mastery of 2-D forms with emphasis on interaction of elements, spatial illusion, and coherent pattern.

17. 3-D Design: 3 (1-4) credits
Exploration of physical and visual properties of 3-D forms, with the use of elements from 2-D course combine with the using of ground, plane, space and forms. Course focus on the development of skills and techniques in working materials. Projects deal with conceptualization, visualization, perception, organization, and utilization of elements.

18. Drawing: 3 (0-6) credits
Techniques and skills development for drawing with the use of basic materials such as pencil, charcoal, pen and range of paper. Study focuses on conceptual and perceptual drawing.

19. Technical Drawing: 3 (0-6) credits
Lectures and exercises in basic principles of orthographic drawing. Drawing techniques using multi-view projections to describe and specify detail, form, dimension, materials, and/or mechanism.

20. Introduction to Ceramic Design: 3 (1-4) credits
Introduction to the rationale of design and systematic design processes; an overview of the profession of ceramic design. Introduction to the theories, methods, and practices of ceramic design. An overview to the ceramic design educational program.

21. Ceramic Studio I: 4 (0-8) credits
Studio activities and projects deal with the mastery of skills and techniques of forming ceramic products using, coiling, slab, and hand-building methods. Appropriate glazing, decoration, and firing methods are taught.

22. Ceramic Studio II: 4 (0-8) credits
Studio activities and projects deal with the mastery of skills and techniques of forming ceramic products using wheel-throwing method. Technical advantages and disadvantages are discussed in relation to design and production. Appropriate glazing, decoration, and firing methods are taught.

23. Ceramic Studio III: 4 (0-8) credits
Studio activities and projects deal with the mastery of skills and techniques of forming ceramic products using slip-casting, various molding methods. Practices in various mold-making techniques and
exercises as well as technical advantages and disadvantages are discussed in relation to design and production. Appropriate glazing, decoration, and firing methods are taught.

24. Ceramic Studio IV: 4 (0-8) credits
   Studio activities and projects deal with the mastery of skills and techniques of forming ceramic products using jiggering, ram-pressing, and other mass production techniques. Technical advantages and disadvantages are discussed in relation to design and production. Similar to Ceramic Studio II, and III, projects are assigned in conjunction with design training from Ceramic Design (I-III) courses and appropriate glazing, decoration, and firing methods are taught.

25. Ceramic Material and Processing I: 2 (2-0) credits
   Lectures on properties of clay. Discussion on the qualitative properties of each clay formulae which are relevant to the ultimate selection of material for ceramic products design and manufacturing.

26. Ceramic Material and Processing II: 2 (2-0) credits
   Lectures on properties of glazes, and other decorative compounds. Discussion on the qualitative properties of each compound which are relevant to the ultimate selection of material for ceramic products design and manufacturing.

27. Ceramic Tools, Equipment, and Machinery I: 2 (1-2) credits
   Lectures involve in various types of tools, equipment, and machinery used in ceramic production of various scales. Emphasis on the appropriate and effective use of such items as well as maintenance.

28. Ceramic Tools, Equipment, and Machinery II: 2 (1-2) credits
   An extension of Ceramic Tools, Equipment, and Machinery I.

29. Clay and Glaze Formulation I: 2 (1-2) credits
   Beginning study of material characteristics both physical and chemical. Experimentation and laboratory activities with different clay bodies, and glazes formulation with major emphasis on small scale ceramic production.

30. Clay and Glaze Formulation II: 2 (1-2) credits
   Continuation of Clay and Glaze Formulation I with more emphasis on clay bodies and glazes formulation for larger scale of ceramic (industrial) production.

31. Introduction to Computer-Aided Design: 3 (2-2) credits
   Introduction to usage and development of computer graphics techniques in two and three dimensions as they apply to design, technical drafting, presentation, and communication.
32. Ceramic Design I: 3 (1-4) credits
A basic ceramic design course which involves practical application of
design theories for the systematic planning and designing of ceramic
products. The course emphasizes the students' awareness and sensitivity
in his creation for both the manufacturer's and end-user's needs. Design
projects are assigned in conjunction with studio activities in Ceramic
Studio II course.

33. Ceramic Design II: 3 (1-4) credits
An intermediate ceramic design course which is aimed at teaching the
students the essences of a well-design ceramic products. Exercises
include the design and development of ceramic products for the semi-
mass production with emphasis on pre-processing, processing, and post
processing planning for small to medium scale ceramic productions.
Projects are assigned in conjunction with studio activities in Ceramic
Studio III course.

34. Ceramic Design III: 3 (1-4) credits
Sequence of Ceramic Design II with the emphasis on mass-production of
ceramic products and systematic design and planning for the large scale
(industrial) ceramic productions. Projects are also assigned in
conjunction with studio activities in Ceramic Studio IV course.

35. Computer-Aided Design I: 3 (2-2) credits
Emphasis on two dimensional drafting by using computer-aided design
software. Students learn to use the software in design, technical drafting,
presentation, and communication on the micro-computer system.

36. Computer-Aided Design II: 3 (2-2) credits
Emphasis on three dimensional drafting, image generation, rendering,
and animation by using computer-aided design software.

37. Introduction to Computer Programming: 3 (1-4) credits
Introduction to programming; lab experience with computers; emphasis on
design application. Overview of computer languages used in
programming for computer graphics and animation.

38. Quality Control: 3 (1-4) credits
Study of theories and practices of quality control in industrial ceramic
manufacturing systems and settings. Application of probability theory,
statistics, and control theory of problems and products inspection and
process control; economic evaluation of quality control techniques.

39. Intro. to Production and Operations Management: 3 (3-0) credits
Topics in the design and operation of a productive system, topics include
product design, layout, location, capacity management, quality
management, production planning, master scheduling, material requirements planning, and management techniques.

40. Marketing: 3 (3-0) credits
A study of business man's role in the awareness of marketing activities, the structure and the institution of marketing for a fundamental basis of successful bidding and service operations that satisfy the market demands. This course is designed with marketing practices of ceramic production as a basis and consists of the following topics: the role and nature of marketing as oppose to business organization; contemporary marketing concepts; marketing sectors; selecting of goods and services; wholesaling activities; institutions of marketing; trends; fluctuation; product pricing and sales promotion policies.

41. Consumer Behavior: 3 (3-0) credits
A review and synthesis of behavioral sciences applied to understanding consumer decision process; emphasis on the impact of consumer decisions upon the strategies of business, government, industry, and consumer business cases.

42. Economics: 3 (3-0) credits
Study of economic concepts basic to a wide range of social problem; application of these principles to understanding economic activity in firms, industries, households and the economy.

43. Research Methodology and Techniques: 3 (3-0) credits
Introductory study of research process, and value of research to designers, design, and production. Emphasis on the role of research in the solution to design problems, data analysis and methods of the field of investigation.

44. Independent Study: 5 (1-8) credits
Individual research and survey of selected area in preparation for Thesis work within the field of ceramics. A development of specific studies design by each student with assistance of selected instructor. Individual student project; to demonstrate proficiency and grasp of previous subject matter in a project approved by the selected instructor.

45. Ceramic Industry Field Trips: 1 (0-2) credits
A first-hand look and observation at the country's range of small to large scale ceramic manufacturers. The trips focus on identifying the varied manufacturing techniques and locating the sources of materials being used in the industry and the country.

46. Practical Training: 4 (4-0) credits
A given opportunity for graduating students to measure their own potential and to experience the implication of having to work in a real-life situation.
Students will be responsible for a given assignment, while they must learn to work systematically with their colleagues in the factory, company, or firm. Presenting their design solutions to the manufacturing company and accepting objective criticism and evaluation are the highlights of the training. This course is also designed to give the students the first-hand information on employment opportunities.

47. Safety Rules and Regulations: 2 (2-0) credits
Safety instructions regarding tools, equipment, machinery operations. Instructions on safety rules and regulations toward the use of materials (toxic, health-hazardous chemistry) in the field of ceramics. Preventive instructions regarding manufacturing processes as well as studio practices.

48. Individual Thesis: 10 (0-20) credits
A culmination of undergraduate works. An opportunity for the students to select, conduct, and follow-through a project of his/her particular interest. Among the required preliminaries are the conduct of extensive research, development and experimentation. The collected data are to be analyzed, evaluated, then approved by the consulting Thesis Advisory committee before each proceeding steps. Final presentation which is composed of two and three dimensional end-products which represent a highly refined expression of the individual, and a culmination of his/her talent and creativity. As partial requirement of the requirement for the given degree, all thesis work exhibitions must be arranged by the graduating class.

49. German I: 3 (3-0) credits
Development of aural comprehension, speaking, reading, and writing skills in German.

50. German II: 3 (3-0) credits
Sequence of German I.

51. Chinese I: 3 (3-0) credits
Basic elements of Mandarin Chinese; the four tones sentence structure, and Chinese Characters.

52. Chinese II: 3 (3-0) credits
Continuation of Chinese I.

53. Japanese I: 3 (3-0) credits
Elementary of standard colloquial Japanese grammar, with intensive oral and written exercises; introduction to the Japanese writing systems.

54. Japanese II: 3 (3-0) credits
Continuation of Japanese I.
55. French I: 3 (3-0) credits
   Introduction to French; development of listening, reading, speaking, and writing skills.

56. French II: 3 (3-0) credits
   Continuation of French I with further development of listening, reading, speaking, and writing skills.

57. Spanish I: 3 (3-0) credits
   Introduction to Spanish; development of listening, reading, speaking, and writing skills.

58. Spanish II: 3 (3-0) credits
   Sequence of Spanish I.

60. Physics and Man: 3 (3-0) credits
   An introduction to the physics of the world of everyday experience through study of selected topics.

61. Basic Geology: 3 (3-0) credits
   Application of basic geologic knowledge to problems resulting from man's use of the Earth and its resources.

62. Aesthetics: 3 (3-0) credits
   Aesthetic concepts and the logic of aesthetic judgement as apply to design concepts and procedures.

63. Promotional Strategy: 3 (3-0) credits
   Consumer behavior, fundamentals of communication, setting goals and objectives, creative strategy, media strategy, and social and economic issues.

64. Physical Chemistry for Ceramics: 3 (3-0) credits
   Study of conditions and changes of liquid, gaz, and solid material during firing procedure at high temperature. Emphasis on the role and influence of gas and chemicals in the chemical and physical reaction in the ceramic kiln.

65. Physical Measurement: 3 (3-0) credits
   Study of theories and principles of using measuring instruments in ceramic works; measurement of clay porosity, solidity, plasticity, transparency; fluidity of liquid clay; color of raw material; width of products' wall; kiln temperature by using thermocouple; various standards of measurement (JIS, BIS, ASTM).

66. Decision Techniques: 3 (3-0) credits
A survey of decision techniques for managers and administrators in corporations, small firms, governmental agencies and public institutions. The course is designed to develop the analytical and conceptual abilities of the decision-making process. Emphasis is on the utilization, evaluation and limitations of quantitative and qualitative methods for decisions under certainty and uncertainty.

67. Personnel Management: 3 (3-0) credits
This course deals with the management of people at work, considers the psychological aspects of human behavior in organizations.

68. Social Psychology: 3 (3-0) credits
Psychological processes in the interaction of individuals and groups. Description of group dynamics, methods of group conflict solution and psychological approaches to social problems.

69. Industrial Organization and Management: 3 (3-0) credits
Study of mechanism and operational situation of industries; the industrial development; the management of plants, personnels, financial, tools, machinery; public relation and related law and regulations.

70. Advertising: 3 (2-2) credits
Advertising in a free market society; its role, history, legal, and other restraints; social and economic impacts; the role of media in advertising; workshop of lectures and problems; marketing problems and strategy presented as background to problem-solving; solutions to advertising problems.

72. Graphic Design: 3 (1-4) credits
Introduction to the application of symbolic, non-verbal, elements in production of visual message. Emphasis on communication theory and the theory of signs.

73. B/W Photography: 3 (1-4) credits
A lecture-demonstration course for basic black and white photographic and darkroom skills. Various cameras, films, photographic media, lighting techniques are covered.

74. Color Photography: 3 (1-4) credits
An introduction to color photography including additive and subtractive color, the Kelvin Scale and color negative developing and printing. Operation of manual and automatic processes. Color darkroom techniques and chemistry are covered as well as lighting techniques.

75. Painting: 3 (0-6) credits
Introduction to basic concepts as visual, procedural and gestural schema incorporating controlled experimentation and broad focus in color,
abstraction and visual harmonies. Techniques, skills, and media are covered.

76. Sculpture: 3 (0-6) credits
Introduction to development of formal perception and projection.
Introduction to basic concepts materials and processes of sculpture.

77. Woodworking: 3 (0-6) credits
An introduction to basic hand tools, power tools and machinery used in woodworking. Methods of mechanics, construction, lamination, craving, and forming.

78. Plastics: 3 (1-4) credits
Introduction to thermoplastics; orientation; cutting and joining; forming; vacuum, drape, blow, injection; foams; thermosetting plastics; orientation; casting.

79. Packaging: 3 (1-4) credits
A theoretical and practical study of package design and packaging. The relationship between the content and the package, and the sum of the total with implication for convenience, efficiency, safety, protection, and cost are discussed as oppose to packaging for ceramics.

80. Exhibition Design: 3 (1-4) credits
Course covers a broad range of communication environments from corporate exhibits to international expositions; from small showroom design to extensive museum planning. Students develop concepts, floor plans, structural systems and graphic solutions for each exhibition.

81. Glass: 3 credits (0-6) credits
Introduction to glass as a fluid material for artistic expression with possible use of glass in design for ceramics.

82. Jewelry and Metal Crafts: 3 (0-6) credits
Introduction to basic jewelry and metal crafts techniques. Design and construction of small scale metal objects by cutting, shaping, forging, and joining of non-ferrous metals with hard-solder, stone setting metal marriages and wood inlay. Exploration of possibility of incorporating metal objects with ceramic materials.

83. Printmaking; Stencil and Silkscreen: 3 (0-6) credits
Image formation through the stencil (silkscreen and related stencil techniques) is developed. Paper stencil, glue block out, lacquer block out, tusche and glue, cut film and photo-sensitive stencil formulations are stressed. Problems of imagery related to the medium are pursued; color mixing, registration, over printing, transparencies.
84. Drawing Anatomy: 3 (0-6) credits

Observation, knowledge of anatomy and structural selectivity and imagery are related to the whole or full act of drawing. By learning to see the internal as well as the external form, seeing, learning and expressing become totally related experiences. This course will develop the students' abilities in these aspects of drawing.
APPENDIX B

QUESTIONNAIRE I AND QUESTIONNAIRE II
QUESTIONNAIRE I

Direction: The following questions require your views concerning ceramic design education and ceramic designers in Thailand. They also concern what would constitute the best elements to include in the ceramic design education program on the undergraduate level. Please supply the information requested to the best of your knowledge and experiences, thank you.

1. General information:
   Age ____________________Sex ____________________
   Name of Institution and Department ____________________
   Present position at the institution ____________________
   Educational background (Degree and Institution) ____________________
   Years of teaching ____________________________________years

2. Besides teaching at the present institution, do you participate in any activities or work in the ceramic industry?
   ____________________No, ____________________Yes.

3. In your opinion, what is the major emphasis in your (institution) curriculum for ceramic education?
   a. Crafts
   b. Fine Art
   c. Industrial Design
   d. Art Education
   e. Other, please indicate ____________________

4. The ceramic education being offered at your institution is
   a. A sub-discipline in the field of fine art
   b. A sub-discipline in the field of art education
   c. A sub-discipline in the field of industrial design
   d. An independent discipline
   e. Other, please indicate ____________________

5. At present does your institution have any contact with the ceramic industry?
   ____________________No, ____________________Yes, if yes please specify ____________________
6. In your opinion, the current ceramic educational curriculum at your institution... (in its relation to the practices in the industry)
   _____ a. sufficiently serves the design demands from the industry
   _____ b. requires minor revision to better serve the design demands from the industry
   _____ c. requires major revision to better serve the design demands from the industry
   _____ d. unsuitable to serve the design demands from the industry
   _____ e. Other, please comment ___________________________

7. If your answer in question 6 is(are) b, c, or d, in what area(s) do you think would need revision or adjustment? (please specify 3 areas that need to be revised and adjusted immediately)
   1. _____________________________________________________________
   2. _____________________________________________________________
   3. _____________________________________________________________
   4. _____________________________________________________________
   5. _____________________________________________________________
   6. _____________________________________________________________

8. If a new ceramic design curriculum is to be developed, what subjects do you think should be included in the curriculum so that the education the future ceramic designer receive will be directly related to the design practices in the ceramic industry. Listed below are the subjects being offered in various ceramic educational institutions, please circle the subjects you think should be incorporated into the ceramic design curriculum?
   1. History of art 2. History of ceramics
   3. Drawing 4. Technical drawing
   5. Graphic design 6. Art elements
   7. Design fundamentals 8. Art appreciation
   9. Arts and crafts 10. Aesthetics
   11. Man & society 12. World cultures
   13. 2-D design 14. 3-D design
   17. Kiln theory and practices 18. Design theories
   19. Design workshops (problem solving)
   20. Tools and equipments in ceramics
   21. Ceramic workshops (hand-forming, throwing, casting, etc.)
   22. Ceramic decorations 23. Chemistry
   24. Industrial ceramics 25. Mathematics
   26. General psychology 27. Physics
   28. Economy 29. Marketing
9. Besides the subjects listed in question 8, what is (are) other subjects do you think should be included in the ceramic design curriculum? (please list)

1. ____________________________________________
2. ____________________________________________
3. ____________________________________________
4. ____________________________________________
5. ____________________________________________

10. In your opinion, what is the appropriate duration for the ceramic design curriculum (provided that the curriculum is being developed)?

   a. Four years
   b. Five years
   c. Other, please specify _____________________________

11. What should be the requirement for degree completion for the students in the ceramic design curriculum being developed? (listed below are the current requirements from various ceramic educational institution)

   a. The completion of coursework and examinations
   b. The completion of coursework, examinations, and professional training
   c. The completion of coursework, examinations, and individual thesis
   d. The completion of coursework, examinations, professional training, and individual thesis
   e. Other, please specify _____________________________

12. In your opinion, the industry’s demand for ceramic designers at present is

   a. Very low
   b. Low
   c. Moderate
   d. High
   e. Very High
13. In your opinion, the ceramic industry at present
   a. is self-sufficient and developing rapidly in a positive direction
   b. needs improvement in certain areas
   c. underdeveloped
   d. no comment
   e. other, please specify

14. If your answer in question 13 is b or c, what areas do you think should be improved by the industry?
   1. 
   2. 
   3. 

15. In your opinion, what are the roles (desire) of ceramic designers in the development of the ceramic industry?

16. Comments and suggestions
QUESTIONNAIRE II

Direction: The following questions require your views concerning ceramic design, the ceramic industry in Thailand, and what constitute the basic requirement needed in the improvement of the ceramic industry. Please supply the information requested to the best of you knowledge and experiences, thank you.

1. General Information:
   Age _____________________ Sex ____________________________
   Educational background _________________________________
   Position at the present company (factory) ________________
   Years of working in ceramics ____________________________ years

2. Information about your company (factory):
   Type of ceramic products ________________________________
   Number of employee _________________________________
   Method of production (hand, machine, etc.) _______________
   Markets for your company’s products (please check whatever apply)
      __________________ Local markets
      __________________ International markets
      __________________ Both local and international markets

3. At present, does your company (factory) receive support from the government?
   ___________ No, (please go to question 5)
   ___________ Yes, (please answer question 4)

4. What kind of support your company (factory) receive from the government?
   (i.e. financial, tax exemption, etc.)
   ___________________________________________________________________
   ___________________________________________________________________
   ___________________________________________________________________

5. At present, does your company hire or employ designer?
   ___________ No, (please go to question 8)
   ___________ Yes, (please go to question 6 and 7)
6. How many designers does your company employ at present?

7. What is the responsibility of the designers?
   1. _______________________________________
   2. _______________________________________
   3. _______________________________________
   4. _______________________________________
   5. _______________________________________

8. Your company (factory) does not hire or employ designers because

9. The designs of your company's (factory) products derive from
   a. Designers
   b. Markets researches
   c. Magazines and catalogues
   d. Customers' orders
   e. Design packets bought or sent from foreign countries
   f. Previous or existing lines of products
   g. Other, please specify _______________________

10. In your opinion, ceramic designers in Thailand are
    a. Highly capable of performing all design tasks demanded by the ceramic industry
    b. Capable of performing some design tasks demanded by the ceramic industry
    c. Capable of performing a few design tasks demanded by the ceramic industry
    d. Incapable of performing design tasks demanded by the ceramic industry
    e. Do not understand the demand of the ceramic industry
    f. Other, please specify _______________________

11. At present, does your company (factory) have any contact with the ceramic design educational institutions?
   ______ No,
   ______ Yes, in what ways? (please indicate)

12. What is the benefit do you think your company (factory) have (or would have, in case your company (factory) does not already hire designer) from hiring designer?
   _____ a. Better products' appearances
   _____ b. Lower production cost
   _____ c. Competitiveness in the markets
   _____ d. More variation of products
   _____ e. Accuracy in customers' design transfer
   _____ f. Other, please specify

13. At present, the sales of your company's (factory) products
   _____ are satisfactory, (please go to question 15)
   _____ require improvement in certain areas, (please answer question 14)

14. In your opinion, your company's (factory) products can be improved by improving
   1. _______________________________________________________
   2. _______________________________________________________
   3. _______________________________________________________
   4. _______________________________________________________
   5. _______________________________________________________

15. In your opinion, what are the qualifications you would look for in hiring the ceramic designer?
   1. _______________________________________________________
   2. _______________________________________________________
   3. _______________________________________________________
   4. _______________________________________________________
   5. _______________________________________________________

16. Comments and suggestions
   _______________________________________________________
   _______________________________________________________
   _______________________________________________________
APPENDIX C

MINISTRY OF UNIVERSITY AFFAIRS' ANNOUNCEMENT

CURRICULUM STANDARD FOR BACHELOR DEGREE PROGRAM: 1982
MINISTRY OF UNIVERSITY AFFAIRS' ANNOUNCEMENT
CURRICULUM STANDARD FOR BACHELOR DEGREE PROGRAM: 1982

Under Section 4 (2) of the Ministry of University Affairs' Administrative
Rules & Regulations Act of 1974, it is the authority and the responsibility of the
Ministry of University Affairs to stipulate the curriculum standard for higher
education. To be utilized in the maintenance the academic and professional
standards; and as the guidelines for accreditation, and academic administration,
the Ministry of University Affairs specified the curriculum standard for Bachelor
degree as follows:

1. The standard is to be called "The Curriculum Standard for Bachelor
Degree Program: 1982" and to be used in Bachelor degree curriculum, or
equivalent curriculum in all fields of study which have the duration of eight
regular semester under the two semesters formality, or equivalent duration.

2. Repeal "The Curriculum Standard for Bachelor Degree Education:
1971" and substitute with the standard described in this announcement.

3. The philosophy and objective of the standard is to create within the
Bachelor degree curriculum, harmony and conformity with; the nation's plan for
higher education, philosophy of higher education institutions, academic and
professional standards within the fields of study, and to create academic
advancement which complies with the demands from the society.

4. Educational System: Two semester system. By dividing one academic
year into two regular semester. Each semester has the minimum duration of 15
weeks. For educational institutions which offer summer semester, the duration
and the number of credit hour should be specified comparable to the regular semester.

5. The number of credit and the duration of the education: The total number of credit hour should fall between 120 (minimum) to 150 (maximum) credit hours. The maximum duration of the education should not exceed eight academic years for full time curriculum, and twelve years for part time curriculum start from the first day of the first semester from which the student was admitted into the curriculum.

6. Structure of the (standardized) curriculum: The curriculum structure should consist of subjects in the areas of 1) general and basic studies, 2) specialized studies, and 3) elective. The ratio of minimum credit hours in each area is specified as follows:

6.1. General and basic studies: Studies which cover various subjects in the fields of social science, humanities, languages, and science and mathematics. The minimum total credit hours should not be less than 30 credit hours and should include subjects in the following areas:

(1) Social science  minimum  6  credit hours
(2) Humanities  minimum  6  credit hours
(3) Languages  minimum  6  credit hours
(4) Science and Mathematics  minimum  6  credit hours

Note: (3) can be any language, (4) the arrangement must include both subjects in science and mathematics.

Educational institutions are allowed to arrange subjects in the area of general and basic studies as an independent or sequential courses as
necessary to cover the essence of each subject in the specified areas of study above.

In addition, if subjects in the four specified fields have been arranged as major or minor subjects in the other areas (specialized studies, and elective), they are to be counted as the required subjects in the area of general and basic studies therefore, it is exceptional to exclude those subjects in the four specified fields from the area of general and basic studies.

6.2. Specialized studies: core subjects, specialized subjects, and professional subjects. The total credits hour should be at least 48 credit hours. In case that the curriculum have been arranged to have major and minor areas of specialized studies, the minimum credit hours for major area of specialized studies should be 30 credit, and 15 credit hours for the minor area.

6.3. Electives: any subjects which have been arranged or offered by the educational institutions as electives. The minimum total credit hours for elective subjects should be three credit hours.

7. Course credit: credit hours

7.1. Lecture or seminar course (theoretical) : with the minimum of one hour/session per week or 15 hours/sessions per one regular semester is to be counted as one credit hour.

7.2. Studio practice or laboratory course (practical): with the minimum of two to three hours/sessions per week or 30 to 45 hours/sessions per one regular semester is to be counted as one credit hour.

7.3. Field work or training course (professional practices): with the minimum of three to six hours/sessions per week or 45 to 90 hours/sessions per one regular semester is to be counted as one credit hour.
8. Registration and enrollment: A minimum of nine credit hours to a maximum of 22 credit hours per one regular semester for full time curriculum. Completion of six regular semesters (minimum) is required prior to graduation.

   For part time curriculum: A minimum of six credit hours to a maximum of 18 credit hours is required. Completion of seven regular semester (minimum) is required prior to graduation.

   Under the circumstance in which there are specific reasons and needs by any educational institution, the registration and enrollment with credit hour configuration different from the ones mentioned above is allowed provided that it does not affect or lower the academic standard of such curriculum.

9. Requirements for graduation: Students must complete the number of credit hours as specified in each curriculum with the minimum grade point average of 2.00 from the 4.00 point grading system in order to graduate.

   Any educational institutions which use different grading system or different requirements for graduation, must specify the grading system and requirements for graduation in such a way that they are equivalent to the requirements for graduation described above.

   This curriculum standard is to be used in the development of new curriculum, or the revision of the existing curriculum.

   Other curriculum which use different educational system and/or equivalent to bachelor degree curriculum specified above are allowed to use this curriculum standard with some applicable adjustment. For bachelor degree curriculum which has the duration of education different from this curriculum standard, it must use this standard as the basis for consideration from which a comparable and suitable standard can be established.
10. The curriculum standard is effective beginning the 1983 academic year.

February 14, 1983
Kasem Suwannakul
Minister, Ministry of University Affairs
APPENDIX D
EXISTING CERAMIC EDUCATION CURRICULUM FROM SIX UNIVERSITIES
IN THAILAND
The undergraduate Industrial Design Curriculum Program (Bachelor of Industrial Design):
Chulalongkorn University.
Faculty of Architecture, Department of Industrial Design.

Program Structure: total 186 credits

Requirements for an Undergraduate Degree Program:

- Foundation Courses 30 Credits
  Science & Mathematics 7 Credits
  Social Sciences 6 Credits
  Humanities 8 Credits
  English 9 Credits
- Faculty's required courses 28 Credits
- Department's required courses 113 Credits
- Electives (pre-arranged) 15 Credits

Course List:

Foundation Courses (30 credits) (lecture-studio)

The following subjects must be taken as required by the Bureau of State University.

1. English
   092-101 Foundation English I 3 (3-0) Credits
   092-102 Foundation English II 3 (3-0) Credits
   092-205 EAP Reading Architecture 3 (3-0) Credits

2. Science and Mathematics
   261-110 Math. for Architecture 3 (3-0) Credits
   361-132 Structure in Architecture 2 (2-0) Credits
362-436 Basic Mechanics for Industrial Des. 2 (2-0) Credits

3. Social Sciences
   417-101 General Psychology 3 (2-2) Credits
   093-130 Man & Society 3 (2-0) Credits

4. Humanities
   360-102 History of Art 3 (3-0) Credits
   362-152 Thai Cultural Heritage 3 (3-0) Credits
   362-463 Industrial Revolution 2 (2-0) Credits

Faculty's Required Courses (28 credits) (lecture-studio)

   361-111 Design Fundamentals 2 (2-0) Credits
   361-112 Studio in Design 4 (0-8) Credits
   361-113 Architecture Design Fundamental 2 (2-0) Credits
   361-114 Architecture Design I 4 (0-8) Credits
   361-131 Building Materials & Construction I 2 (2-0) Credits
   361-133 Building Materials & Construction II 3 (1-4) Credits
   361-151 Architectural Drawing 2 (1-2) Credits
   361-152 Architectural Presentation 2 (0-4) Credits
   361-211 Architectural Des. Criteria & Concept I 2 (2-0) Credits
   361-212 Architectural Design II 5 (0-10) Credits

Department's Required Courses (113 credits) (lecture-studio)

1. Supported Courses 19 Credits
   211-111 Introduction into Business Manage. 2 (2-0) Credits
   215-316 Marketing 2 (2-0) Credits
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>360-404</td>
<td>Method of Research &amp; Report Writing</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>362-151</td>
<td>Thai Ornaments</td>
<td>2 (1-2)</td>
</tr>
<tr>
<td>362-311</td>
<td>Thai Arts &amp; Crafts</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>362-312</td>
<td>Design I</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>362-351</td>
<td>Industrial Art and Craft Field Trip</td>
<td>2 (0-4)</td>
</tr>
<tr>
<td>362-416</td>
<td>Design II</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>612-432</td>
<td>Introduction to Industrial Economics</td>
<td>3 (3-0)</td>
</tr>
</tbody>
</table>

2. Technical Courses  
- 164-456 Ergonomics                  | 3 (2-3) |
- 269-221 Fundamentals of Photography Sci. | 2 (2-0) |
- 269-222 Photography Lab (B&W)         | 1 (0-3) |
- 362-231 Workshop Training            | 2 (1-2) |
- 362-241 Technical Drawing            | 2 (1-2) |
- 362-242 Illus. Techn. of Human & Animal Fig. | 2 (1-2) |
- 362-331 Appropriate Technology       | 2 (2-0) |
- 362-332 Material & Process I         | 2 (1-2) |
- 362-435 Material & Process II        | 2 (1-2) |

3. Professional Courses  
- 362-221 Textile I                    | 3 (1-4) |
- 362-222 Textile II                   | 3 (1-4) |
- 362-321 Textile III                  | 4 (1-6) |
- 362-223 Interior Design & Decoration I | 3 (1-4) |
- 362-322 Interior Design & Decoration II | 3 (1-4) |
- 362-323 Interior Design & Decoration III | 4 (1-6) |
- 362-324 Graphic Communication I      | 3 (1-4) |
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>362-424</td>
<td>Graphic Communication II</td>
<td>3 (1-4)</td>
</tr>
<tr>
<td>362-425</td>
<td>Graphic Communication III</td>
<td>4 (1-6)</td>
</tr>
<tr>
<td>362-325</td>
<td>Ceramics I</td>
<td>3 (1-4)</td>
</tr>
<tr>
<td>362-428</td>
<td>Ceramics II</td>
<td>3 (1-4)</td>
</tr>
<tr>
<td>362-429</td>
<td>Ceramics III</td>
<td>4 (1-6)</td>
</tr>
<tr>
<td>362-426</td>
<td>Product Design I</td>
<td>3 (1-4)</td>
</tr>
<tr>
<td>362-427</td>
<td>Product Design II</td>
<td>3 (1-4)</td>
</tr>
<tr>
<td>362-525</td>
<td>Product Design III</td>
<td>4 (1-6)</td>
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</tbody>
</table>

4. Students are required to conduct an intensive research in one of the specialized areas offered by the Department (i.e. Textile; Interior Design; Graphic Communication; Ceramics; and Product Design)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>362-520</td>
<td>Professional Practice</td>
<td>2 (2-0)</td>
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<tr>
<td>362-526</td>
<td>Seminar I</td>
<td>3 (3-0)</td>
</tr>
<tr>
<td>362-527</td>
<td>Design Studio on Special Problem</td>
<td>4 (1-6)</td>
</tr>
<tr>
<td>362-528</td>
<td>Individual Study</td>
<td>2 (0-4)</td>
</tr>
<tr>
<td>362-529</td>
<td>Seminar II</td>
<td>3 (3-0)</td>
</tr>
<tr>
<td>362-570</td>
<td>Thesis (in one of the five areas)</td>
<td>12 (0-24)</td>
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</tbody>
</table>

Electives (15 credits) (lecture-studio)

1. Elective Subjects offered (pre-arranged) by the Department of Industrial Design

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>362-261</td>
<td>Elementary Ceramics</td>
<td>2 (1-2)</td>
</tr>
<tr>
<td>362-262</td>
<td>Sculpture</td>
<td>2 (1-2)</td>
</tr>
<tr>
<td>362-263</td>
<td>Painting</td>
<td>2 (1-2)</td>
</tr>
<tr>
<td>362-264</td>
<td>Product Model Making</td>
<td>2 (1-2)</td>
</tr>
</tbody>
</table>
2. Any other elective course offered by Inter-Department within the confines of Chulalongkorn University.
The undergraduate curriculum in Ceramic Technology (Bachelor of Science):
Phra Nakhon Teacher's College.

Program Structure: total 147 credits

<table>
<thead>
<tr>
<th>Category</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Foundation Courses</strong></td>
<td>32</td>
</tr>
<tr>
<td>Language and Communication</td>
<td>8</td>
</tr>
<tr>
<td>Humanities</td>
<td>8</td>
</tr>
<tr>
<td>Social Science</td>
<td>8</td>
</tr>
<tr>
<td>Science and Mathematics</td>
<td>8</td>
</tr>
<tr>
<td><strong>Specialized Courses</strong></td>
<td>109</td>
</tr>
<tr>
<td>Core Subjects</td>
<td>88</td>
</tr>
<tr>
<td>Management Science</td>
<td>16</td>
</tr>
<tr>
<td>Practical and Professional Training</td>
<td>5</td>
</tr>
<tr>
<td><strong>Elective</strong></td>
<td>6</td>
</tr>
</tbody>
</table>

**Course List:**

**Foundation Courses** (32 credits) (lecture-studio)

1. **Language and Communication** 8 Credits

   Required 4 credits:

   2611201 Thai Grammar 2 (2-0) Credits
   2631101 Library and Research Study 2 (2-0) Credits

   Elective 4 credits from subjects in Elective Subjects Group I, and Group II, one subject from each group:

   **Elective Subjects Group I**

   2611202 Speech (Thai) 2 (2-0) Credits
   2611204 General Reading (Thai) 2 (2-0) Credits
   2611221 Writing for Communication 2 (2-0) Credits
Elective Subjects Group I

2621103 General Reading in English 2 (2-0) Credits
2621110 Writing for Communication in Eng. I 2 (2-0) Credits
2621111 Writing for Communication in Eng. II 2 (2-0) Credits
2731105 Basic Japanese 2 (2-0) Credits
2731106 Japanese for Communication 2 (2-0) Credits
2741105 Basic Chinese 2 (2-0) Credits
2741106 Chinese for Communication 2 (2-0) Credits
2761105 Basic French 2 (2-0) Credits
2761106 French for Communication 2 (2-0) Credits
2771105 Basic German 2 (2-0) Credits
2771106 German for Communication 2 (2-0) Credits

2. Humanity Courses 8 Credits

Required 2 credits:
2671101 Basic Philosophy 2 (2-0) Credits

Elective 6 credits from subjects in Elective Subjects Group I, Group II, and Group III, one subject from each group:

Elective Subjects Group I

2631716 Aesthetics in Visual Arts 2 (2-0) Credits
2651203 Music Appreciation 2 (2-0) Credits
2661701 Aesthetics in Thai Classical Dances 2 (2-0) Credits

Elective Subjects Group II

2121201 General Psychology 2 (2-0) Credits
2122503 Human Relations 2 (2-0) Credits
Elective Subjects Group III

- 2671102 Introduction to Logic 2 (2-0) Credits
- 2671112 Philosophy and Religion 2 (2-0) Credits
- 2671201 Buddhism 2 (2-0) Credits
- 2671202 Moral and Living 2 (2-0) Credits

3. Social Science Courses 8 Credits

Required 4 credits:

- 2682302 Basic Thai Culture 2 (2-0) Credits
- 4611110 Thai Economic System and Coop. 2 (2-0) Credits

Elective 4 credits from subjects in Elective Subjects Group I, and Group II, one subject from each group:

Elective Subjects Group I

- 2691201 Present World Incidents 2 (2-0) Credits
- 2691221 Civilization 2 (2-0) Credits
- 2721101 Politics and Government 2 (2-0) Credits
- 2721212 Law and Living 2 (2-0) Credits

Elective Subjects Group II

- 2681401 Human and Society 2 (2-0) Credits
- 2681507 Social Science and Development 2 (2-0) Credits
- 2682503 Population and Living Quality 2 (2-0) Credits
- 2711216 Human and Environment 2 (2-0) Credits
- 2722301 Geography of Thailand 2 (2-0) Credits
- 2612201 Human and Economic 2 (2-0) Credits
4. Science, Technology and Mathematics Courses 8 Credits

Required 4 credits:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>3171110</td>
<td>General Mathematics</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>2161206</td>
<td>Science and Sport</td>
<td>2 (1-2)</td>
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</table>

Elective 4 credits from subjects in Elective Subjects Group I, and Group II, one subject from each group:

Elective Subjects Group I

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>3101003</td>
<td>Science for Health</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>3101005</td>
<td>Science for Living</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>3101103</td>
<td>Science and Society</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>3101104</td>
<td>Human and Physical Science</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>3101105</td>
<td>Human and Biological Science</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>3101106</td>
<td>Living and Environment</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>3101107</td>
<td>Science in Living</td>
<td>2 (2-0)</td>
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</table>

Elective Subjects Group II

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>3171109</td>
<td>Mathematics and Decision Making</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>3191001</td>
<td>Computer Usage</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>3191002</td>
<td>Computer Programming</td>
<td>2 (1-2)</td>
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</table>

Specialized Courses (109 credits) (lecture-studio)

1. Core Subjects 88 Credits

1.1. Basic Specialized Subjects: 18 credits;

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>4111501</td>
<td>Technical Drawing</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>4173137</td>
<td>Engineering Drawing</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>3121104</td>
<td>Introduction to Chemistry</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>4191213</td>
<td>Basic Drawing</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>4141107</td>
<td>Fundamentals of Electricity</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>4193520</td>
<td>Introduction to Geology</td>
<td>2 (2-0)</td>
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<tr>
<td>Selection II:</td>
<td>required 8 credits</td>
<td></td>
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<tr>
<td>3111303</td>
<td>Introduction to Physics</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>3111503</td>
<td>Applied Mechanics</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>4194526</td>
<td>Physical Chemistry for Ceramics</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>4191215</td>
<td>Theory of Design</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>4191216</td>
<td>Experimental Design</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>4194525</td>
<td>Physical Measurement</td>
<td>2 (1-2)</td>
</tr>
<tr>
<td>4193519</td>
<td>Industrial Materials</td>
<td>2 (2-0)</td>
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<tr>
<td>4191214</td>
<td>Basic Graphic</td>
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1.2. Specialized Subjects: 70 credits (lecture-studio)

<table>
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<tr>
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<tbody>
<tr>
<td>Selection I:</td>
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<tr>
<td>4191101</td>
<td>Introduction to Ceramics</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>4194403</td>
<td>Machines, Tools and Equipment I</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>4191501</td>
<td>Ceramic Raw Materials</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>4191201</td>
<td>Ceramic Design I</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>4192202</td>
<td>Ceramic Design II</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>4191302</td>
<td>Hand Forming</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>4192302</td>
<td>Throwing I</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>4192309</td>
<td>Mold Making and Casting I</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>4192503</td>
<td>Glazes I</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>4191404</td>
<td>Kilns I</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
</tr>
<tr>
<td>-------------</td>
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</tr>
<tr>
<td>4192507</td>
<td>Refractories and Abrasives</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>4193209</td>
<td>Ceramic Design III</td>
<td>3 (2-2)</td>
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<tr>
<td>4193410</td>
<td>Machines, Tools and Equipment II</td>
<td>3 (2-2)</td>
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<tr>
<td>4193409</td>
<td>Kilns II</td>
<td>3 (2-2)</td>
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<tr>
<td>4194519</td>
<td>Ceramic Industry and Technology</td>
<td>3 (2-2)</td>
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<tr>
<td>4194520</td>
<td>Clay Body I</td>
<td>3 (2-2)</td>
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<tr>
<td>4194522</td>
<td>Glazes II</td>
<td>3 (2-2)</td>
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<td>Glazes III</td>
<td>3 (2-2)</td>
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<tr>
<td>4194320</td>
<td>Mold Making and Casting II</td>
<td>3 (2-2)</td>
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<tr>
<td>4194321</td>
<td>Mold Making and Casting III</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>4194322</td>
<td>Jiggering I</td>
<td>3 (2-2)</td>
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<tr>
<td>4194323</td>
<td>Jiggering II</td>
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<tr>
<td>4194802</td>
<td>Research Methodology</td>
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</table>

**Selection II: required 10 credits**

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<tbody>
<tr>
<td>4192508</td>
<td>Cement and Plaster</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>4192509</td>
<td>Glass and Enamel</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>4192323</td>
<td>Ceramic Craft</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>4192511</td>
<td>Color Stains</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>4192320</td>
<td>Underglaze Decoration</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>4192321</td>
<td>Overglaze Decoration</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>4192322</td>
<td>Ceramic Decoration</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>4192601</td>
<td>Ceramic Sculpture</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>4192602</td>
<td>Traditional Ceramics</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>4192603</td>
<td>Ceramics for Construction</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>4194524</td>
<td>Special Ceramics</td>
<td>2 (1-3)</td>
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</table>
2. **Management Science** 16 Credits

**Required 10 credits:**

<table>
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<tr>
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<th>Course Name</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>4621101</td>
<td>Principle of Marketing</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>4641101</td>
<td>Organization and Management</td>
<td>3 (3-0)</td>
</tr>
<tr>
<td>4641201</td>
<td>Introduction to Business</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>4651101</td>
<td>Principle of Accounting</td>
<td>3 (2-2)</td>
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</table>

**Elective 6 credits:**

<table>
<thead>
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<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>4193703</td>
<td>Industrial Organization and Manage.</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>4193704</td>
<td>Industrial Psychology</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>4193705</td>
<td>Industrial Economics</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>4642113</td>
<td>Quality Control</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>4111201</td>
<td>Schoolshop Safety</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>4193211</td>
<td>Package Design</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>4193212</td>
<td>Advertising Design</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>4193701</td>
<td>Research Methodology</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>4194702</td>
<td>Basic Computer</td>
<td>2 (1-3)</td>
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</table>

**Practical and Profession Training** (5 credits) (lecture-studio)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>4194902</td>
<td>On The Job Training</td>
<td>5 (300)</td>
</tr>
</tbody>
</table>

**Electives** (6 credits)
The undergraduate Ceramics Curriculum (Bachelor of Fine Arts (Ceramics)):
The Department of Decorative Arts, Silpakorn University.

Program Structure: total 139 credits (minimum)

- Foundation Course (minimum) 30 Credits
  - Humanities (minimum) 6 Credits
  - Social Science (minimum) 6 Credits
  - Science and Mathematics (minimum) 6 Credits
    (One subject in each category)
  - Language (minimum) 6 Credits

- Specialized Courses (minimum) 91 Credits
  - Core Subjects (minimum) 17 Credits
    Major Subjects
      - Required Major Subjects (minimum) 62 Credits
      - Required Elective Major Subjects* (minimum) 12 Credits
    - Electives** (or minor area of studies) (minimum) 18 Credits

- Minor Curriculum arranged for students
  from other majors (Interior Design, Visual Communication Design, Product Design, and Applied Art Studies) (minimum) 18 Credits

Note: * students are allowed to select subjects from the subjects in either the industrial arts area or the fine art area.
  ** students are allowed to select subjects from elective subjects or other subjects offered within the university (with approval from academic advisor)

Course List:
Foundation Courses (30 credits minimum) (lecture-studio)

1. **Required subjects:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>080 101</td>
<td>Man and Creativity</td>
<td>3 (3-0)</td>
</tr>
<tr>
<td>080 126</td>
<td>Man and His Environment</td>
<td>3 (3-0)</td>
</tr>
<tr>
<td>080 151</td>
<td>Man and Science</td>
<td>3 (3-0)</td>
</tr>
<tr>
<td>080 152</td>
<td>General Mathematics I</td>
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</tr>
<tr>
<td>080 176</td>
<td>Language and Communication</td>
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2. **Required elective subjects:**

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<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>080 177</td>
<td>English I</td>
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<tr>
<td>080 178</td>
<td>English II</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>080 179</td>
<td>Basic French I</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>080 180</td>
<td>Basic French II</td>
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</tr>
<tr>
<td>080 181</td>
<td>French I</td>
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</tr>
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<td>080 182</td>
<td>French II</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>080 183</td>
<td>Basic German I</td>
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</tr>
<tr>
<td>080 184</td>
<td>Basic German II</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>080 185</td>
<td>German I</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>080 186</td>
<td>German II</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>080 187</td>
<td>Basic Chinese I</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>080 188</td>
<td>Basic Chinese II</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>080 189</td>
<td>Basic Japanese I</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>080 190</td>
<td>Basic Japanese II</td>
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3. **Elective subjects:**

<table>
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from subjects in the following areas:
3.1. Humanities:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>080 103</td>
<td>Introduction to Logic</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>080 107</td>
<td>Music Appreciation</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>080 114</td>
<td>Art Appreciation</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>080 115</td>
<td>Eastern Art</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>080 116</td>
<td>Western Art</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>080 117</td>
<td>Literary Appreciation</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>080 118</td>
<td>Contemporary Thai Literature</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>080 119</td>
<td>Eastern Civilization</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>080 121</td>
<td>Western Civilization</td>
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</table>

3.2. Social Science:

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>080 127</td>
<td>Introduction to Psychology</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>080 128</td>
<td>Developmental Psychology</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>080 129</td>
<td>Introduction to Sociology</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>080 134</td>
<td>Structure of Thai Economy</td>
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</tr>
<tr>
<td>080 135</td>
<td>Law and Society</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>080 139</td>
<td>Physical Education</td>
<td>1 (0-2)</td>
</tr>
<tr>
<td>080 140</td>
<td>Sport Education</td>
<td>2 (1-2)</td>
</tr>
<tr>
<td>080 141</td>
<td>Principles of Recreation</td>
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</table>

3.3. Science and Mathematics:

<table>
<thead>
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<tbody>
<tr>
<td>080 154</td>
<td>General Mathematics II</td>
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</table>

3.4. Language:

<table>
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<tr>
<td>080 191</td>
<td>Pali I</td>
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</tr>
<tr>
<td>080 192</td>
<td>Pali II</td>
<td>3 (3-0)</td>
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</table>

Specialized Courses (91 credits minimum) (lecture-studio)
1. **Core Subjects:**

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>360 101</td>
<td>Theory of Design</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>360 102</td>
<td>Theory of Color</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>360 103</td>
<td>Basic Drawing I</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>360 104</td>
<td>Basic Drawing II</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>360 105</td>
<td>Survey of Art</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>360 106</td>
<td>Basic Practice</td>
<td>4 (2-6)</td>
</tr>
<tr>
<td>360 107</td>
<td>Basic Graphics</td>
<td>3 (1-4)</td>
</tr>
</tbody>
</table>

2. **Required Major Subjects:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>360 101</td>
<td>Technical Drawing</td>
<td>3 (1-4)</td>
</tr>
<tr>
<td>365 102</td>
<td>Experimental Design</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>365 103</td>
<td>Introduction to Ceramics</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>365 104</td>
<td>Hand Forming</td>
<td>3 (1-4)</td>
</tr>
<tr>
<td>365 105</td>
<td>History of Ceramics</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>365 106</td>
<td>Ceramic Design I</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>365 107</td>
<td>Wheel Throwing I</td>
<td>3 (1-4)</td>
</tr>
<tr>
<td>365 108</td>
<td>Ceramic Glaze I</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>365 109</td>
<td>Mold Making and Slip Casting I</td>
<td>3 (1-4)</td>
</tr>
<tr>
<td>365 110</td>
<td>Ceramic Glaze II</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>365 111</td>
<td>Wheel Throwing II</td>
<td>3 (1-4)</td>
</tr>
<tr>
<td>365 112</td>
<td>Fundamental of Electricity</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>365 113</td>
<td>Drying and Firing</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>365 201</td>
<td>Decorating Techniques</td>
<td>3 (2-3)</td>
</tr>
<tr>
<td>365 202</td>
<td>Fundamental of Geology</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>365 203</td>
<td>Wheel Throwing III</td>
<td>3 (1-4)</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Name</td>
<td>Credits</td>
</tr>
<tr>
<td>-------------</td>
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</tr>
<tr>
<td>365 204</td>
<td>Clay and Clay Body</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>365 205</td>
<td>Ceramic Design II</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>365 206</td>
<td>Mold Making and Slip Casting II</td>
<td>3 (1-4)</td>
</tr>
<tr>
<td>365 207</td>
<td>Aesthetics I</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>365 208</td>
<td>Kiln and Kiln Design</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>365 209</td>
<td>Thesis Preparation</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>365 210</td>
<td>Thesis</td>
<td>10 (0-20)</td>
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</table>

3. **Required Elective Major Subjects:** 12 Credits.

Choose from either ceramic art or ceramic industrial art areas.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>365 211</td>
<td>Ceramic Art I</td>
<td>4 (1-6)</td>
</tr>
<tr>
<td>365 212</td>
<td>Ceramic Art II</td>
<td>8 (2-12)</td>
</tr>
<tr>
<td>365 213</td>
<td>Ceramic Industrial Art I</td>
<td>4 (1-6)</td>
</tr>
<tr>
<td>365 214</td>
<td>Ceramic Industrial Art II</td>
<td>8 (2-12)</td>
</tr>
</tbody>
</table>

**Electives (18 credits minimum) (lecture-studio)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>365 215</td>
<td>Ceramics and Processes</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>365 216</td>
<td>Aesthetics II</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>365 217</td>
<td>Industrial Psychology</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>365 218</td>
<td>Industrial Organization and Manage.</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>365 219</td>
<td>Marketing</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>365 220</td>
<td>Research Methodology</td>
<td>2 (2-0)</td>
</tr>
<tr>
<td>365 221</td>
<td>Individual Project I (Ceramics)</td>
<td>2 (0-6)</td>
</tr>
<tr>
<td>365 222</td>
<td>Individual Project II (Ceramics)</td>
<td>2 (0-6)</td>
</tr>
<tr>
<td>365 223</td>
<td>Individual Project III (Ceramics)</td>
<td>2 (0-6)</td>
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</table>
**Minor Curriculum (18 credits) (lecture-studio)**

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>365 103</td>
<td>Introduction to Ceramics</td>
<td>2 (0-6)</td>
</tr>
<tr>
<td>365 104</td>
<td>Hand Forming</td>
<td>3 (1-4)</td>
</tr>
<tr>
<td>365 107</td>
<td>Wheel Throwing I</td>
<td>3 (1-4)</td>
</tr>
<tr>
<td>365 108</td>
<td>Ceramic Glaze I</td>
<td>2 (0-6)</td>
</tr>
<tr>
<td>365 109</td>
<td>Mold Making and Slip Casting</td>
<td>3 (1-4)</td>
</tr>
<tr>
<td>365 113</td>
<td>Drying and Firing</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>365 201</td>
<td>Decorating Techniques</td>
<td>3 (2-3)</td>
</tr>
</tbody>
</table>
The undergraduate Ceramics Curriculum (Bachelor of Education (Crafts)):
The Department of Arts and Crafts, Institute of Technical and Vocational Education.

Program Structure: (total 150 credits)

- Foundation Courses (32 credits)
  
  Social Science 6 Credits
  Humanities 6 Credits
  Language 6 Credits
  Science 6 Credits
  Mathematics 3 Credits
  Physical Education, Recreation, and Activities 2 Credits

- Education Courses (30 credits)
  
  Fundamental Education Subjects 12 Credits
  Specialized Education Subjects 12 Credits
  Elective Education Subjects 6 Credits

- Professional Courses (82 credits)
  
  Core Subjects in Arts 12 Credits
  Specialized Professional Subjects 48 Credits
  Elective Professional Subjects 22 Credits

- Electives 6 Credits

Course List:

Foundation Courses (32 credits) (lecture-studio)

1. Social Science 6 Credits

Select from the following subjects:
<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>111-003</td>
<td>Human and Society</td>
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</tr>
<tr>
<td>111-005</td>
<td>Society and Environment</td>
<td>3 (3-0)</td>
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<tr>
<td>111-007</td>
<td>Population Study</td>
<td>3 (3-0)</td>
</tr>
<tr>
<td>112-001</td>
<td>Society and Economic</td>
<td>3 (3-0)</td>
</tr>
<tr>
<td>113-002</td>
<td>Politic and Government of Thailand</td>
<td>3 (3-0)</td>
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2. **Humanities**

Select from the following subjects:

<table>
<thead>
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<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>121-001</td>
<td>Report Writing and Library Usage</td>
<td>3 (3-0)</td>
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<tr>
<td>122-001</td>
<td>Basic Philosophy</td>
<td>3 (3-0)</td>
</tr>
<tr>
<td>122-002</td>
<td>Introduction to Logic</td>
<td>3 (3-0)</td>
</tr>
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<td>123-001</td>
<td>Basic Thai Culture</td>
<td>3 (3-0)</td>
</tr>
<tr>
<td>123-003</td>
<td>General Psychology</td>
<td>3 (3-0)</td>
</tr>
<tr>
<td>124-002</td>
<td>Music Appreciation</td>
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3. **Language**

Select from the following subjects:

<table>
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<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>131-101</td>
<td>Thai Grammar</td>
<td>3 (2-2)</td>
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<tr>
<td>131-103</td>
<td>Communication Techniques</td>
<td>3 (2-0)</td>
</tr>
<tr>
<td>132-161</td>
<td>English I</td>
<td>3 (2-2)</td>
</tr>
<tr>
<td>132-162</td>
<td>English II</td>
<td>3 (2-2)</td>
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<tr>
<td>133-171</td>
<td>Technical English I</td>
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4. **Science**

Select from the following subjects:

<table>
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<tr>
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<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>140-101</td>
<td>Human and Physical Science</td>
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<tr>
<td>141-141</td>
<td>General Chemistry</td>
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<tr>
<td>141-142</td>
<td>Applied Chemistry</td>
<td>3 (3-0)</td>
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</table>
142-163 Physiology 3 (2-3) Credits
5. Mathematics 3 Credits
Select from the following subjects:
154-101 Statistic I 3 (3-0) Credits
154-142 Statistic II 3 (3-0) Credits
154-133 Statistic III 3 (2-3) Credits
6. Physical Education, Recreation and Activities 2 Credits
Select from the following subjects:
161-001 Activities I 1 (0-3) Credits
161-002 Activities II 1 (0-3) Credits
162-001 Recreation 1 (0-3) Credits
162-001 Physical Education 1 (0-3) Credits

Education Courses (30 credits) (lecture-studio)
1. Fundamental Education Subjects 12 Credits
211-301 Educational Psychology 2 (2-0) Credits
221-301 Principles of Vocation Education 2 (2-0) Credits
222-301 Educational Evaluation and Measure. 2 (2-0) Credits
231-301 Basic Educational Technology 2 (2-0) Credits
231-302 Practic I (Educational Technology) 1 (0-3) Credits
241-301 Principles and Methodology in Teaching 2 (2-0) Credits
241-302 Practic II (Teaching Methodology) 1 (0-3) Credits
2. Specialized Education Subjects 12 Credits
212-002 Academic and Professional Counseling 2 (2-0) Credits
221-302 History and Philosophy of Education 2 (2-0) Credits
241-001 Curriculum Arrang. and Teaching Eva. 2 (2-0) Credits
703-301 Workshop Organization and Admin. 2 (2-0) Credits
703-302 Art and Craft Teaching Methodology 2 (2-0) Credits
241-401 Teaching Train. (Minimum 72 Hours) 4 (0-10) Credits

3. **Elective Education Subjects** 6 Credits

Select from elective education subjects offer in the Department of Education

**Profession Courses** (82 credits) (lecture-studio)

1. **Core Subjects in Art** 12 Credits
   - 701-001 History and Style of Art 2 (2-0) Credits
   - 701-002 Anatomy 2 (2-0) Credits
   - 701-003 National Arts 2 (1-3) Credits
   - 701-004 Principles of Drafting 2 (1-3) Credits
   - 701-005 Art Elements 2 (1-3) Credits
   - 701-007 Drawing 2 (1-3) Credits
   - 701-007 Aesthetics 2 (1-3) Credits
   - 701-008 Problems in Art History 3 (3-0) Credits

2. **Specialized Professional Subjects** 48 Credits
   - 740-101 Hand-Crafts Theory 2 (2-0) Credits
   - 740-102 Local Hand-Crafts 2 (1-2) Credits
   - 740-203 Creative Hand-Crafts 2 (1-2) Credits
   - 740-104 Elective Hand-Crafts I 3 (2-3) Credits
   - 740-105 Elective Hand-Crafts II 3 (2-3) Credits
   - 740-206 Elective Hand-Crafts III 3 (2-3) Credits
<table>
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<tr>
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<th>Course Title</th>
<th>Credits</th>
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<td>Ceramics</td>
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<tr>
<td>741-108</td>
<td>Wheel Throwing I</td>
<td>2 (1-4)</td>
</tr>
<tr>
<td>741-109</td>
<td>Mold Making I</td>
<td>2 (1-4)</td>
</tr>
<tr>
<td>741-110</td>
<td>Ceramic Decoration Techniques I</td>
<td>2 (1-4)</td>
</tr>
<tr>
<td>741-111</td>
<td>Jiggering I</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>741-112</td>
<td>Glaze Calculation I</td>
<td>2 (1-3)</td>
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<tr>
<td>741-213</td>
<td>Clay and Clay Body I</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>741-214</td>
<td>Kiln and Firing</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>741-215</td>
<td>History of Ceramics</td>
<td>2 (2-0)</td>
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<tr>
<td>741-216</td>
<td>Special Problem Project</td>
<td>2 (1-3)</td>
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<td>741-217</td>
<td>Color for Ceramics</td>
<td>2 (1-3)</td>
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<td>741-218</td>
<td>Wheel Throwing II</td>
<td>3 (2-3)</td>
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<tr>
<td>741-219</td>
<td>Mold Making II</td>
<td>3 (2-3)</td>
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<td>741-220</td>
<td>Special Problem</td>
<td>4 (2-8)</td>
</tr>
<tr>
<td>741-322</td>
<td>Wheel Throwing III</td>
<td>4 (2-5)</td>
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<tr>
<td>741-323</td>
<td>Mold Making III</td>
<td>4 (2-5)</td>
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<tr>
<td>741-324</td>
<td>Ceramic Decoration Techniques II</td>
<td>4 (2-5)</td>
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<tr>
<td>741-325</td>
<td>Ceramic Design I</td>
<td>2 (1-3)</td>
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<td>741-326</td>
<td>Ceramic Design II</td>
<td>2 (1-2)</td>
</tr>
<tr>
<td>741-327</td>
<td>Underglaze Sticker Production</td>
<td>3 (1-6)</td>
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741-332 Underglaze Painting 2 (1-3) Credits
741-333 Overglaze Painting 2 (1-3) Credits
741-334 Kiln and Firing II 2 (1-3) Credits
741-335 Applied Ceramics 2 (1-3) Credits
741-436 Glaze Calculation 2 (1-3) Credits
741-437 Clay and Clay Body II 2 (1-3) Credits
741-438 Ceramic Art 4 (2-8) Credits
741-339 Material Science 3 (3-0) Credits
721-340 Material Science 3 (3-0) Credits

3. Elective Professional Subjects 22 Credits

Select from subjects in the elective professional subjects list

Electives (6 credits) (lecture-studio)

Select from the following list of subjects or from other lists with approval from academic advisor.

702-001 Research and Report Writing 2 (2-0) Credits
702-002 Art Analysis 2 (2-0) Credits
702-003 Mechanical Anatomy 2 (2-0) Credits
702-004 Folk Arts 3 (3-0) Credits
702-005 Visual Arts 3 (3-0) Credits
702-006 Photography Techniques 3 (3-0) Credits
702-007 Exhibition Design 3 (3-0) Credits
702-008 Management and Marketing 3 (3-0) Credits
702-009 Paper Art 3 (3-0) Credits
702-010 Workshop Organization and Admin. 3 (3-0) Credits
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<td>Pattern and Scrollwork</td>
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**Elective Professional Subjects:**

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The undergraduate Industrial Design Curriculum (Bachelor of Architecture in Industrial Design):

Faculty of Architecture, King Mongkut's Institute of Technology Chaokhuntaharn Ladkrabang Campus.

Program Structure: (total 180 credits)

- Foundation Courses (31 credits)
  
  Science and Mathematics 6 Credits
  Language 8 Credits
  Humanities 8 Credits
  Social Science 9 Credits

- Professional Courses (143 credits)
  
  Basic Professional Subjects 62 Credits
  Major Professional Subjects 81 Credits

- Electives 6 Credits

Course List:

Foundation Courses (31 credits) (lecture-studio)

1. Science and Mathematics 6 Credits
   
   36171 Mathematics 3 (3-0) Credits
   37171 Physics 3 (3-0) Credits

2. Language 8 Credits
   
   35171 English I 2 (2-1) Credits
   35172 English II 2 (2-1) Credits
   35173 English III 2 (2-1) Credits
   35174 English IV 2 (2-1) Credits
### Humanities

- 35188 History of Art \(2 \text{ (2-0) Credits}\)
- 35390 History of Industrial Design I \(2 \text{ (2-0) Credits}\)
- 35391 History of Industrial Design II \(2 \text{ (2-0) Credits}\)
- 35283 Psychology \(2 \text{ (2-0) Credits}\)

### Social Science

- 35788 Economics \(2 \text{ (2-0) Credits}\)
- 35577 Organization and Management \(2 \text{ (2-0) Credits}\)
- 35580 Marketing \(2 \text{ (2-0) Credits}\)
- 35082 Statistics \(2 \text{ (2-0) Credits}\)
- 39171 Physical Education \(1 \text{ (0-3) Credits}\)

### Professional Courses (142 credits) (lecture-studio)

1. **Basic Professional Subjects**

   - 20101 Delineation I \(2 \text{ (1-3) Credits}\)
   - 20102 Delineation II \(2 \text{ (1-3) Credits}\)
   - 20105 Fine Arts I \(2 \text{ (1-3) Credits}\)
   - 20106 Fine Arts II \(2 \text{ (1-3) Credits}\)
   - 20107 Fine Arts III \(2 \text{ (1-3) Credits}\)
   - 23325 Three Dimensional Arts \(2 \text{ (1-3) Credits}\)
   - 20108 Visual Design \(1 \text{ (0-3) Credits}\)
   - 23126 Metal Workshop \(2 \text{ (1-3) Credits}\)
   - 23127 Wood Workshop \(2 \text{ (1-3) Credits}\)
   - 23328 Basic Photography \(2 \text{ (1-3) Credits}\)
   - 23329 Advanced Photography \(2 \text{ (1-3) Credits}\)
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2. **Major Professional Subjects**

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*81 Credits*
23149 Engineering Technology I 3 (2-3) Credits
23150 Engineering Technology II 3 (2-3) Credits
23151 Engineering Technology 3 (2-3) Credits
23252 Indus. Des. I (First Sem., Sec. Year) 3 (1-6) Credits
23253 Indus. Des. II (Second Sem., Sec. Year) 3 (1-6) Credits
23354 Indus. Des. III (First Sem., Third Year) 4 (2-6) Credits
23355 Indus. Des. IV (Sec. Sem., Third Year) 4 (2-6) Credits
23456 Indus. Des. V (First Sem., Fourth Year) 5 (2-9) Credits
23457 Indus. Des. VI (Sec. Sem., Fourth Year) 5 (2-9) Credits
23458 Indus. Des. VII (First Sem., Fifth Year) 6 (2-12) Credits
23479 Packaging Design I 3 (1-6) Credits
23480 Packaging Design II 3 (1-6) Credits
23545 Thai Product 2 (1-3) Credits
  Professional Electives III*,** 3 (1-6) Credits
  Professional Electives III*,** 3 (1-6) Credits
  Professional Electives IV*,** 3 (1-6) Credits
  Professional Electives IV*,** 3 (1-6) Credits
(Select two subjects from four subjects)
  Professional Electives V*,** 3 (1-6) Credits
  Professional Electives VI*,** 3 (1-6) Credits
  Professional Electives VII*,** 3 (1-6) Credits
(Select one subject from two subjects)
*Profession Major Subjects select from Professional Electives III-VII
**First Semester, Third Year
***Second Semester, Third Year

****First Semester, Fourth Year

*****Second Semester, Fourth Year

******First Semester, Fifth Year

23581 Thesis in Indus. Des. (major area of stu.) 8 (0-24) Credits

Elective Professional Subjects III-VII

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<td>Furniture Design VI</td>
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<tr>
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<td>Metal Design VI</td>
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<td>23573</td>
<td>Metal Design VII</td>
<td>3 (1-6)</td>
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<td>23374</td>
<td>Textile Design III</td>
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<td>23375</td>
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<td>23476</td>
<td>Textile Design V</td>
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<td>23477</td>
<td>Textile Design VI</td>
<td>3 (1-6)</td>
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</table>
23578 Textile Design VII 3 (1-6) Credits

Electives (6 credits) (lecture-studio)

20085 Music Appreciation 2 (2-0) Credits
20087 Speech Communication 2 (2-0) Credits
20088 Written Communication 2 (2-0) Credits
20089 Thai Arts 2 (2-0) Credits
20090 Thai Arts 2 (2-0) Credits
20091 Thai Vernacular Architecture 2 (2-0) Credits
20092 Appropriate Technology 2 (2-0) Credits
20093 Business Law 2 (2-0) Credits
20094 Conservation 2 (2-0) Credits
20096 Thai Culture 2 (2-0) Credits
20012 Applied Mechanics 2 (2-0) Credits
20020 Program Analysis 2 (2-0) Credits

Note: Follow the completion of the second semester of the fourth year, students are required to obtain professional experience from training in government offices, private firms, or factories for a minimum period of 30 days. There is no fee for professional training credits. Students who do not complete the professional training are not eligible for graduation.
The undergraduate program in Ceramics (Bachelor of Fine Arts (Ceramics)):
The Department of Fine Arts, Rangsit University.

Program Structure: total 135 credits (minimum)

- Foundation Courses (32 credits minimum)
  Humanities and Physical Education 8 Credits
  Social Science 6 Credits
  Science and Mathematics 6 Credits
  Language 12 Credits

- Major Courses (96 credits minimum)
  Core Subjects 16 Credits
  Major Subjects 62 Credits
  Supplement Major Subjects or Minor Subjects 18 Credits
  (select one area from the area of ceramic art or the area of ceramic industrial art)

- Electives (7 credits)

Course List:

**Foundation Courses** (32 credits) (lecture-studio)

1. Humanities and Physical Education 8 Credits
   
   Required subjects: 5 credits
   
   GE 1001 Life and Buddhism 3 (3-0) Credits
   GE 1701 General Physical Education I 1 (0-2) Credits
   GE 1702 General Physical Education II 1 (0-2) Credits
   
   Elective subjects: 3 credits, select from the following subjects
   
   GE 1002 Logic 3 (3-0) Credits
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<td>GE 1003</td>
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<td>GE 1004</td>
<td>Western and Eastern Civilization</td>
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<tr>
<td>GE 1005</td>
<td>Fundamentals of Philosophy</td>
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</tr>
<tr>
<td>GE 1006</td>
<td>General Psychology</td>
<td>3 (3-0)</td>
</tr>
<tr>
<td>GE 1007</td>
<td>Ethics</td>
<td>3 (3-0)</td>
</tr>
<tr>
<td>GE 1008</td>
<td>Man and Aesthetics</td>
<td>3 (3-0)</td>
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</tbody>
</table>

2. Social Science

- Required Subject: 3 credits
  - GE 1101 Man and Society | 3 (3-0) Credits

- Elective Subject: 3 credits select from the following subjects
  - GE 1102 Society and Government | 3 (3-0) Credits
  - GE 1103 Society and Law        | 3 (3-0) Credits
  - GE 1104 Society and Economy    | 3 (3-0) Credits

3. Science and Mathematics

- Required Subjects: 4 credits
  - GE 1201 Life and Environment   | 2 (2-0) Credits
  - GE 1202 Fundamentals of Mathematics | 2 (2-0) Credits

- Elective Subject: 2 credits select from the following subjects
  - GE 1203 Science and Society    | 2 (2-0) Credits
  - GE 1204 Fundamentals of Computer | 2 (2-0) Credits
  - GE 1205 Fundamentals of Statistics | 2 (2-0) Credits

4. Language

- GE 1501 Thai                      | 3 (3-0) Credits
- GE 1601 Foundation English I     | 3 (3-0) Credits
- GE 1602 Foundation English II    | 3 (3-0) Credits
<table>
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<tr>
<th>Course Code</th>
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<td>Arts Theory and Practice</td>
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<td>FA 1012</td>
<td>Drawing</td>
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<td>A Survey of Art</td>
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<td>FA 1014</td>
<td>Principle of Practical Art</td>
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<td>FA 1015</td>
<td>Basic Graphics</td>
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<td>FA 1016</td>
<td>Basic Design</td>
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<td>Experimental Design</td>
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<tr>
<td>CD 2804</td>
<td>Hand Forming</td>
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<td>Wheel Throwing I</td>
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<td>Wheel Throwing II</td>
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<td>Mold Making and Slip Casting I</td>
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<td>Decorating Techniques</td>
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<td>CD 3806</td>
<td>Fundamental Geology</td>
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<td>CD 3807</td>
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<td>Kiln and Kiln Design</td>
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<td>Ceramic Design Seminar</td>
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<td>From Ceramic Industrial Art area</td>
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<td>Minor Subjects: 18 credits (lecture-studio) from</td>
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<tr>
<td></td>
<td>subjects in the areas of Interior Design,</td>
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<tr>
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<td>Product Design, and Visual Communication Design</td>
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<td>3.1. Subjects from the area of Interior Design</td>
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<td>ID 2502</td>
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ID 2507 Construction I 2 (1-3) Credits
ID 3505 History of Interior Design and Furniture 2 (2-0) Credits
ID 3507 Decoration Thai Style I 2 (1-3) Credits
ID 3511 Interior Graphics 2 (1-3) Credits
ID 2609 Equipment Material and Furniture 2 (1-3) Credits

3.2. Subjects from the area of Product Design
PD 2601 Product Design I 3 (1-6) Credits
PD 2602 Product Design II 3 (1-6) Credits
PD 2603 Product Design III 5 (2-9) Credits
PD 2605 Two Dimension Design I 2 (1-3) Credits
PD 2607 Three Dimension Design I 2 (1-3) Credits
PD 3601 Mechanical Drawing I 2 (1-3) Credits
PD 3603 Packaging Design I 2 (1-3) Credits

3.3 Subjects from the area of Visual Communication Design
VD 2701 Visual Communication Design I 4 (2-6) Credits
VD 2702 Visual Communication Design II 4 (2-6) Credits
VD 2703 Illustration I 2 (1-3) Credits
VD 2705 Lettering and Typography I 2 (1-3) Credits
VD 2707 Photography I 2 (1-3) Credits
VD 3701 Visual Communication Design III 4 (2-6) Credits

Electives (7 credits) (lecture-studio)
FA 2062 Aesthetics II 2 (2-0) Credits
FA 2064 Industrial Psychology 2 (2-0) Credits
FA 2065 Industrial Organization and Manage. 2 (2-0) Credits
FA 2066 Individual Project I 2 (0-6) Credits
FA 2067 Individual Project II  
FA 2068 Individual Project III

2 (0-6) Credits
3 (0-6) Credits
APPENDIX E

EDUCATION IN THAILAND

Education in Thailand is free and compulsory for six years. All education is state controlled. There are four types of schools; 1) Government schools established and maintained by government funds; 2) Local schools which are usually financed by the Government; however, if they are founded by the people of the district, funds collected from the public may be used in supporting such schools; 3) Municipal schools, a type of primary school financed and supported by the municipality; 4) Private schools set up and owned by private individuals under the provisions of the 1954 Private Schools Act. The National Scheme of Education provides for education on four levels: 1) Pre-School Education (nursery and kindergarten), which is compulsory; 2) Elementary Schools Education; 3) Secondary Education; 4) Higher Education. Budgetary expenditure on education in 1987/88 was projected at 43,800 million baht, or 18% of total planned spending. Expansion of rural education has been an important project to stem the increasing flow of students to the cities, especially Bangkok.

Much has been done for the improvement in both quality and quantity of vocational training throughout the country. Short-term vocational courses are given in more rural areas, and new multi-vocational mobile schools have been tried out giving such courses as dressmaking, hairdressing, cooking, etc. Another innovation is the Special Agricultural School for the self-help settlements, designed to give such settlers a basic knowledge of agriculture. According to UNESCO estimates, the adult illiteracy rate in 1985 was only 9.0% (males 5.8%, females 12.2%).
Elementary and Secondary Education: Starts at the age of seven and lasts for six years. All children are required by law to attend elementary school. From 1955 on the Ministry of Education made an annual provision in the budget so that every district would have at least one primary extension school. These efforts have now spread to the villages, resulting in the opening of about 100 schools of this type every year. In 1985 there were 8,125,836 children in elementary education.

Secondary education aims at providing knowledge and skills to enable pupils to carry out an occupation or to prepare them for further education. Secondary education is divided into the lower and upper schools, each having no more than three grades. At the lower level, the studies cover a range of academic and vocational subjects but are not concerned directly with occupational skills. The upper level is designed to prepare students with knowledge and skills for directly taking up specific occupations. There is also a teacher-training stream at secondary level. In 1985 4,022,858 were in general secondary education; this figure does not include those in teacher training or vocational courses.

Higher Education: In 1989 there were 37 (16 government supports, and 21 private) universities and technical institutes in Thailand, offering both undergraduate and graduate courses in all fields. The enrollment of women, although small, has increased faster than that of men. Other higher education establishments include the various Military and Police Academies providing a
standard of training equivalent to that of civil establishments, and teacher-training establishments.