

CHAPTER II

REVIEW OF LITERATURES

The Faculty of Dentistry, Chulalongkorn University was originally founded in 1940. The present curriculum is a discipline-based curriculum and consisted of a 6-year program of studies leading to a Doctor of Dental Surgery (D.D.S.)². Presently, the faculty comprises 16 departments offering one bachelor degree program, and many postgraduate programs.

2.1 THE CURRICULUM OF THE FACULTY OF DENTISTRY, CHULALONGKORN UNIVERSITY

The curriculum had 5 major revisions³. The first to the fourth curriculum had the structure of six-year curriculum grouped as “two-two-two”. The first two years emphasized basic general sciences. The second two years figured basic medical sciences and pre-clinical dental laboratory subjects. The final two years were mainly practice in the dental clinic.

The first curriculum was used during 1940-1953. The structure of the curriculum was adapted from one of the University of Pennsylvania, in the United States of America. In the first two years, the dental students studied basic general sciences together with other health profession students. Dental school comprised of 12 departments, and took responsibility of dental students in their last 4 years, teaching pre-clinical and clinical subjects. Teaching and learning techniques were mainly lectures, demonstrations,

laboratory trainings and clinical practicing. The subjects taught and total hours used are summarized in Table 2.1.

The second curriculum was launched in 1957. The structure was similar to the first curriculum. Changes included increase or decrease of subjects, renaming of subjects, and/or increase or decrease of the contents. The hours of studying in the last 4 years increased from 4,523 to 6,097 hours. The subjects taught and total hours used are summarized in Table 2.2.

The third curriculum was used in 1969. The change was the introduction of the credit system. There were three terms in a year. Each term was consisted of 12 weeks. The credits were weighted by the hours used, i.e., 1 credit of lecture meant there was 1 hour of lecture of that subject in a week throughout of that term. The credit of laboratory and clinical subjects, however, were not standardized. The total credits of the last 4 years were 262. The total hours used were 5,772 (325 extra hours where dental students practice during university holidays were not included). The subjects taught and total hours used are summarized in Table 2.3. During this curriculum, the department of pediatric dentistry was established replacing the department of school of dental hygienist.

The fourth curriculum was established in 1972 to improve the clarity of the credit system. The bachelor degree of Doctor of Dental Science required a minimum of 230 credits through 6 years of studying. The structure of the curriculum consisted of 2 groups of subjects, general education and professional subjects. The subjects taught and credits used are summarized in Table 2.4. Four new departments were established during this period, included Department of Biochemistry, Department of Community Dentistry, Department of Periodontology and Department of Occlusion.

Table 2.1 : The First Undergraduate Curriculum of Faculty of Dentistry,
Chulalongkorn University (1940)

| CURRICULUM CONTENT OF THE 3 rd – 6 th YEAR | | | | | |
|--|------|-----|-----|-----|-------------|
| SUBJECT | YEAR | | | | HOURS |
| | 3 | 4 | 5 | 6 | |
| Anatomy | 490 | - | - | - | 490 |
| Physiology & Biochemistry | 488 | - | - | - | 488 |
| Bacteriology & Clinical Pathology | - | 116 | 5 | - | 121 |
| Pathology | - | 140 | - | 23 | 163 |
| Parasite | - | 46 | - | - | 46 |
| Operative Dentistry | - | 210 | 420 | 420 | 1050 |
| Prosthodontics | 215 | 210 | 210 | 210 | 845 |
| Dental Anatomy | 105 | - | - | - | 105 |
| Dental Histology | - | 33 | - | - | 33 |
| Dental Pathology | - | - | 70 | - | 70 |
| Pharmacology | - | 70 | 35 | - | 105 |
| Surgery | - | 59 | 90 | 230 | 379 |
| General Medicine | - | 70 | 35 | 46 | 151 |
| Oral Diagnosis | - | - | - | 35 | 35 |
| Orthodontics | - | - | 105 | 105 | 210 |
| Radiology | - | - | 70 | 46 | 116 |
| Dental History | - | 22 | - | - | 22 |
| Ethics | - | - | - | 4 | 4 |
| Economic | - | - | - | 11 | 11 |
| Laws and Forensic Dentistry | - | - | - | 11 | 11 |
| Medical Psychology | - | - | - | 22 | 22 |
| Health Education & Public Health | - | 35 | - | - | 35 |
| Public Health Administration | - | - | - | 30 | 30 |
| Nutrition | - | 11 | - | - | 11 |
| Total Hours | | | | | 4523 |

Table 2.2 : The Second Undergraduate Curriculum of Faculty of Dentistry,
Chulalongkorn University (1957)

| CURRICULUM CONTENT OF THE 3 rd – 6 th YEAR | | | | | |
|--|------|------|------|------|-------|
| SUBJECT | YEAR | | | | HOURS |
| | 3 | 4 | 5 | 6 | |
| Anatomy | 400 | - | - | - | 400 |
| Physiology & Biochemistry | 400 | - | - | - | 400 |
| Bacteriology | - | 192 | - | - | 192 |
| Pathology | - | 72 | 72 | - | 144 |
| Operative Dentistry | - | 432 | 516 | 552 | 1500 |
| Prosthodontics | 216 | 300 | 372 | 336 | 1224 |
| Dental Histology | - | 48 | - | - | 48 |
| Dental Anatomy | 288 | - | - | - | 288 |
| Dental Pathology | - | 72 | - | - | 72 |
| Pharmacology | - | 180 | - | - | 180 |
| Surgery | - | 36 | 36 | - | 72 |
| Oral Surgery | - | 36 | 360 | 400 | 796 |
| General Medicine | - | - | 108 | - | 108 |
| Oral Diagnosis | - | - | 24 | - | 24 |
| Orthodontics | - | - | 144 | 250 | 394 |
| Radiology | - | - | 59 | 48 | 107 |
| Dental History | - | - | - | 8 | 8 |
| Laws and Forensic Dentistry | - | - | - | 8 | 8 |
| Economy | - | - | 24 | - | 24 |
| Medical Psychology | - | - | - | 48 | 48 |
| Health Education & Public Health | - | 36 | - | - | 36 |
| Teaching Methodology | - | - | - | 24 | 24 |
| Total Hours/Year | 1304 | 1404 | 1715 | 1674 | - |
| Total Hours | - | - | - | - | 6097 |

Table 2.3 : The Third Undergraduate Curriculum of Faculty of Dentistry,
Chulalongkorn University (1969)

Curriculum Content of the 3rd Year

| Subject | Hours | Hours per week | | | | | | Credit per year |
|------------------|--------------|--------------------------|-----------|--------------------------|-------------|--------------------------|-----------|-----------------|
| | | 1 st Semester | | 2 nd Semester | | 3 rd Semester | | |
| | | Lecture | Practice | Lecture | Practice | Lecture | Practice | |
| Biochemistry | 132 | 3 | 7.5 | - | - | - | - | 6 |
| Physiology | 294 | - | - | 3 | 7.5 | 4 | 10 | 13 |
| Anatomy | 420 | 3 | 7.5 | 3 | 7.5 | 4 | 10 | 19 |
| Neurology | 42 | - | - | 1 | 2.5 | - | - | 2 |
| Dental Anatomy | 204 | 2 | 5 | 3 | 7 | - | - | 9 |
| Dental Histology | 42 | - | - | - | - | 1 | 3 | 2 |
| Prosthodontics | 264 | 3 | 8 | 1 | 3 | 2 | 5 | 12 |
| Dental Material | 24 | - | - | 1 | - | 1 | - | 2 |
| Total | 1,422 | 11 | 28 | 12 | 27.5 | 12 | 28 | 65 |

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Table 2.3 (Continued) : The Third Undergraduate Curriculum of Faculty of Dentistry,
Chulalongkorn University (1969)

Curriculum Content of the 4th Year

| Subject | Hours | Hours per week | | | | | | Credit per year |
|---------------------|--------------|--------------------------|-------------|--------------------------|-------------|--------------------------|-------------|-----------------|
| | | 1 st Semester | | 2 nd Semester | | 3 rd Semester | | |
| | | Lecture | Practice | Lecture | Practice | Lecture | Practice | |
| Operative Dentistry | 402 | 4 | 8 | 4 | 7 | 3 | 8 | 19 |
| Prosthodontics | 396 | 2 | 6.5 | 3 | 6.5 | 4 | 11 | 17 |
| Pathology | 168 | 2 | 5 | 2 | 5 | - | - | 8 |
| Bacteriology | 150 | 1 | 3.5 | 1 | 3.5 | 1 | 2.5 | 6 |
| Parasite | 84 | 1 | 2.5 | 1 | 2.5 | - | - | 4 |
| Pharmacology | 126 | 1 | 2.5 | 1 | 2.5 | 1 | 2.5 | 6 |
| Dental Material | 12 | 1 | - | - | - | - | - | 1 |
| Surgery | 84 | 1 | - | 2 | - | 1 | 3 | 5 |
| Oral Pathology | 42 | - | - | - | - | 1 | 2.5 | 2 |
| Total | 1,464 | 13 | 28.0 | 14 | 27.0 | 11 | 29.5 | 68 |

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Table 2.3 (Continued) : The Third Undergraduate Curriculum of Faculty of Dentistry,
Chulalongkorn University (1969)

Curriculum Content of the 5th Year

| Subject | Hours | Hours per week | | | | | | Credit per year |
|---------------------|--------------|--------------------------|-------------|--------------------------|-------------|--------------------------|-----------|-----------------|
| | | 1 st Semester | | 2 nd Semester | | 3 rd Semester | | |
| | | Lecture | Practice | Lecture | Practice | Lecture | Practice | |
| Prosthodontic | 72 | 2 | - | 2 | - | 2 | - | 6 |
| Physiology | 24 | 1 | - | 1 | - | - | - | 2 |
| Orthodontics | 144 | 1 | 3 | 1 | 3 | 1 | 3 | 6 |
| Periodontology | 36 | 1 | - | 1 | - | 1 | - | 3 |
| Oral Medicine | 36 | 1 | - | 1 | - | 1 | - | 3 |
| Surgery | 48 | 1 | - | 1 | - | 2 | - | 4 |
| Pediatric Dentistry | 36 | 1 | - | 1 | - | 1 | - | 3 |
| General Medicine | 72 | 2 | - | 2 | - | 2 | - | 6 |
| Public Health | 24 | 1 | - | 1 | - | - | - | 2 |
| Statistics | 72 | 2 | - | 2 | - | 2 | - | 6 |
| Medical Psychology | 24 | - | - | - | - | 2 | - | 2 |
| Dental Clinic | 816 | - | 23.5 | - | 23.5 | - | 21 | 23 |
| Total | 1,404 | 13 | 26.5 | 13 | 26.5 | 14 | 24 | 66 |

* Not include practice hours 32.5 hours / week for 10 weeks during the holiday period

Table 2.3 (Continued) : The Third Undergraduate Curriculum of Faculty of Dentistry,
Chulalongkorn University (1969)

Curriculum Content of the 6th Year

| Subject | Hours | Hours per week | | | | | | Credit per year |
|---------------------------|--------------|--------------------------|-------------|--------------------------|-------------|--------------------------|-------------|-----------------|
| | | 1 st Semester | | 2 nd Semester | | 3 rd Semester | | |
| | | Lecture | Practice | Lecture | Practice | Lecture | Practice | |
| Orthodontics | 24 | 1 | - | 1 | - | - | - | 2 |
| Periodontology | 24 | 1 | - | 1 | - | - | - | 2 |
| Radiology | 48 | 2 | - | 2 | - | - | - | 4 |
| Preventive Dentistry | 24 | 1 | - | 1 | - | - | - | 2 |
| Surgery | 60 | 2 | - | 2 | - | 1 | - | 5 |
| Prosthodontics | 72 | 2 | - | 2 | - | 2 | - | 6 |
| Office Administration | 24 | 1 | - | 1 | - | - | - | 2 |
| Medical & Treatment | 36 | 1 | - | 1 | - | 1 | - | 3 |
| Hospital administration | 12 | - | - | - | - | 1 | - | 1 |
| Oral Medicine | 12 | - | - | - | - | 1 | - | 1 |
| Economy | 12 | - | - | - | - | 1 | - | 1 |
| Laws & forensic Dentistry | 12 | - | - | - | - | 1 | - | 1 |
| General Anesthesia | 30 | - | - | - | - | 2 | - | 2 |
| Operative Dentistry | 24 | - | - | - | - | 2 | - | 2 |
| Oral Surgery Clinic | 108 | - | 3 | - | 3 | - | 3 | 3 |
| Dental clinic | 960 | - | 27.5 | - | 27.5 | - | 25 | 26 |
| Total | 1,482 | 11 | 30.5 | 11 | 30.5 | 12 | 28.0 | 63 |

Table 2.4 : The Fourth Undergraduate Curriculum of Faculty of Dentistry,
Chulalongkorn University (1972)

Curriculum Content of 1st–6th Year

| GENERAL EDUCATION (70) | | | |
|------------------------------------|-----------------------------------|--------------------|--|
| SOCIAL SCIENCE (6) | HUMANITIES (7) | LANGUAGE (6) | BASIC SCIENCES AND MATHEMATICS (51) |
| 313 183 SOCIETY AND CULTURE (3) | 110 180 CIVILIZATION (3) | 092 115 FE I (3) | 261 101 CALCULUS I (4) |
| 610 211 PRIN HEALTH ECON (3) | 119 101 INTRO TO PHILOS (2) | 092 116 FEL II (3) | 261 282 PROB & STAT BI SC (3) |
| | 467 101 BEHAVIORAL SCIENCE (2) | | 262 175 GEN CHEM I (3) |
| | | | 262 176 GEN CHEM II (3) |
| | | | 262 178 CHEM LAB (1) |
| | | | 262 233 PHYS CHEM (2) |
| | | | 262 261 ORG CHEM I (2) |
| | | | 262 262 ORG CHEM II (2) |
| | | | 262 219 ORG CHEM LAB (1) |
| | | | 263 105 GEN BIO (3) |
| | | | 263 106 GEN BIO LAB (1) |
| | | | 263 235 COMPAR ANAT (3) |
| | | | 263 236 COMPAR ANAT LAB (1) |
| | | | 264 103 GEN PHYS I (3) |
| | | | 264 183 GEN PHYS LAB I (1) |
| | | | 264 104 GEN PHYS II (3) |
| | | | 264 184 GEN PHYS LAB II (1) |
| | | | 272 201 CELL BIOLOGY (3) |
| | | | 272 250 CELL BIOLOGY LAB (1) |
| | | | 273 202 ELE MAT SC II (3) |
| | | | 472 603 GENERAL ANESTHESIA (1) |
| | | | 475 411 BASIC GEN SURGERY (1) |
| | | | 475 612 HEAD AND NECK SURGERY (1) |
| | | | 480 506 GEN MED I (2) |
| | | | 480 507 GEN MED II (2) |

Table 2.4 (Continued) : The Fourth Undergraduate Curriculum of Faculty of
Dentistry, Chulalongkorn University (1972)

| PROFESSIONAL SUBJECTS | | | | | |
|----------------------------|-----|------------------------------|-----|----------------------------|-----|
| (160) | | | | | |
| 661 301 GROSS ANATOMY I | (4) | 667 304 PROSTH LAB II | (1) | 670 503 INTRO TO ORAL SURG | (1) |
| 661 302 GROSS ANATOMY II | (2) | 667 341 DENT MAT I | (1) | 670 502 BASIC ORAL SURG I | (1) |
| 611 303 HISTOLOGY I | (2) | 667 342 DENT MAT II | (1) | 670 604 BASIC ORAL SURG II | (1) |
| 611 304 HISTOLOGY II | (2) | 667 421 PART DENT I | (1) | 670 602 ORAL SURG | (2) |
| 611 305 EMBRYOLOGY | (1) | 667 422 PART DENT LAB I | (1) | 670 603 CLIN ORAL SURG | (5) |
| 611 306 NEUROANATOMY I | (2) | 667 423 PART DENT II | (1) | 671 401 ORAL DIAGNOSIS | (1) |
| 611 307 NEUROANATOMY II | (2) | 667 424 PART DENT LAB II | (1) | 671 501 ORAL DIAG CLIN I | (1) |
| 611 310 ORAL HISTOLOGY | (2) | 667 431 C AND B I | (1) | 671 502 ORAL MEDICINE I | (1) |
| 662 401 MICROBIOL I | (1) | 667 432 C AND B LAB I | (1) | 671 503 ORAL MEDICINE II | (1) |
| 662 402 MICROBIOL LAB II | (1) | 667 433 C AND B II | (1) | 671 601 ORAL DIAG CLIN II | (2) |
| 662 407 MICROBIOL II | (1) | 667 434 C AND B LAB II | (1) | 671 602 ORAL MEDICINE III | (1) |
| 662 408 MICROBIOL LAB II | (1) | 667 441 DENT MAT III | (1) | 671 603 ORAL MEDICINE IV | (1) |
| 662 405 MICROBIOL III | (1) | 667 442 DENT MAT IV | (1) | 672 501 PEDODONTICS I | (1) |
| 662 406 MICROBIOL LAB III | (1) | 667 501 PROSTH CLIN I | (2) | 672 502 PEDODONTICS II | (1) |
| 663 402 ORAL PATH I | (2) | 667 511 COMPLETE DENT I | (1) | 672 503 CLIN PEDO I | (1) |
| 663 403 SYSTEM PATH | (1) | 667 512 COMPLETE DENT II | (1) | 672 601 CLIN PEDO II | (2) |
| 663 405 GEN PATHOLOGY | (2) | 667 521 PART DENT III | (1) | 673 301 BIOCHEMISTRY I | (3) |
| 663 406 GEN PATHOLOGY LAB | (1) | 667 522 PART DENT IV | (1) | 673 302 BIOCHEMISTRY II | (2) |
| 663 407 ORAL PATH II | (2) | 667 531 C AND B III | (1) | 673 303 BIOCHEMISTRY LAB | (1) |
| 663 408 ORAL PATH LAB II | (1) | 667 532 C AND B IV | (1) | 674 301 COMM DENT I | (1) |
| 664 403 PHARMACOLOGY I | (3) | 667 603 PROSTH CLIN II | (6) | 674 501 DENT HLTH ED | (1) |
| 664 404 PHARMACOLOGY II | (3) | 668 301 BASIC OPER DENT I | (1) | 674 502 EPIDEMIOLOGY I | (1) |
| 664 601 ORAL THERAP I | (1) | 668 402 OPER DENT LAB | (1) | 674 503 EPIDEMIOLOGY II | (1) |
| 664 602 ORAL THERAP II | (1) | 668 405 INTRO TO ENDODONT | (1) | 674 504 COMM DENT CLINIC | (1) |
| 665 301 PHYSIOLOGY I | (2) | 668 406 ENDODONTOLOGY | (1) | 674 601 COMM DENT II | (1) |
| 665 302 PHYSIOLOGY II | (2) | 668 407 ENDODONTICS PRACTICE | (1) | 674 602 COMM DENT III | (1) |
| 665 303 PHYSIOLOGY LAB | (1) | 668 408 BASIC OPER DENT II | (1) | 675 401 INTRO PERIO | (1) |
| 665 380 PHYSIOLOGY PROJECT | (1) | 668 409 RESTOR DENT | (1) | 675 402 PERIO CLINIC I | (1) |
| 673 380 BIOCHEM PROJECT | (1) | 668 410 RESTOR DENT LAB | (1) | 675 501 PERIODONTICS | (1) |
| 665 501 ORTHODONTICS I | (1) | 668 501 CLINIC OPER DENT I | (2) | 675 502 BAS PERIO THERAPY | (1) |
| 666 502 ORTHO LAB I | (1) | 668 601 COMPRE OPER DENT | (1) | 675 503 PERIO CLINIC II | (2) |
| 666 503 ORTHODONTICS II | (1) | 668 602 CLINIC OPER DENT II | (5) | 675 601 ADV PERIO THERAPY | (1) |
| 666 504 ORTHO LAB II | (1) | 669 401 RADIOLOGY I | (1) | 675 603 PERIO CLINIC III | (3) |
| 666 601 ORTHODONTICS III | (1) | 669 501 RADIOLOGY II | (1) | 676 303 DENTAL ANATOMY I | (2) |
| 666 602 ORTHO CLINIC | (2) | 669 502 RADIOLOGY CLINIC | (1) | 676 304 DENTAL ANATOMY II | (1) |
| 667 301 PROSTHODONTICS I | (1) | 669 601 RADIOLOGY III | (1) | 676 305 OCCLUSION I | (2) |
| 667 302 PROSTHODONTICS II | (1) | 670 401 LOCAL ANESTHESIA | (1) | 676 501 OCCLUSION II | (1) |
| 667 303 PROSTH LAB I | (1) | 670 403 EXODONTIA | (1) | 676 601 OCCLUSION III | (1) |
| | | 670 501 CLINICAL EXODONTIA | (2) | | |

Contents of the first to the fourth curriculum were “disease-oriented”. The curriculums emphasized more on dental treatment subjects such as fillings, extraction, and prosthetics. Outcome of the dental education using the first to the fourth curriculum: graduated dentists, then focused their practices mainly on dental treatments²¹. Most of them practiced in the big cities and limited numbers of people were served.

Due to the increase of the population and the maldistribution of the dentists, a new dental curriculum towards health rather than disease-orientated dental curriculum was then developed.

The fifth curriculum, which is the present one, was then established. The major change was the structure of the curriculum. It was grouped as “one-two-three”. The general science subjects were reduced to one year. The clinical subjects were increased to three years. Subjects in the area of dental public health, oral epidemiology, oral health education and community dentistry had been increased. Comprehensive community dentistry subjects had been established².

The present curriculum consists of 236 credits through 6 years of study (summarized in Table 2.5). Four groups of subjects are required: general educations (47 credits), faculty core courses (60 credits), professional areas of concentration (126 credits) and elective subjects (3 credits). The subjects taught and credits used are summarized in Table 2.5.

The goal of the present curriculum is to create qualified graduates possessing the following attributes:

1. Adequate knowledge in Dental Sciences and other related Health Sciences, in order to pursue advanced dental education and/or to operate research projects for solving dental health problems

Table 2.5 : The Fifth Undergraduate Curriculum of Faculty of Dentistry
Chulalongkorn University (1986)

Curriculum Content of 1st –6th Year

| GENERAL EDUCATION (47) | | | |
|--|--------------------------------|-------------------|---|
| SOCIAL SCIENCE (6) | HUMANITES (6) | LANGUAGE (6) | BASIC SCIENCES AND MATHEMATICS (29) |
| 313 183 SOCIETY AND CULTURE (3) | 110 180 CIVILIZATION (3) | 092 115 FE I (3) | 171 183 INTRO COMP PROG (3) |
| 660 610 LAW, ETH AND FOREN DENT (1) | 674 403 COMM DENT AND SOC (2) | 092 116 FE II (3) | 213 282 STAT BIO SCIENCE (3) |
| 674 611 DENT HLTH (2) | 674 612 APPLIED MED PSYCHO (1) | | 261 101 CALCULUS I (4) |
| | | | 262 167 GEN CHEM (3) |
| | | | 262 168 ORG CHEM (3) |
| | | | 262 178 CHEM LAB (1) |
| | | | 262 219 ORG CHEM LAB (1) |
| | | | 263 105 GEN BIO (3) |
| | | | 263 106 GEN BIO LAB (1) |
| | | | 264 109 MEDICAL PHYS (1) |
| | | | 264 189 MEDICAL PHYS LAB (1) |
| | | | 273 205 INTRO MAT SCI (3) |

| FACULTY CORE COURSES (60) | | | |
|---------------------------------|----------------------------------|-----------------------------------|--|
| 272 204 CELL BIOLOGY (2) | 662 301 MICROBIOLOGY I (1) | 664 405 PHARMACOLOGY I (3) | |
| | 662 302 MICROBIOLOGY LAB I (1) | 664 501 PHARMACOLOGY II (3) | |
| 660 310 ORAL RSRCH MTD (1) | 662 303 MICROBIOLOGY II (1) | 664 603 ORAL PHARMACOLOGY (1) | |
| 660 311 ORAL RSRCH PROJ (1) | 662 304 MICROBIOLOGY LAB II (1) | | |
| 660 520 ORAL BIOLOGY I (1) | 662 305 MICROBIOLOGY III (1) | | |
| 660 621 ORAL BIOLOGY II (1) | 662 306 MICROBIOLOGY LAB III (1) | 665 201 PHYSIOLOGY I (2) | |
| 660 550 SOFTWARE PACKAGE (1) | | 665 202 PHYSIOLOGY II (2) | |
| | 663 301 GEN PATH (2) | 665 203 ORAL PHYSIOLOGY (1) | |
| 661 201 GROSS ANATOMY I (4) | 663 302 ORAL PATH I (2) | | |
| 661 202 GROSS ANATOMY II (2) | 663 303 GEN PATH LAB (1) | 667 241 DENT MAT I (1) | |
| 661 203 HISTOLOGY I (2) | 663 304 ORAL PATH II (2) | 667 242 DENT MAT II (1) | |
| 661 204 HISTOLOGY II (2) | 663 305 ORAL PATH LAB (1) | 667 443 DENT MAT III (1) | |
| 661 205 HUMAN EMBRYOLOGY (1) | 663 401 SYSTEMIC PATH (1) | | |
| 661 206 NEUROANATOMY I (2) | | 673 201 BASIC BIOCHEMISTRY (2) | |
| 661 207 NEUROANATOMY II (2) | | 673 202 HUMAN BIOCHEMISTRY (2) | |
| 661 309 ORAL HISTOLOGY (2) | | 673 251 BIOCHEMISTRY LAB (1) | |
| | | 673 311 ORAL BIOCHEMISTRY (1) | |

Table 2.5 (Continued) : The Fifth Undergraduate Curriculum of Faculty of Dentistry
Chulalongkorn University (1986)

| PROFESSIONAL AREAS OF CONCENTRATION (126) | | ELECTIVE (3) |
|--|-----|---|
| 472 503 GEN ANES | (1) | 669 511 RADIOLOGY III (1) 669 512 RADIOLOGY CLINIC (1) |
| 480 406 GEN MED I | (2) | |
| 480 407 GEN MED II | (2) | 670 301 LOC ANES AND EXODON I (1) 670 302 LOC ANES AND EXODON II (1) |
| 660 601 COMPSVE DENT I | (8) | 670 312 BASIC GEN SURG (1) |
| 660 602 COMPSVE DENT II | (4) | 670 402 CLIN ORAL SURG I (2) |
| 660 603 COMPSVE DENT III | (5) | 670 404 ORAL SURGERY I (1) |
| 660 430 ERGONOMICS I | (1) | 670 405 ORAL SURGERY II (1) |
| 660 631 ERGONOMICS II | (1) | 670 504 ORAL SURGERY III (1) 670 505 ORAL SURGERY IV (2) |
| 666 401 ORTHODONTICS I | (1) | 670 506 CLIN ORAL SURG II (3) |
| 666 402 ORTHODONTIC LAB I | (1) | 670 507 HEAD AND NECK SURGERY (1) |
| 666 403 ORTHODONTICS II | (1) | |
| 666 404 ORTHODONTIC LAB II | (1) | 671 311 ORAL DIAGNOSIS (1) |
| 666 511 ORTHODONTICS III | (1) | 671 411 ORAL MED CLIN I (1) |
| 666 512 ORTHODONTIC CLINIC | (1) | 671 412 ORAL MED I (1) 671 413 ORAL MED II (1) |
| 667 211 COMPLETE DENT I | (1) | 671 511 ORAL MED CLIN II (1) |
| 667 212 COMPLETE DENT LAB I | (1) | 671 512 ORAL MED III (1) |
| 667 213 COMPLETE DENT II | (1) | 671 513 ORAL MED IV (1) |
| 667 214 COMPLETE DENT LAB II | (1) | |
| 667 221 REM PART DENT I | (1) | 672 401 PEDIATRIC DENT I (1) |
| 667 222 PART DENT LAB I | (1) | 672 402 PEDIATRIC DENT II (1) |
| 667 231 CROWN AND BRIDGE I | (1) | 672 403 PEDIATRIC DENT LAB (1) |
| 667 232 CROWN AND BRIDGE LAB I | (1) | 672 511 PEDIATRIC DENT III (1) |
| 667 315 COMPLETE DENT III | (1) | 672 512 CLIN PEDIA DENT (2) |
| 667 323 REM PART DENT II | (1) | |
| 667 324 PART DENT LAB II | (1) | 674 101 BAS COMM DENT (1) |
| 667 325 REM PART DENT III | (1) | 674 311 PREVENTIVE DENT I (1) |
| 667 333 CROWN AND BRIDGE II | (1) | 674 302 EPIDEMIOLOGY I (1) |
| 667 334 CROWN AND BRIDGE LAB II | (1) | 674 303 PRIN ORAL HLTH ANA (1) |
| 667 335 CROWN AND BRIDGE III | (1) | 674 401 EPIDEMIOLOGY II (1) |
| 667 401 PROSTH CLINIC I | (2) | 674 402 COMMUNITY DENT II (1) |
| 667 416 COMPLETE DENT IV | (1) | 674 511 PUB HLTH ADM (1) |
| 667 426 REM PART DENT IV | (1) | 674 512 DENT PUB HLTH ADM (1) |
| 667 436 CROWN AND BRIDGE IV | (1) | 674 513 COMMUNITY DENT II (1) |
| 667 502 PROSTH CLINIC II | (3) | 674 603 PREVENTIVE DENT II (2) |
| 668 211 BASIC OPER DENT | (1) | 675 311 INTRO PERIODONTICS (1) |
| 668 311 OPER DENT | (1) | 675 411 DIS PERIODONTICS (1) |
| 668 312 OPER DENT LAB | (1) | 675 412 PERIO THERAPY I (1) |
| 668 313 RESTOR DENT | (1) | 675 413 PERIO CLINIC I (2) |
| 668 314 RESTOR DENT LAB | (1) | 675 511 PERIO THERAPY II (1) |
| 668 321 INTRO ENDODONT | (1) | 675 513 PERIO CLINIC II (3) |
| 668 421 ENDODONT | (1) | |
| 668 422 ENDODONT LAB | (1) | 676 201 DENT ANATOMY (2) |
| 668 411 CLIN OPER DENT I | (2) | 676 202 DENT ANATOMY LAB (1) |
| 668 511 CLIN OPER DENT II | (3) | 676 301 OCCLUSION I (2) |
| 668 512 COMPRE OPER DENT | (1) | 676 401 OCCLUSION II (1) 676 402 OCCLUSION LAB (1) |
| 669 311 RADIOLOGY I | (1) | 676 511 OCCLUSION CLINIC (1) |
| 669 411 RADIOLOGY II | (1) | |

2. Dexterity in clinical examination, diagnosis, treatment planning and treatment of oral and other organ-related diseases, including rehabilitation.
3. An ability to promote dental public health and manage preventive measures
4. An ability to contribute knowledge in dental public health
5. Take responsibilities of the society, realization of the national problem, preparation to serve the community and willingness to take part in finding appropriate solution of public health problems.
6. Contain knowledge in practice administration, assume a leadership role and encompass good human relationship.
7. Good moral and professional ethics including preservation of Thai culture and identity

The present curriculum is a discipline-based curriculum, which emphasizes on the subject matter to be learned. Although the curriculum has served well, many problems still exist.

2.2 THE FORMATIVE EVALUATION

The Faculty conducted a formative evaluation to evaluate the fifth curriculum³. Both faculty members and students found the curriculum to be overcrowded. In spite of the problem, the faculty members thought that all subjects in the faculty core course group and in the professional areas of concentration group were necessary but at different values. The methods of teaching were also considered. As lecture was still the main means in

transferring knowledge to the students, there was no way to ensure that the students had proper ability to integrate their knowledge.

The study also used the Delphi technique to study the future requirements for dental graduates in the next 10 years. The study found that there would be a variety of career options for dentists because of the various needs of the society. There should be more integration of the basic medical science to the problems of oral diseases and clinical care. It would be promoted more as well as the greater cross-infection control.

Due to the changing technologies, nowadays computer plays an important role both in the teaching and learning process. Different teaching techniques should be manipulated to improve the quality of the students.

Subsequent summative evaluation tried shortly afterwards failed to materialize probably due to flawed strategic planning and administration of the evaluation coupled with poor cooperation of the stakeholders

Although the Summative evaluation could not be completed, the Faculty realized the importance of improving the curriculum. At the moment, there are some attempts to redesign and implement the curriculum that will meet the current and future requirements.

2.3 CONCERNS WITH THE TRADITIONAL DISCIPLINE-BASED CURRICULUM

The most characteristic and comprehensive feature of the disciplines design is the relative orderliness of the curricular design. The curriculum plan appears neatly divided into subjects. The responsible faculty members organized the course of study with appropriate concern for priority, sequence, and scope²². The curriculum generally includes didactic instruction in basic

and pre-clinical sciences followed by practice in clinical disciplines. As each department works as a separate unit, lecturers then emphasize their teachings on their own disciplines rather than on the practice of Dentistry. The dental students learn by accumulating knowledge and clinical skills. It is assumed that cognitive knowledge is a pre-requisite for clinical performance and integration across contexts to occur spontaneously. The problem is that greater didactic knowledge does not always reflect a higher level of learning²³. In addition, as a discipline-based, each subject is taught independently without proper integration. Some students might not be able to follow the flow of teaching and learning process and to integrate the knowledge by themselves.

In discipline-based model, all students study the same material, in the same setting, within the same time frame, which is a dubious assumption²⁰. Setting fixed time for any course implies that all students learn in the same manner and at the same rate, a presumption rejected long ago by students of human learning.

Nowadays exploration of knowledge rapidly expands because of the fast advances of biotechnology and biomedical sciences. Dentistry, like other medical science, has added and immense body of new knowledge. Teachers are responsible of transferring a large amount of scientific fact and theories to students just like spoon-feeding mainly through lecture. The curricula become densely packed with content overload. It allows little time for students to reflect on their understanding, what they learn and how to translate their knowledge into practice. Students tend to memorize facts without truly understanding. Furthermore, it causes anxiety and stress that undermine the quality of students' physical and mental health⁵.

Another concern is that students spend much of their time in pre-clinical work on phantom heads and in department clinics, which carry very little resemblance to the real world. In laboratory, students are required to learn to create fillings and crowns and dentures but lack of other aspects of comprehensive dentistry such as patients' care, communication skills, interpersonal relationships, decision-making skills. They also develop technical skills without sufficient development of clinical reasoning. In clinical training, students are also forced to complete requirement of each discipline or department. Not only students lose their opportunities to develop comprehensive patient care, but also patients' needs get less consideration²⁴²⁵. Furthermore, since most of the dental schools are separate from medical schools and hospitals, students have not enough experiences working in a health care team caring for medical patients²⁴²⁶.

The curricula also gives little emphasis on the skills for patient/practitioner communication, patient /practitioner interaction, and interpersonal relationships. Formal and systematic training in administrative and management skills do not exist⁷¹¹²⁴.

Another major limitation of discipline-based curriculum is the lack of direct association of the organized subject matters to the problems and the interest of the students. The subject matters will be more interesting if they are present in the context of real-world problems that face practicing dentists²⁶.

The educational evaluation of dental students' achievement has also been questioned. In the disciplined-based curriculum, didactic courses and practicing courses are taught separately. Therefore, knowledge and practicing skills are usually tested separately. Knowledge testing is usually done by recalling isolated facts. Practicing skills are usually assessed by checking

how close to the standard performance a student could perform or by looking at the freedom of error. Concerns about these evaluation techniques have been raised. Firstly, it is not true that greater knowledge means higher level of learning. Secondly, knowledge does not always precede performance. Thirdly, better performance implies performing in a wider range of circumstances and responding appropriately rather than approximation to the ideal or standard performance^{23 27}.

The challenge to improve health care and the corresponding needs to improve education for the health professions are beginning to highlight these limitations of the discipline-based model. However, the most common response has been revision of curriculum content to reflect the latest findings and clinical techniques. Courses and disciplinary distinctions have been preserved, while changes are seen most in new course syllabi, new textbooks, new audiovisual materials, or new time allotments. These changes rarely bring dental education closer to the real world of practicing dentists²⁰.

2.4 EXTERNAL FACTORS AS THE SOURCES OF STIMULUS TO EVALUATE AND REFORM THE CURRICULUM

Many fundamental changes have taken place in the parameters that affect, or should affect dental care. These range from improved scientific understandings of the caries process, to societal realization that maintaining oral health through regular preventive dental care, as opposed to ongoing restorative dental procedures, is a worthwhile and achievable goal²⁸. However, many dental schools still focus heavily on teaching restorative dentistry on the belief that the treatment of dental caries should be managed by cutting out tooth structures and by restoring the damaged tooth to "normal"

form and function. These beliefs increase the risk of unnecessary treatment and repeat restoration cycle. Thus, dental education should consider seriously the failure to give dental students the present philosophy of good dental care, that gives priority to prevention as well as minimally invasive restorative treatment.

Dentists in the twenty-first century have to serve the oral health needs of multicultural community. The patient involves a broad spectrum of the population. Both low and high technologies have roles in different situations. The social and cultural aspects should be highlighted so that proper management of health care could be established for each community¹².

As medical compromised patients and the number of elderly persons increase, dental schools will have to prepare their students to be able to handle these patients. In the future dentists will have to work closely with the medical and other health professions, both in the hospital and the community^{12 29}.

Health care reform, changes in the funding of health care services, hospital accreditation, changing patient expectations^{29 30} are other external forces that put pressure on dental schools to seriously look at their present curriculum.

Finally, the most salient external force impinging on the revision of the curriculum is accreditation. The university quality assurance system has the strongest impact on the dental school. The dental school has to be able to assure that the school has provided high standard of education relevant to the needs of the nation. Therefore, the dental school needs to establish an effective system that could ensure that all dental graduates have satisfactory knowledge and have acquired appropriate personal skills and clinical

competence upon completion of the study. This could be done by clearly redefined the educational objectives, which can translate into outcome measures to evaluate the success of the dental education. In turn those outcome measures will provide data supporting that the educational objectives have been met.

2.5 BROAD CHANGES IN EDUCATIONAL THOUGHT

Western Countries, especially the United States of America and Canada, also had similar problems. Two Pew Health Professions Commissions Reports recommended changes or improvement in knowledge, skills, and values of future dentists to ensure that they were adequately prepared to practice in new work environments, such as managed care settings, and in interdisciplinary teams^{4 31 32} The Institute of Medicine sponsored a study to assess the dental education in the United States of America and made recommendations regarding the future of dental education⁵.

The study found that the curriculum was crowded with redundant or marginally useful materials and gave students too little time to consolidate concepts or to develop critical thinking skills. Comprehensive care was more ideal than real in clinical education, and instruction still focused too heavily on procedures rather than on patient care. Linkage between dentistry and medicine was insufficient to prepare students for growing volume of patients with more medically complex problems and an increase in medically oriented strategies for prevention, diagnosis, and treatment. The basic and clinical sciences did not adequately relate the scientific basis of oral health to clinical practice. Lack of flexible tenure and promotion policies and resources for

faculty development limited the efforts to match faculty resources to education. Despite progress, an insensitivity of students' needs was still a concern.

The Institute of Medicine made twenty-two specific recommendations that revolve around five major themes. Firstly, closer integration of dental and medical education is needed because dental practitioners would have to work more closely with other health professionals. Secondly, dental education must teach desirable models of clinical practice with diverse settings and interaction with diverse populations. Thirdly, dental schools will need to demonstrate their value to their parent universities, health centers and communities and can no longer afford to be isolated centers. Fourthly, accreditation and licensure should be continuously reformed to minimize the deficiencies in the present system. Fifthly, it proposed that each dental school should develop a better plan and timetable for curriculum reform. Emphasis should be put on the integration of the basic, behavioral and clinical sciences. Decompression of redundant subjects and materials should occur. Active learning and preparation of students for lifelong learning should be dominant mode of instruction. More experimentation with new models of education and practice were urged in order to be ready for the future³³.

Broad changes in educational thought have risen. Factors that gave rise to it were:

Teaching is learning. The quality of teaching can be testified by the outcome of students. Goals for student learning should be clarified in terms of what students should know and be able to do. Information about what competent practitioners know and are able to do drives goal specifications³³.

Trying to teach everything does not work well. Students are often overwhelmed by the quantity of information presented and frequently come

away with an inadequate understanding and appreciation for what is important³⁴. Selection of course contents with more precision may be one of the alternatives to develop an appropriate curriculum. However, it is necessary to know precisely what dentist now do in real practice to determine the minimum curricular essentials that will ensure competency.

Dental education has to be open to modification - to better teaching and learning strategies, and to new attitudes and methods that will cope with the fact that it is impossible to teach or provide the opportunities to learn everything that graduates will encounter in variety of career practice setting²⁹.

It is realized that dental education leading to the first dental degree is just one step in a forty-plus year journey as the individual moves through formal to informal educational experiences in one's professional lifetime. The design of pre-doctoral dental curriculum, then, must be based on an understanding of the knowledge and skills that form the foundation for further knowledge and skills that must be acquired after graduation. Dental schools must prepared their students for their own future learning by emphasizing on active learning³².

Moreover, the society expects safe, effective, and accountable practice. It expects more than course-passers. It wants competent practitioners who are caring and ethical. The dental school should not graduate anyone who cannot function as a complete general practitioner. Intellectual competence, physical technical competence and interpersonal competence are components of competent practitioner.

Now richer models of professional practice exist. Advances in psychology and cognitive science bring much richer understanding about learning itself, and on how to nurture competence³³.

A sense of competence is a key component of both intellectual development in general and of professional effectiveness in particular. It is a sense of competence that enables practitioners to cope with challenges and problems and to achieve personal and client goals.

2.6 THE COMPETENCY-BASED CURRICULUM

“Competence” in the competency-based education literature, is considered to be a global, multifaceted construct consisted of equal parts of knowledge, experience, problem-solving ability (derived from accumulated knowledge, experience and reflection, intellectual maturity, self-confidence, professional and ethical values), and, in certain professions including dentistry, motor skill automatically. The goal of an academic program based on competency is to provide students with learning experiences that allow the integrated development of the multiple components of competence, rather than isolated development of subordinate skills¹⁴.

The competency-based curriculum for dental profession derived from the idea that dental curricula should be characterized in term of their impact on students, expressed as competencies, rather than discipline-based contents. Instructional and behavioral objectives with content and discipline-specific emphasis can be reframed into a new integrated curriculum design that will reinforce the relationship between the basic biomedical, clinical and behavioral sciences¹³. Competency-based curriculum emphasizes functions. It is grounded on the empirically validated principle that states that students, when given appropriate instruction, can master the prescribed basic performance objectives. The intended output of a competency-based curriculum is a health professional who can practice dentistry at a defined

level of competency in accord with local conditions to meet local needs²⁰. The achievement of competency by all graduated students is a reasonable yardstick by which to measure the efficacy of the curriculum. Characteristics that define competency-based curriculum include:¹²

- 1) Precise definition of trainee outcomes
- 2) Curriculum that focuses on what students need to learn in order to perform well in real practice
- 3) Hierarchically sequenced, interdisciplinary learning modules linked to specific competencies
- 4) Competency assessment techniques that measure unassisted learner performance in setting that closely approximate a real work environment

2.6.1 COMPETENCY AND COMPETENCY STATEMENTS

Competency is the midpoint of the continuum of professional growth from novice to expert. It is a transition not the end point. Ideally professional development begins the first day the student enter dental school and does not end until the day the dentist completely retire from the profession. The process can be divided conveniently into five stages: novice, beginner, competent, proficient and expert^{13 35}. The most significant milepost is the attainment of the first professional degree, which corresponds to the attainment of the professional competency. Competencies are abilities essential to beginning the practice of Dentistry. These abilities incorporate understanding, skill and values in an integrated response to the normal range of problems and challenges in the practice of dentistry that will allow a graduate to practice safely and independently²³. The competencies can be described by several basic characteristics:

- A typical part of the general practice of dentistry
- A combination of knowledge and attitude, psychomotor skills, and/or communication skills
- Perform in a clinical setting or clinical context
- The continued performance at or above the defined standard of care³⁶

The foundation of building competency-based dental curriculum is based on developing competency statements that describe the dental graduates¹⁹. Writing competency statements is to change one perspective from that of the subject matter expert, who lists things student must do in school, to a broader perspective of identifying the essential skill, knowledge, and values necessary to practice dentistry²³. The competency statements characterize the basic skill set of general dentists.

The difference between competency statements and instructional objectives are: firstly, instructional objectives describe the ability the students must be able to do in school according to each discipline. Competency statements, are similar to instructional objectives, but describe the ability of graduates in real dental practice. Secondly, instructional objectives that come from single disciplines usually do not cross boundaries. Competencies are by definition interdisciplinary; therefore, competency statements would be built across boundaries³⁵. Thirdly Competency statements do not answer all questions about testing circumstances, alternative methods, or evaluation criteria as instructional objectives do²³.

The value and usefulness of these competencies are directly related to two applications.

The first application is defining the core content of the predoctoral curriculum. The competency-statements are used to identify relevant contents and provide guidance on decisions³⁶.

Competency statements will provide the basis for rebuilding the curriculum from a segmented format to one that will allow students to learn and perform in a way that are more closely resemble to how they will be expected to function as a practicing professionals.

Because a competency-based curriculum focuses on the mastery of actual job skills, which are multi-component behaviors requiring horizontal integration of knowledge and skills required from several specialty areas, competency-based education is much more likely to feature interdisciplinary learning than traditional curricula¹⁴ Competencies support integration and merge all disciplines which should benefit both students and patients who are receiving treatment¹⁷.

A second application is related to the issue of outcomes assessment. The dental school will have in place methods to measure the degree to which a student has acquired competencies and can demonstrate the competencies needed to care for patients.

The different ways to evaluate the outcomes of the curriculum will also be developed³⁷ Multiple evaluation methods from multiple courses were necessary to evaluate a single competency³⁸.

2.6.2 THE DEVELOPMENT OF COMPETENCY STATEMENTS

To develop competency statements, careful delineation of components of dental practice is the first and most critical step in designing a competency-based curriculum. A variety of techniques are used to identify

and validate competencies including expert panels, practitioner surveys, job and task analysis, critical incident techniques, the Delphi process and Health care needs. ^{14 20}.

Experts are typically the first step in the identification of the entry-level competence for a licensed professional. They may be a highly selected group who give consensus on components of the competencies. Experts can help in the following functions:

- 1) To define general areas of knowledge and skills necessary for practice Dentistry,
- 2) To rank those areas according to their relative importance ,
- 3) To identify specific components within those areas,
- 4) To provide operational definitions of those components, and
- 5) To designate the required level of competence which a qualified dentist should demonstrate in each area.

Dental practitioners can provide valuable information on what competencies are essential or useful in current practice Practitioners are requested to identify responsibility and tasks that are currently and frequently in their professional practice. Observation by peers or others using observation guide and checklist is another method to gain the data.

Critical incident technique has been employed in many health professions to identify competencies that must receive special attention in the curriculum because they potentially can endanger patient or require a high degree of practitioner flexibility, spontaneity or judgment in their execution. The responders are usually requested to describe incidents of dental care, which they have observed and judged to reflect superior or poor performance. The setting which the event took place, what happened, account of the outcome

and why it was judged to be effective or ineffective are examples of the questions given.

The Delphi Technique is a group consensus process commonly used in the health professions to ensure that academic programs are future-oriented and remain on the cutting edge in relation to public needs and the advance of science.

Health care needs of the community, and the resources available to meet those needs should provide the principal directional signals in building the curriculum. Public health statistics represent one major clue to the knowledge and skills dental graduates must acquire. Dental records from hospitals, health centers or individual physician practices represent another potential source of formation about needs that can guide curriculum developers. Social, economic, and political realities must be reflected in the program through which its dentists are educated. Health personnel education has to adapt to social and economic needs as reflected in political decisions on national priorities²⁰.

2.6.3 COMPETENCY-BASED SYSTEM

There are three stages in the evolution of dental competency-based education. The first stage is to develop sets of statements defining graduates of various educational experiences. The second stage is the issue of competency evaluation. The third stage is to combine the written statements and evaluation methods into a complete and integrated system³⁹. These three stages could be accomplished by answering three questions: 1) What knowledge, skills, and values should the entry-level dental practitioner possess? 2) What curriculum structure and learning experiences will help

dental students attain these competencies?, and 3) How do dental school faculty know if students have attained these competencies? ¹⁴

As a system, competency-based curriculum includes course objectives, competency statements, programme goals, comprehensive evaluation methods, course and curriculum development, rationale allocation of resources, accreditation, and responsiveness to other constituents³⁹.

The basic components of the competency-based system include the course, the curriculum and the program. All part of a competency-based system interacts and must fit appropriately. Glassman P. and Chambers DW.³⁹ demonstrated the relations of the components of the system using three figures as will be shown in the following section.

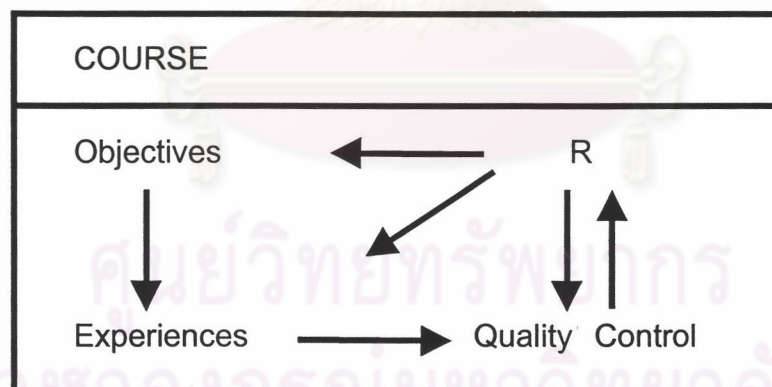
2.6.3.1 THE COURSE

In competency-based education, learning is not defined as acquiring some proportion of knowledge, skills, and values in a set of disciplines, but acquiring the ability to function appropriately in the environment learners are entering. As courses are bundles of experiences for learners, the selection of course objectives in the competency-based perspectives should be grounded on what should students learn in each course that can help them to function effectively in new contexts, for examples, entering the next course, entering into clinical practice course, and entering in to real practice etc.

The learning experiences should follow the objectives. The quality control or evaluation should measure whether the learner has changed sufficiently to progress to the next level. Three major classes of corrective actions include rejection of the student to move to the next experiences, redesign of the course experiences (for the next go round) and remediation

where the learner who is deficient is partially cycled through supplement experiences designed to correct the deficiency. Occasionally, two other actions will be used: reconsideration to modify unrealistic or inappropriate objectives, reappraisal of the evaluation method when there is a question about the quality control methods themselves. The link between the competency-based system at the level of individual bundles of experience and the curriculum as a whole is made through course objectives. These are phrased as those behaviors that qualify learner for the next experiences, and those who are responsible for the subsequent experiences should have a voice in framing these objectives. The relations of each component in the course level are shown in Figure 2.1.

Figure 2.1 Competency-based system for courses

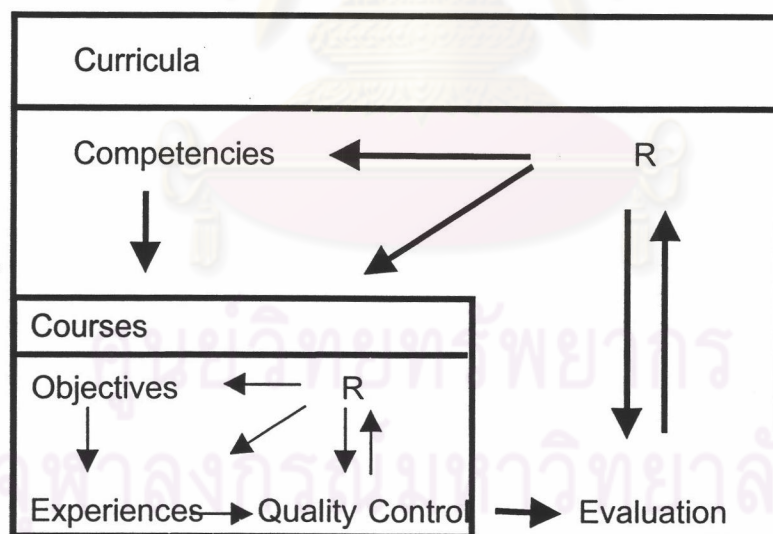


- R =
- a) Reconsideration of Objectives
 - b) Reappraisal of Quality Control
 - c) Redesign of Experiences
 - d) Remediation (in-course)
 - e) Rejection of Students

2.6.3.2 THE CURRICULUM

The entire system for the course has become a single component at the curricular level as shown in Figure 2.2. At the curriculum level, objectives become competencies, experiences become courses, quality control become student evaluation, and qualified becomes competent. The same five components in competency-based system model can be applied at the level of the entire curriculum. Redesign at the curriculum level concerns with sequencing, total coverage, and articulation of experiences. Remediation often means adding special courses or requiring that students repeat a year of instruction. Rejection normally involves diminishing a student from school.

Figure 2.2 Competency-based system for curricula



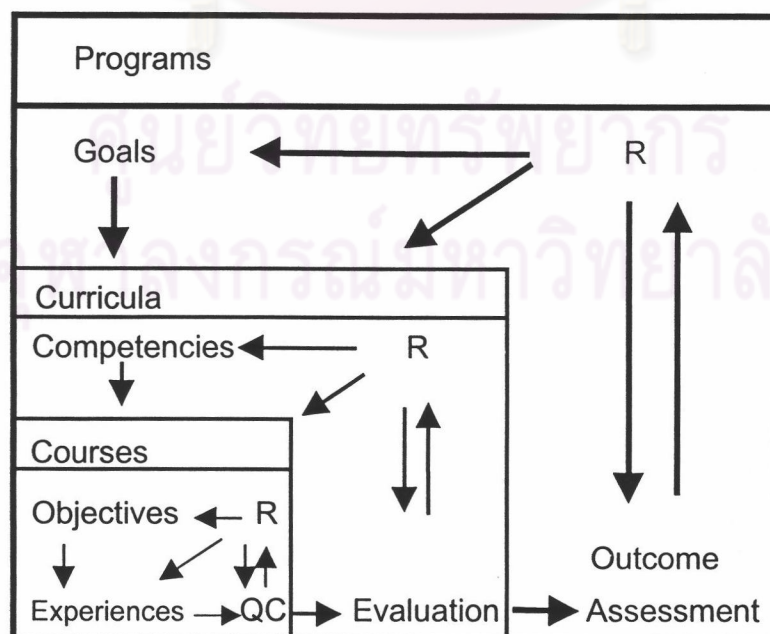
- R =
- Reconsideration of Competencies
 - Reappraisal of Evaluation
 - Redesign of Course
 - Remedial Course
 - Rejection of Courses and Students

2.6.3.3 THE PROGRAM

Figure 2.3 shows the relationships among the course, the curriculum and the program. The curriculum and the resulting profile of competencies of its graduates are one element in overall program assessment. Program goals also include patient service, community service research, fiscal solvency, and others. Again, the objectives of the program become goals, experiences become courses and curriculum and evaluation of the program becomes outcome assessment. The same five components of competency-based system models can be applied at the level of the programs.

Competency statements play a critical role in permitting communication between levels in the system. They are the common language of quality between the curriculum and the wider community concerned with the program.

Figure 2.3 Competency-based system for education programs



- R = a) Reconsideration of Goals
b) Reappraisal of Outcome Assessment
c) Redesign of Curricula
h) Remedial Reworking of program component
i) Rejection of Courses and Program

2.7 COMPETENCY-BASED CURRICULUM DEVELOPMENT IN THE WESTERN COUNTRIES

The first dental school to develop competencies statements was the University of Puerto Rico in 1987/88. Since then, probably half of U.S. dental schools have developed sets of competencies to be used for accreditation purposes or for the curriculum committees to analyze or to modify their educational programs. Some of the schools have gone through several generations of competencies statements²³.

The American Association of Dental Schools took the lead in coordination of competency-based education in 1994. The House of Delegates adopted a position that curricula would be discussed in terms of competencies rather than continuing to develop the curriculum guidelines based on specific disciplines¹⁵.

In 1997 the House of Delegates approved a prototype set of competencies for new dentists. These competencies could be used as a starting point for schools and others wishing to develop their own set of competencies. The Council of Sections of the Association had considered plans for full development of foundation knowledge and skills, appropriate evaluation mechanisms, and research supporting both appropriateness competency statements chosen and the learning process underlying

competency education. More recently, competencies are also being considered in the postdoctoral dental programs and competencies also entered in the areas of accreditation and initial licensure¹⁶.

Thematic Network on European Dental Education provided a list of basic clinical competencies required of all newly graduated and/or newly registered dentists in the European Union¹⁸. The clinical competencies listed were the minimum competencies required throughout Europe for the safe practice of Dentistry but did not cover the full range of competence required of a modern dentist.

The whole cycle of full development of competency education is still in progress. A survey of staffs of Faculty of Dentistry opinions is certainly needed and is crucial as Faculty staffs are major stakeholders. This study aims to survey at least 10 Clinical Departments as a first step in that direction.

2.8 SURVEYS OF OPINIONS TOWARDS DENTAL COMPETENCIES

2.8.1 SURVEYS OF FACULTY STAFFS

Review of the dental literatures revealed some published reports or surveys of the faculty members' opinions towards the dental competencies. Graber et al. assessed the opinions of the academic deans of all United States Dental Schools to determine the extent to which dental education programs were responding to contemporary calls for educational reform³¹.

The survey measured the extent to which these educators believed that 33 selected competencies were presently emphasized and the extent to which they believed should be emphasized in the required curriculum. The survey also asked the respondents to choose three topics among the list that

they believe were most important to assure that their graduates were prepared adequately for practice in the evolving health care system.

“Health promotion/disease prevention”, “primary care”, and “effective patient-provider relationships/communication” were the three topic areas rated most highly for ideal emphasis by the academic deans. Four of the top five rated topics were the same for both current and ideal emphasis.

“The use of electronic information system”, “accountability for cost effectiveness and patient outcomes” and “primary care” were the items believed to be the most important competencies to assure that their graduates were prepared adequately for practice in the evolving health care system.

The limitations of the survey include: First, the dental academic deans, although a key group with considerable influence on curriculum development, are not solely responsible for curriculum development. Second, the survey was designed to be brief and easy to complete so that detailed demographic questions and differences between dental schools were not explored. Third, the survey evaluated only those competencies that have been consistently identified as critical to the preparation of all future health care professionals.

Postdoctoral General Dentistry Program directors were surveyed to determine the extent to which they felt the 85 proposed competencies match their concepts of the postdoctoral general dentistry graduate, both of their own program and of all postdoctoral general dentistry programs⁴⁰.

It was found that between 44-65 competencies statements that were rated highly by program directors could serve as the basis for a “core” set of statements to describe the abilities of graduates of postdoctoral general dentistry programs.

De Wald and McCann 1999 described the curriculum development process used by the Caruth School of Dental Hygiene to develop a competency-based curriculum for a dental hygiene program. A three-step process was used that involved developing a competency document, an evaluation plan, and a curriculum inventory³⁸.

In the first step, the document "Competencies for the Dental Hygienist" was developed. Departments that were assigned by the administrator to define the knowledge, skills, and values the hygienist should ideally have upon graduation did this. The competencies were organized into two domains: major competencies and supporting competencies, before being presented to the whole faculty for discussion and editing.

2.8.2 SURVEYS OF DENTAL PRACTITIONERS

In the past, most dental schools evaluated their curricula through review committees and other processes that did not extend outside the school. Most of the studies generally covered only one aspect of practice, rather than multiple aspects of dental education and practice. Necessary cautions have been exercised to assess the needs for curriculum changes in sound and realistic ways based on reliable and valid scientific evidences. Assessment of areas of interests and needs of dental practitioners about dental education is one important approach to gain data necessary in planning curricular reform. This type of information should be incorporated in individual schools' curricular assessment and pervade in the education culture so that there would be a curriculum alteration that would be useful, practical and appropriate²⁹. The main reason why general dental practitioners must be involved in the planning

of undergraduate courses is that general dental practice is where the majority of dental graduates spend their career⁴¹.

Stewart L., et al.,⁴² surveyed the opinions of dentists with a view to assess the present undergraduate curriculum in relation to clinical dental practice. The questionnaire sought the opinions regarding the priority to be given to basic sciences and medical sciences as well as the production of topics not presently included in the undergraduate course. Anatomy, pathology and medicine were the three subjects with the greatest proportion of “high” ratings. The three topics which were not presently included in the undergraduate course but were recommended highly for inclusion including practice management/ administration”, “professional relationship” and “relative analgesia”

Shugars D.A., Bader J.D. and O’neil E.H.⁴³ assessed dentists’ attitudes about the importance of formal training in 16 competencies that reflect skills, attitudes and behaviors, identified by the commission. Most respondents indicated that competency in treating and preventing disease, practicing ethically, communicating with patients, applying problem-solving techniques, and continuing to learn were very important.

Meadows H. Ireland R. and Bligh J.⁴⁴ assessed the attitudes of general dental practitioners towards aspects of changes in undergraduate dental education. A questionnaire of 50 items was distributed to each of 712 general dental practitioners using a Likert-like 5-point scale. Around 90% of them agreed that it was important for dentists to have competencies related to medical conditions. Examples are referral for the second opinion, up-to-date on cardiopulmonary resuscitation, communicating effectively with other health

professionals involved in their patient's care, good knowledge of first aid, capability to identify medical conditions.

Furthermore, about 95% of them agreed that dentists should do self-direct learning and continuing education. There were elements of their own dental training they had not used since they graduated. To work as a member of health care teams should be taught as well as to become leaders of oral health teams.

2.8.3 THE STUDY OF SELF-PERCEPTION OF COMPETENCE OF GRADUATES

There has been no study on the outcome of new dental graduates in terms of competencies in Thailand. There are several reports that assessed self-perceived levels of proficiency focused on individual procedures in Dentistry. But very few reported broad educational outcomes. Holmes DC, Diaz-Arnold AM, and Williams VD⁴⁵ developed a survey instrument to evaluate self-perceived competency in twenty-one selected areas at the time of graduation of the 1985-1994 graduates.

The alumni were asked to rate their perceived level of personal competency on a four-point scales (1=never competent; 2 = seldom competent; 3= usually competent; 4=always competent). Furthermore the subjects were asked whether they felt adequately prepared for the board examinations and for independent practice. Specific demographic data were also consolidated.

The results indicated that graduates felt most competent in the fundamental aspects in clinical dentistry. The least competent competency fell into the area of occlusion and temporomandibular joint disorders. Very little

association was demonstrated between demographic characteristics of the respondents and their competency self-ratings. The shortcomings in this study were, firstly the graduates were asked to recall and assess their perceived competence at the time of graduation so that the recall bias might influence the validity of the results. Secondly, the instrument was not pre-tested. Lastly no further mailing was sent to the non-responding alumni.

Another study was done by Greenwood LF, Lewis DW, and Burgess RC⁴⁶ to assess self-perception competencies of 1993-1996 graduates. A questionnaire composed of 63 competency statements modified from dental student competencies developed by the Association of Canadian Faculties of Dentistry, with a four-point Likert scale (very well-, well-, poorly-, very poorly prepared) was used. Descriptive statistics were used to describe the results. Chi-square and One-way ANOVA were used to test the significance of the differences in responses according to graduation year.

The results were similar to those from the study by Holmes DC et.al. where graduates felt more competent in the area of common items of Dentistry, such as basic restorative dentistry, examination, diagnosis, treatment planning, local anesthesia, and scaling. The areas they felt less well prepared were financial and personnel management, performance of soft-tissue biopsies, and management of chronic orofacial pain. In this study, graduates were also asked to recall their perception at the time of graduation. The recall bias might affect the validity of the results. The questionnaire was pre-tested by six recently graduated dentists and a few revisions were made.

2.9 THE PRESENT STUDY

In order to introduce the Faculty Staffs to the perspective of the competency statements as well as to gain their opinions towards competencies standard suitable for new dental graduates of the Faculty of Dentistry, Chulalongkorn University, the author decided to use a questionnaire that contained competency statements as items to assess and to measure their opinions.

Dental practitioners were chosen as another group to be included in the study because they were important stakeholders to be concerned. Their opinions would reflect the real needs of dental practitioners where most of the new dental graduates would enter into after graduated.

Competency statements used in the study were adapted from competency standards of three Dental Schools in the United States of America. Apart from being available to retrieve data from the Internet, two of the schools were chosen because they were pioneers in developing competency statements. Another school was chosen because many Faculty staffs finished their post-graduate studies there.

The questionnaire used both close-ended and open-ended questions to assess the opinions. Details of methodology and questionnaire development are present in the next chapter. The author expects that the result of the study will be useful as the starting point of curriculum redesign to meet both the national needs as well as the international standards.