

## CHAPTER V

### OUTCOME MEASURES

#### Outcome Attributes being Measured.

The outcome of this study were divided into two variables categories, dependent and independent variable.

#### 1. Dependent variable (professional competence).

1.1 The professional competence of the new graduates.; were primary outcome which stated as variables depended on educational factors. They were classified into 9 categories which rated by the new graduates themselves and their supervisors as shown in the table 5.1. The overall rating (rating as a whole on each category of competence) were done by the supervisors in the area of clinical problem solving skills, evaluative skills, treatment skills, and planning and treatment of common diseases.

1.2 The professional competence of the 1989 graduates.; were outcomes which used to compare with the professional competence of the new graduates. They were also in the same categories and rated by 1989 graduates and their supervisors as shown in the table 5.1

Table 5.1 Dependent variables, sources of data, and instrument used

VARIABLES	SOURCES	INSTRUMENT
<b>1. NEW GRADUATES</b>		
1.1 Interpersonal relations and communication skills		rating scale
1.2 Professional ethics and attitudes	New graduates	rating scale
1.3 Continued education behaviors	and supervisors	rating scale
1.4 Personal qualities	(item	rating scale
1.5 Quality supporting to primary health care	rating)	rating scale
1.6 Evaluative skills	New graduates	rating scale
1.7 Treatment skills	and	rating scale
1.8 Planning and treatment of common diseases	supervisors	rating scale
1.9 Clinical problem solving skills	(Global rating)	rating scale
<b>2. 1989 GRADUATES</b>		
2.1 Interpersonal relations and communication skills		rating scale
2.2 Professional ethics and attitudes	1989 graduates	rating scale
2.3 Continued education behaviors	and supervisors	rating scale
2.4 Personal qualities	(Item	rating scale
2.5 Quality supporting to primary health care	rating)	rating scale
2.6 Evaluative skills	1989 graduates	rating scale
2.7 Treatment skills	and	rating scale
2.8 Planning and treatment of common diseases	supervisors	rating scale
2.9 Clinical problem solving skills	(Global rating)	rating scale

### 1.3 Delineation of standard competence.

The standard competence were invented to be used for assessing the quality of the graduates. The steps in delineation were as follow;

a) Studying standard job description particularly on curative and rehabilitative section of health care function in order to analyse into main competence domain or area.

b) Reviewing literature about component of physical therapy competence and medical competence necessary to health practices.

c) Reconciliation of evidences and making decision on competence areas interested to study. The competence composed of 9 areas as follow;

- 1) Interpersonal relations and communication skills
  - 2) Professional ethics and attitudes
  - 3) Continued education behaviors
  - 4) Personal qualities
  - 5) Quality supporting to primary health care
  - 6) Evaluative skills
  - 7) Treatment skills
  - 8) Planning and treatment of common diseases
  - 9) Clinical problem solving skills
- d) Stipulating the operational definition as scope for each competence area.

e) Reviewing both thai and foreign literatures about specific desirable competence for competent physical therapist.

f) Delineation of each competence area into specific item of behaviors, attitude, skill. In this

process, many sources of physical therapy competence were reviewed. The most useful one was come from the seminar at Khon Kaen University (Khon Kaen University, Faculty of Associated Medical Sciences, Department of Physical Therapy, 1990). This seminar revised the competence of the physical therapist in various diseases upon the ICD (International Classification of Diseases) guidelines which were the result of the last seminar on 1987 (Khon Kaen University, Faculty of Associated Medical Sciences, Department of Physical Therapy, 1987). The participants were asked to judged on what competence the graduates should be obtained after finishing the baccalaureate degree in physical therapy. At last, the competence were concluded as three level as; must (know, do, or behave), should, and should realize. However, there were the criteria for justification, they were not clearly defined. In this study, the researcher revised the criteria and operationally defined them with the helpful literature (Standard for Basic Education in Physical Therapy, 1971). It said about the criteria as follow;

"The level of skill needed in performance of most specific tasks is determined to a considerable degree by the frequency with which they are performed by professional therapists in practice. Specific competencies to be developed by the student may, therefore, be classified using three broad categories:

a. those in common usage in physical therapy service throughout the country in which the student should develop a level of skill adequate to allow safe and effective performance.

b. those utilized primarily in specialty areas of physical therapy services in which the student should develop knowledge of concepts and principles adequate to allow advancement to useful levels of skill with experience.

c. those rarely used in current physical therapy services which students should know exist. They should recognize the possible contributions of these activities to patient services; however, little skill in performance should be expected of the average recent graduate.

g) Verification of the definite competence by a group of experts.

The group of experts were composed of twelve physical therapists. First group of six were the teachers of three schools (2 from each of Mahidol Khon Kaen, and Chiangmai University), another group were full time physical therapist who were working in general hospital. In the latter six experts, four were working in governmental and state enterprise hospital, other two were in private hospital. The criteria for selection the experts of teacher group were as follow;

- 1) working as full time physical therapy teachers
- 2) experiencing in practice physical therapy at least 5 years
- 3) having good track of practical skill, attitude toward profession
- 4) participating in professional activities frequently.

The criteria for selection the expert of the physical therapist group are as follow;

- 1) working as full time physical therapists
- 2) experiencing in practice physical therapy at least 5 years
- 3) having good track of practical skill, attitude toward profession
- 4) participating in professional activities frequently.

The name of the experts consulted for checking the standard competence were in the Appendix D.

The items were checked on the basis of acceptance as required competence for the new graduates in practicing physical therapy curative and rehabilitative role. Acceptance with nine out of twelve experts (or 75%) were used as the criteria for conservation of those competence items.

The questionnaires of standard competence was sent to the experts by mailing and direct contact. The overall process in verification of the competence took approximately one month. The changes were suggested by the experts and made decision by the researchers cooperated with the advisor. The list of changes were in the Appendix D.

- h) Collecting the above justified competence

for construction of questionnaire. In the skill component of competence (evaluative skills, treatment skills, and planning and treatment of common diseases), only the "must" level of competence were used.

## 2. Independent variables.

The independent variables were the educational events which determined as important effects on the professional competence of the graduates directly or indirectly. The educational factors of the program which were interested in this study were categorized into 7 areas as; curriculum, quality of teacher, teaching-learning, students' activities, student counselling, facilities, and academic background of the graduates. The details of issues in each areas are showed in table 5.2.

Table 5.2 Independent variables, sources of data, and instrument used

VARIABLES	INSTRUMENT
1. Curriculum	
1.1 Course content	
- Degree of applicability of group of major subjects	rating scale
1.2 Clinical experience	
- Clinical experience in school (by doing, assisting, observing)	rating scale
2. Quality of teacher	
2.1 Quality of faculty	
(a) Ability in teaching	rating scale

Table 5.2 (continued)

VARIABLES	INSTRUMENT
(b) Ability in clinical instruction	rating scale
(c) Ability in profession	rating scale
(d) Actual teacher's characteristics and personality	rating scale
2.2 Quality of clinical instructors (outside university)	
(a) Ability in clinical instruction	rating scale
(b) Ability in profession	rating scale
(c) Actual teacher's characteristics and personality	rating scale
3. Teaching-learning	
3.1 Learning style	
- Actual learning style in major subjects	rating scale
4. Student's activities	
4.1 Advantage and disadvantage	rating scale
4.2 Level of involvement	closed-ended question
5. Student counselling	
5.1 Academic counselling	
(a) Benefit	rating scale
(b) Frequency	rating scale
5.2 Personal counselling	
(a) Benefit	rating scale
(b) Frequency	rating scale
6. Facilities (adequacy, good quality, convenience to borrow)	
6.1 Practice room	rating scale
6.2 Laboratory and equipment	rating scale
6.3 Library service	rating scale
6.4 Textbook	rating scale
7. Academic achievement	
7.1 Total GPA	school record
7.2 All clinical practice GPA	school record

### 3. Baseline data measurement.

Data about personal background of each group of respondents were obtained as follow;



3.1 Graduates. Baseline data were required to show the general status of both new and 1989 graduates. The data obtained, and instrument were showed in the table 5.3.

Table 5.3 Baseline data of graduates and instrument used.

DATA	INSTRUMENT
1. Demographic: sex, age, income, extra-income	closed-ended question
2. Work status; type of hospital, position, working address (region), time for job-reception after completing, changing job	closed-ended question

3.2 Supervisors. The baseline data were required to show the personal status and to find out the effect of extraneous variable on rating of graduates' professional competence. The data obtained and instrument were showed in the table 5.4.

Table 5.4 Baseline data of supervisors and instrument used

DATA	INSTRUMENT
1. Demographic; age, sex	closed-ended question
2. Academic background; highest degree granted.	closed-ended
3. Working status; type of specialty, year of experience, type of hospital.	closed-ended question
4. Level of acquaintance with graduate.	closed-ended question

### Instrument.

The main instrument, used in this study was survey questionnaire. The review of the students' records about academic achievement was another method of data collection.

#### 1. Questionnaire.

Three questionnaires were used to gather data from four sources as follow.

1) Questionnaires for the new graduates; was divided into 4 sections.

Section 1 Personal background and working status

Section 2 Graduates self-appraised professional competence

Section 3 Graduates' opinion about clinical experience during studying.

Section 4 Opinion about curriculum and teaching-learning.

2) Questionnaire for the 1989 graduates; was divided into 2 sections.

Section 1 Personal background and working status

Section 2 Graduates self-appraised professional competence

3) Questionnaire for the supervisors (both 1989 and 1990 graduates' supervisors); was divided into 2 sections.

Section 1 Personal background and working status

Section 2 Opinion on actual graduates' professional competence

1.1 Characteristics of specified type of measuring instrument contained in questionnaire.

1.1.1 Rating scale.

1.1.1.1 Rating scale for measuring professional competence (dependent variables).

1.1.1.1.1 Attitude and behavior component. For assessment of interpersonal relations and communication skill, professional ethics and attitudes, continued education behaviors, personal quality, quality supporting to primary health care and clinical problem solving skills competence areas, the rating scale with 7 points was used.

Number of steps on the continuum was determined by amount of the reliability. On theoretical basis, the reliability of a scale increased rapidly as the number of divisions increase to about seven, and then rises more slowly until there are 11 points. More than this, the increment is almost stable. (Nunnally, 1967 quoted in Streiner, 1985). Although, with some conjectures it is probable that the actual optimal number of point is between 7 and 11 (Streiner, 1985).

The 7 steps of scale for differentiate among subjects' professional competence was defined as the continuous order of professional competence from the lowest level of professional competence (represented by 1) to the highest level of professional competence (represented by 7).

1.1.1.1.2 Skill component. To find out the appropriate rating scale for measuring skill component, the literatures about educational measurement were reviewed. On the study of Malee Phulklontan and Chaloeam Varavithya (1984), they let the 6<sup>th</sup> year medical students and interns to use 3-point rating scale to self-appraise their own competence. These competence were complex task which composed primarily skill component. Each point of the scale was defined as follow; 0 cannot perform, 1 not confidence to perform, 2 independently perform. Based on theoretical issues as mentioned above, this 3-point scale has less reliability. So there was an attempt to searching more reliable type of scale up to 5 or 7 points.

Sought for the rating scale used only by self-evaluation or assessment, the following two literature were reviewed. Wolliscroft et al. (1985) asked the primary care resident to evaluate how readily they made a diagnosis or performed a procedure on a 4-point scale. When 4 was referred to not at all, 3 with help, 2 with

difficulty without help, and 1 easily without help. Bleys, Gerritsma, and Netjes (1986) measured the gain in performance of medical students during the internal medicine course on 3 areas such as history taking, physical examination, diagnosis and patient management. The 5-point likert scale ranging from insufficient to sufficient professional skill was used for student self-assessment. Although the study of Bleys et al. used more points with the advantage of more reliability, the rating showed some difficulty between the two extreme. However, these two scales used different criteria (level of independent for Wooliscroft et al. study, professional standard for Bleys et al. study) and did not have clear cut criteria.

In an attempt to improve student assessment form in clinical location, Cross (1983) applied the idea of constructive criticism and continuous assessment. These meant the immediate relevant and incentive feedback to the student and progressive improvement of performance. The author then expanded the 3-point scale-above average, satisfactory, and unsatisfactory-to be the 5-point scale. The new scale can be used to measure all three areas of clinical competence-intellectual, technical, and interpersonal. The scale grading was based on the attainment of criteria set for each item of competence. The description of each category was as follow:

Above average/AA/5	all or most of the criteria to consistently high degree-remainder to an acceptable degree
Satisfactory <sup>+</sup> /S <sup>+</sup> /4	a few of the criteria to a high degree-remainder to an acceptable degree
Satisfactory/S/3	all the criteria to an acceptable degree
Satisfactory <sup>-</sup> /S <sup>-</sup> /2	some of the criteria to an acceptable degree, but weakness should be eliminated with experience and help
Unsatisfactory/U/1	none of the criteria to an acceptable degree

The characteristics of the above scale are somewhat similar to the scale developed by Bondy (1983) which defined as criterion-referenced scale. This 5-point scale were evolved from numerous discussion with clinical faculty, process of student learning, comments from the students and faculty when used. The characteristics of competency or criteria for clinical evaluation clustered into three major areas: 1) professional standards and procedures for the behavior, 2) qualitative aspects of the performance, 3) assistance needed to perform the behavior. Five levels of competence were identified which could be descriptively labeled: Independent, Supervised, Assisted, Marginal, and Dependent, and which were applicable to each of the three major areas.

After developing this form, she further studied

the accuracy and the reliability of the form (Bondy, 1984). In this study, faculty from four baccalaureate nursing programs were asked to participate in testing the accuracy and reliability of faculty evaluation of student performance as seen on a videotape. Three videotapes each portrayed a nursing student performing on ordinary nursing activity at five different levels of competency. The study design included three fixed factors (use of criteria, faculty experience, and type of student activity) and a trial factor with repeated measures (the five level of performance). The experimental group (n=27) used a 5-point scale with criteria for rating the level of performance while the control group (n=33) used the same scale without criteria. A computed score and an estimated were collected from each subject for each level of performance. The experimental group that used the scale with criteria gave more accurate computed and estimated evaluation scores than the control group. An examination of the means showed that as the student's level of performance improved, the beneficial effect of the criteria become more pronounced (i.e. more accuracy on higher scale). Faculty experience was not a significant factor in accuracy. The correlation between each subject's computed score and the corresponding estimated score did not meet the acceptable level (.90). But the values for level 3 and 4 are statistically significant.

Although the scale of Bondy was more objective, it was too complex, hardly to evaluate, and also took time. Since this study have to evaluate many items of competence (up to 80), it was not feasible to use the time-consuming scale. However the mentioned above scale were helpful in developing the criteria of evaluation.

In conclusion, the 5-point rating scale with using criteria was developed for the present study. Some modification were based on the guideline from the above two papers of Cross and Bondy, and on the feasibility, objectivity and reliability.

1.1.1.2 Rating scale for measuring independent variables. The 7 points rating scale was used, but the definition of step was differed. The attitude, opinion were defined on the continuum from the lowest score to highest score, from 1 to 7, as; strongly disagreed-strongly agreed, not important-very important, ill-excellence, unnecessary-very necessary, very satisfactory-unsatisfactory, etc.

The instrument and scales used for measuring the independent variables were almost brought from the questionnaire in the study of Banterng Ratchatapithi et al. Some were from the study of Sutassanee Wiwatanapataphee.



**1.1.2 Question.** There are many types of questions defined as; i) open-ended question, ii) closed-ended with ordered response choices, iii) closed-ended with unordered response choices, iv) partially closed ended question (Woodward and Chambers, 1981). Selection of type of question was done upon which type of data needed and the advantage and disadvantage of each type of question. However, most of the questions posed in the questionnaire were closed-ended because of easy statistic explanation, enthusiastic and easy response.

**1.2 Questionnaire construction.** Suban Panvidsavard and Chaiwatana Panjapong (1979) suggested 6 steps in questionnaire construction as; i) listing type and content of required data, ii) selection of specified instrument (question, scale, etc.), iii) construction of first draft questionnaire, iv) approval, v) pretest or try out, and vi) editing and publishing.

The first two steps were already described in the part of outcome attributes being measured. In that part, the interested topics of data were segregated into specified items. The type of measuring instrument were defined particularly to that data required. Beside consideration of the data and type of instruments used, the objectives were concerned as what type of question would be asked. Three types of question were suggested

in specification of data needed; knowledge, attitude, behavior (Uthumporn Jamornmarn, 1987). The next step in questionnaire construction were as follow;

**1.2.1 Construction of first draft questionnaire.** The standard competence which already approved by the experts were brought to be a part of the questionnaire for graduates and supervisors. The first draft of three questionnaire was constructed according to the data and type of instrument used that specified in the first two steps. Principles of questionnaire construction and question writing were used as guidelines for construction (Suban Panvidsavard, and Chaiwatana Panjapong, 1979; Woodward, and Chambers, 1981). The guidelines for writing each type of question were also recommended (Uthumporn Jamornmarn, 1987).

**1.2.2 Approvement.** The questionnaires were verified by the researcher after construction completed, in order to firstly check for content validity, internal consistency, and language and wording. The physical layout of the questionnaire were formatted on the basis of attractiveness, easy to identify, code and store. The cover letters were developed and checked for impression and motivation to the respondents.

**1.2.3 Pretest.** After completion of approvement, the questionnaire were pretested in following steps;

1.2.3.1 Pretest for content validity. All questionnaires were sent to the group of ten experts; five as the representation of physical therapist, other five as the representation of educators; to check for coverage of the objectives of the study, clarity and communicability. The name of the ten experts was listed in the Appendix E. The experts were also asked for suggestion for improving the quality of the questionnaires. In order to help the experts in approving questionnaire efficiently, the following document were sent with the well constructed and typed questionnaire; i) Concept and structure in questionnaire construction, ii) the main and sub-main idea of the question items, iii) the objectives of construction and usage of questionnaire, and iv) specification of question items for each main idea; as recommended by Uthumporn Jamornmarn, 1987. Also, the guidelines for checking the questionnaires about content validity and format were sent. After that, the researcher corrected and improved the questionnaire with acceptance from the advisor. The changes after the process of checking content validity were listed in the Appendix E. As a result of changes, the pages of the questionnaire of the new graduates, 1989 graduates, and the supervisors were decreased from 39 to 26, 16 to 13, and 14 to 9 respectively.

1.2.3.2 Pretest for reliability. The expert-validated questionnaire for the

new graduates were sent to a sample group of eight graduates by mailing. Since the contents in 2 sections of the questionnaires for 1989 and the new graduates were the same, so it was unnecessary to pretest the former one. These subjects were the graduates who completed from Mahidol University in 1988. They were working in governmental and private hospital during time of the study. The criteria for selection were convenience to communicate, the supervisor of the subject should be in various profession (e.g. doctor, physical therapist). So most subjects were working in Bangkok. The name and the working place of the pretested samples were collected from the school records and the class mate.

The questionnaires for supervisors (the questionnaire for the supervisors of 1989 and the new graduates were the same) were sent to the eight supervisors of the above selected subjects of 1988 graduates by mailing.

The name of the pretested group of the graduates and their supervisors were listed in the Appendix E.

The subjects were asked for completing the questionnaire in ten day. After that the researcher visited to the subjects to ask for the following issues;

- 1) Analysis for time spent in completion of questionnaire.

Table 5.5 Reliability coefficient of the pretested questionnaires for the new graduates.

ISSUES	No. of items	Reliability Coefficient
Global Questionnaire		0.8683
Section 1		N.C. <sup>a</sup>
Section 2		0.8776
1. Interpersonal relations and communication skills	8	0.9192
2. Clinical problem solving skills	20	0.9089
3. Professional ethics and attitudes	5	0.7779
4. Continued education behaviors	6	0.9088
5. Quality supporting to primary health care	5	0.9470
6. Personal qualities	10	0.8037
Section 3 <sup>b</sup>		0.8331
1. Evaluative skills	15	0.8274
2. Treatment skills	21	0.8862
3. Planning and treatment of common diseases		
3.1 Musculoskeletal diseases	23	0.7985
3.2 Neurological diseases	9	0.8608
3.3 Respiratory diseases	7	0.7929
3.4 Miscellaneous diseases	2	N.C. <sup>c</sup>
Section 4		0.8943
1. Applicability of each course	21	0.9147
2. Learning style	1	N.C. <sup>a</sup>
3. Student counselling		
3.1 Frequency	2	N.C. <sup>c</sup>
3.2 Benefit	2	N.C. <sup>c</sup>
4. Student activities		
4.1 Level of involvement	4	N.C. <sup>a</sup>
4.2 Advantage and disadvantage	7	0.7398
5. Quality of teacher		
5.1 Quality of faculty		
a) Ability in teaching	12	0.8967
b) Ability in clinical instruction	9	0.9173
c) Ability in profession and actual teacher characteristics	12	0.9441
5.2 Quality of clinical instructors (outside university)		
a) Ability in clinical	9	0.8772
b) Ability in profession and actual teacher characteristics	12	0.9457
6. Facilities	21	0.9193

<sup>a</sup>Not calculated because the items were asking about fact

<sup>b</sup>No calculation for clinical experience items because they were asking about fact

<sup>c</sup>Not calculated because the number of items was so small

Table 5.6 Reliability coefficient of the pretested questionnaires for the supervisors.

ISSUES	No. of items	Reliability Coefficient
Global Questionnaire		0.7874
Section 1		N.C. <sup>a</sup>
Section 2		0.7874
1. Interpersonal relations and communication skills	8	0.7831
2. Professional ethics and attitudes	5	0.7648
3. Continued education behaviors	6	0.7699
4. Quality supporting to primary health care	5	0.8376
5. Personal qualities	10	0.7641
6. Clinical problem solving skills	1	N.C. <sup>b</sup>
7. Skill components of professional competence (e.g. evaluative skills, treatment skills, and planning and treatment of common diseases)	6	0.8050

<sup>a</sup>Not calculated because the items were asking about fact  
<sup>b</sup>Not calculated because the number of items was so small

- 2) Wording and language of each question, and also the instruction on how understandable, clarity.
- 3) Checking for content validity by asking the following questions; Was each of the questions measuring what it was intended to measure ?, Did each closed-ended question had an answer that applied to each respondent ?, Were questions answered correctly ?.
- 4) Checking for reliability by examining the question constructed to check for internal consistency with other questions that it worked or not.

- 5) The format and cover letter created a positive impression and motivated people to reply.
- 6) The suggestions to improve the quality of the questionnaires.

Some changes were done after this pretesting and listed in the Appendix E.

All questionnaires were analysed for the reliability as separated sections, except section 1, because it ask the fact about personal data which needed not to be analysed (Vichian Gate-singha, 1987). The Hoyt's Analysis of Variance was used to find the reliability (Vichian Gate-singha, 1987). The reliability coefficient of overall questionnaire, each section, and each subsection were showed in table 5.5 and 5.6.

**1.2.4 Editing and publishing.** After pretesting, the problem of usage were analysed and solved with suggestion from the advisors. Then the identification part and the precoded blocks were put into the corrected questionnaire. The final form were edited for printing problems in the last step before sending to publish.