

## ความสัมพันธ์ระหว่างสมรรถภาพทางการสอนกับผลสัมฤทธิ์ทางการเรียนของนักศึกษาสายวิทยาศาสตร์ คณะศึกษาศาสตร์ มหาวิทยาลัยสงขลานครินทร์

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### บทคัดย่อ

การวิจัยครั้งนี้มีวัตถุประสงค์เพื่อศึกษาความสัมพันธ์ระหว่างสมรรถภาพทางการสอนกับผลสัมฤทธิ์ทางการเรียนของนักศึกษาสายวิทยาศาสตร์ คณะศึกษาศาสตร์ มหาวิทยาลัยสงขลานครินทร์ กลุ่มตัวอย่างที่ใช้ในการศึกษาเป็นนักศึกษาสายวิทยาศาสตร์ คณะศึกษาศาสตร์ มหาวิทยาลัยสงขลานครินทร์ชั้นปีที่ 4 ที่กำลังออกฝึกสอนในภาคเรียนที่ 1 ปีการศึกษา 2542 จำนวน 151 คน ตัวแปรอิสระคือผลสัมฤทธิ์ทางการเรียนใน 3 กลุ่มรายวิชาซึ่งได้จากสำนักงานทะเบียน มหาวิทยาลัยสงขลานครินทร์ ตัวแปรตามคือสมรรถภาพทางการสอน 6 ด้านที่ได้จากการรวบรวมโดยใช้แบบฟอร์มสังเกตพฤติกรรมการสอน การวิเคราะห์ข้อมูลทำการวิเคราะห์เป็นค่าเฉลี่ยเลขคณิต ส่วนเบี่ยงเบนมาตรฐาน วิเคราะห์ความแปรปรวนแบบทางเดียว สหสัมพันธ์และวิเคราะห์การถดถอยพหุคูณ ผลการวิจัยพบว่า 1) ผลสัมฤทธิ์ทางการเรียนของนักศึกษาเรียงจากมากไปน้อยคือ ผลสัมฤทธิ์ทางการเรียนกลุ่มวิชาชีพทางการศึกษา กลุ่มวิชาเอกและกลุ่มวิชาพื้นฐานวิชาเอก 2) สมรรถภาพทางการสอนของนักศึกษาเรียงจากมากไปน้อยคือ ทักษะการสรุปบทเรียน ทักษะการประเมินผล ทักษะการจัดกิจกรรมการเรียนการสอน ทักษะการนำเข้าสู่บทเรียน ทักษะการใช้คำถามและทักษะการเสริมแรง 3) ผลสัมฤทธิ์ทางการเรียนของนักศึกษาใน 3 กลุ่มวิชามีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติที่ระดับ .05 4) สมรรถภาพทางการสอนของนักศึกษาทั้ง 6 ทักษะ มีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติที่ระดับ .05 5) ผลสัมฤทธิ์ทางการเรียนในกลุ่มวิชาชีพทางการศึกษาสามารถพยากรณ์สมรรถภาพทางการสอนได้ 5 ทักษะ ยกเว้นทักษะการสรุปบทเรียน ขณะที่ผลสัมฤทธิ์การเรียนในกลุ่มวิชาพื้นฐานวิชาเอกและกลุ่มวิชาเอกไม่สามารถพยากรณ์สมรรถภาพทางการสอนได้

คำสำคัญ: ผลสัมฤทธิ์ทางการเรียน, สมรรถภาพทางการสอน

# The Relationship Between Teaching Competency and the Academic Achievement of Science Program Students of the Faculty of Education, Prince of Songkla University

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*This study primarily aimed to examine the relationship between teaching competency and the academic achievement of fourth-year Science Program students in the Faculty of Education, Prince of Songkla University. The subjects were 151 fourth-year Science Program students doing their student teaching practicum over a four-month period in the first semester of the 1999 academic year. Independent variables comprised the samples' academic achievement records in three subject-group courses drawn from the Student Records and Admission Office at Prince of Songkla University. Dependent variables comprised six specific skills of teaching competency collected through the use of the "Student Teaching Behavior Observation Form". Data obtained was analyzed using arithmetic mean, standard deviation, one-way ANOVA, correlation coefficient and multiple linear regression analysis. The findings revealed the following: 1) The subjects' academic achievements in descending rank order were academic achievement in educational profession courses, academic achievement in the specialized major courses and academic achievement in science foundations major courses. 2) The teaching competencies in descending rank order were conclusion skills, evaluation skills, manipulation of instructional activities skills, introduction to the lesson skills, questioning skills and reinforcement skills respectively. 3) There was a significant difference in the subjects' academic achievement in each area of the three-group courses at the .05 level. 4) There was a significant difference in each of the six specific skills in the subjects' teaching competency at the .05 level. 5) The academic achievement in educational profession courses could make predictions for five skill areas of teaching competency, but not in conclusion skills. However, the academic achievement in science foundations major courses and specialized major courses could make no prediction for teaching competency.*

**Keywords:** academic achievement, teaching competency

## Background and Rationale

Over the few past decades Thailand has implemented national development programmes under two National Social and Economic Development Schemes and is now on the eighth one. Through several national, social and economic development schemes, Thailand has been able to bring about changes in social structures, ways of

earning a living, ways of life and culture. Under these changes a great number of concerned individuals and parties have paid more attention to educational management with reorientation of concepts in educational management to meet the needs for human resources (which had been treated only as an input for economic growth and

labour) to promote development of human resources and make citizens more well-rounded.

Since B.E. 2511 (1968 A.D.) the Faculty of Education at Prince of Songkla University, Pattani Campus, has offered educational courses and teaching profession-related courses under the Teacher Education Programs with a great number of graduates serving as teachers in schools throughout Thailand. All teacher students in the Faculty of Education are expected to be equipped with major field courses and professional courses of teaching, and to apply their knowledge and skills to efficiently and effectively transfer professional knowledge to students at the primary and secondary school levels.

In order to have the university graduates as future teachers well-equipped with teaching competency, in addition to their major fields of study, the Education Faculty has required all teacher students or teacher trainees to take 33 credit/hours of educational courses, which are divided into 4 main groups as follows.

1. Educational foundations courses of 8 credit/hours.
2. Psychology courses of 6 credit/hours.
3. Professional competency courses of 11 credit/hours.
4. Fieldwork courses of 6 credit/hours.

For 6 credit/hours of the fieldwork course, all students in their senior year will be sent to schools for their practical training or teaching practicum for a four-month period. To be eligible for practical training, a student is required to have taken and passed all courses under groups 1, 2 and 3. Besides educational profession courses, the Science Program of the Faculty of Education, Prince of Songkla University offers some courses which add major knowledge, including science foundations major courses comprising 8 courses and the specialized major courses. Each field has a different number of courses and units. The Faculty of Education, Prince of Songkla University expects that after the students have completed the courses and gained experience from practical courses according to the required curriculum, they will have the competency to be

qualified teachers. However, to date no research study has been done to support the assumptions underlying such a requirement or to test the relationship between academic achievement in all required courses and students' teaching competency. It is the intention of this investigator to look into a researchable question as a proposed research study entitled "**The Relationship Between Teaching Competency and Academic Achievement of Science Program Students of the Faculty of Education, Prince of Songkla University**"

#### **General Objectives of the Research Project**

1. To examine the relationship between teaching competency and academic achievement of student teachers in Science Degree Programs in the Faculty of Education at Prince of Songkla University.
2. To gather suggestions for improvement of the Teacher Education Curriculum in the Faculty of Education at Prince of Songkla University.

#### **Specific Objectives of the Research Project**

1. To compare the differences in the academic achievement in educational profession courses, the academic achievement in science foundations major courses and the academic achievement in the specialized major courses of student teachers in Science Degree Programs in the Faculty of Education at Prince of Songkla University.
2. To compare the differences in introduction to lesson skills, manipulation of instructional activities skills, questioning skills, reinforcement skills, conclusion skills, and evaluation skills of student teachers in Science Degree Programs in the Faculty of Education at Prince of Songkla University.
3. To find out the academic achievement in order to predict the teaching competency of student teachers in Science Degree Programs in the Faculty of Education at Prince of Songkla University.

### Expected Results

1. To enable concerned individuals and parties to be informed of the relationship between teaching competency and academic achievement of student teachers in Science Degree Programs in the Faculty of Education at Prince of Songkla University.

2. To present the findings for the instructional improvement to the Faculty of Education at Prince of Songkla University.

### Research Hypotheses

1. There were differences in academic achievement in the three-group courses of student teachers in Science Degree Programs in the Faculty of Education at Prince of Songkla University.

2. There were differences in the teaching competency in the 6 specific skills of student teachers in Science Degree Programs in the Faculty of Education at Prince of Songkla University.

3. At least one of the three-group courses of academic achievement of student teachers in Science Degree Programs in the Faculty of Education at Prince of Songkla University could predict the teaching competency.

### Research Variables

1. The independent variables were academic achievement of the three-group courses: the academic achievement in educational profession courses, the academic achievement in science foundations major courses and the academic achievement in the specialized major courses.

2. The dependent variables comprised the teaching competency of six specific skills: introduction to lesson skills, manipulation of instructional activities skills, questioning skills, reinforcement skills, conclusion skills and evaluation skills.

### Definitions of Key Terms

**1. Teaching competency** refers to the teaching competency of student teachers in the

Science Degree Programs in the Faculty of Education, Prince of Songkla University, who were at the time of data collection doing student teaching at various secondary schools situated in Pattani and in neighboring provinces. Data collection was administered using a “**Student Teaching Behavior Observation Form**” asking questions on six specific skills: introduction to lesson skills, manipulation of instructional activities skills, questioning skills, reinforcement skills, conclusion skills and evaluation skills.

**2. Academic achievement** refers to the following:

2.1 The academic achievement in educational profession courses which all students need to have taken prior to their teaching practicum.

2.2 The academic achievement in all science foundations major courses, comprising 8 major foundations courses of 24 credit/hours.

2.3 The academic achievement in specialized major courses.

**3. The students** refers to seniors or fourth-year students in the Science Degree Programs in the Faculty of Education, Prince of Songkla University in the first academic semester of 1999, who would do practical training or have student teaching practice for a four-month period.

### Methodology

This explanatory research aimed to examine the correlation between teaching competency and academic achievement of students in the Science Degree Programs in the Faculty of Education, Prince of Songkla University.

#### Population

The population of this study was 168 fourth-year students of the 1999 academic year in the Science Degree Programs in the Faculty of Education, Prince of Songkla University.

#### Samples

The samples of this study were 151 fourth-year students of the 1999 academic year in the Science Degree Programs in the Faculty of Education, Prince of Songkla University, who had done complete registration for their courses and

were able to start their practicum for four months in secondary school. The number of the samples was classified into their major fields of study as follows:

Major Fields of Study	Number of Samples
Biology	23
Chemistry	26
General Science	22
Mathematics	61
Physics	19
<b>Total</b>	<b>151</b>

### Study Design

In this study correlation design was used.

### Research Instrument

The instrument for this study was the “**Student Teaching Observation Form**” which consisted of a 5-point rating scale questionnaire of teaching competency, ranging from ‘very good’ to ‘very unsatisfactory’, covering 6 specific skills of teaching competency:

1. Introduction to the lesson
2. Manipulation of instructional activities
3. Questioning
4. Reinforcement
5. Conclusion
6. Evaluation

**Phases of Instrument Construction were as follows:**

1. Survey of research and related works on teaching competency
2. Division of teaching behaviors into observable categories
3. Construction of the “**Student Teaching Observation Form**” based on observable categories.
4. Evaluation of the “**Student Teaching Observation Form**” for content validity, verbal usage and suggestions for improvement by 5 experts in the teaching profession, each of whom has had a 10-year minimum of teaching experience in his respective field of Physics, Chemistry, Biology, General Science and Mathematics. This was done according to Rovinelli and Hambleton’s technique (IC) (Jerry, 1996, 124 ).

If the resulting IC value exceeds or equals 0.5, it means that such behaviors fit adequately with the skills to be measured; if the IC value of any item is smaller than 0.5, that item should be improved or deleted. The resulting sum was a 26-item questionnaire approved by the experts, comprising 6 specific skills of teaching competency:

- Introduction to the lesson 4 items
- Manipulation of instructional activities 7 items
- Questioning 4 items
- Reinforcement 4 items
- Conclusion 4 items
- Evaluation 3 items

5. A try-out of the “**Student Teaching Observation Form**” was administered to a group of samples for the computation of reliability using the  $\alpha$ -Coefficient (Cronbach, 1990,204).

The computed result of reliability of the questionnaire equaled 0.85, meaning that it was fit for the research procedure.

### Data Collection

1. In order to obtain the teaching competency data of the students, the investigator made use of the “**Student Teaching Observation Form**”, and in turn collected the data in the following order.

1.1 Had trainer teachers in each school who were very experienced and skillful in teaching observe the students’ teaching with no prior notice 2 times for 50 minutes each time.

1.2 Had the student teachers’ supervisor from the Faculty of Education, Prince of Songkla University observe the students’ teaching in the classroom with no prior notice 2 times for 50 minutes each time.

1.3 Had the students who were the subjects in this study evaluate themselves using the same observation form. In order to reduce the emotional tension on the part of the student teachers, the investigator made clear to them and assured them that the results of this teaching appraisal would have no effects on their teaching practice results later and asked them to self-evaluate according to the real situation as honestly

and truthfully as possible.

1.4 Took the data from steps 1.1, 1.2 and 1.3 to be computed for the arithmetic mean to define the teaching competency of each individual student.

2. The data on academic achievement were students' past records from the Office of Registration and Admission, Prince of Songkla University, Pattani Campus. Data on students' academic achievement were divided into three-group courses, thus:

2.1 Educational profession courses comprise 12 courses.

2.2 Science foundations major courses comprise 8 courses.

2.3 The specialized major courses of each major field of study.

**Statistical Procedure for Data Analysis**

1. Analyzing the instrument quality

1.1 IC by Rovinelli and Hambleton's technique (Jerry, 1996, 232 )

1.2 Reliability ( $r_{tt}$ ) by  $\alpha$ -Coefficient method (Cronbach, 1990, 204 )

2. Statistics used in analyzing the instrument

2.1 Arithmetic Mean (Wapole, 1983, 45)

2.2 Standard Deviation (Wapole, 1983, 47)

2.3 One-way ANOVA (Freund, 1984, 370)

2.4 Multiple Comparison by Scheffe' technique (Kirk, 1982, 369)

2.5 Pearson Correlation Coefficient (Freund, 1984, 430)

2.6 Multiple Correlation Coefficient (Freund, 1984, 439)

2.7 Multiple Linear Regression (Freund, 1984, 449)

**Conclusions and Discussion**

In analyzing the data and interpreting the results of this study, the researcher used the following symbols:

$X_1$  stands for the academic achievement in educational profession courses

$X_2$  stands for the academic achievement in science foundations major courses

$X_3$  stands for the academic achievement in specialized major courses

$Y_1$  stands for the introduction of lesson skills

$Y_2$  stands for the manipulation of instructional activities skills

$Y_3$  stands for the questioning skills

$Y_4$  stands for the reinforcement skills

$Y_5$  stands for the conclusion skills

$Y_6$  stands for the evaluation skills

**1. Statistics of the Academic Achievement**

The statistical results concerning academic achievements are shown in Table 1.

From Table 1, it was found that the academic achievement of the students in all majors followed the same trend, from the maximum to minimum as follows: academic achievement in educational profession courses ( $X_1$ ), academic achievement in specialized major courses ( $X_3$ ) and academic achievement in science

**Table 1 Statistics of academic achievement**

Major G.P.A.	Mathematics		Physics		Chemistry		Biology		General Sci		Total	
	$\bar{X}$	S.D	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
$X_1$	3.130	0.301	2.951	0.292	3.086	0.348	3.132	0.335	3.241	0.252	3.117	0.313
$X_2$	2.429	0.452	2.265	0.665	2.236	0.558	1.828	0.775	2.068	0.737	2.243	0.633
$X_3$	2.455	0.562	2.382	0.493	2.591	0.457	2.604	0.319	2.600	0.574	2.501	0.510

foundations major courses ( $X_2$ ) respectively.

The findings of this study could be summed up as follows:

The samples drawn for this study had been earlier selected through the recorded documents of the University Entrance Examinations in their respective choice of specialized fields of study to attend Prince of Songkla University as shown in Table 2 (Ministry of University Affairs, 1997, 142)

Table 2 shows the subject courses which all student teachers in each major field of study sat for the Entrance Examinations to enter the Science Programs in the Faculty of Education, Prince of Songkla University. It was indicated that each student in all major fields needed to pass the Teacher Trait test measuring attitudes and aptitudes for the teaching profession. Therefore, those taking courses in the Faculty of Education, Prince of Songkla University got the highest level of academic achievement in educational profession courses ( $X_1$ ) considered to be suitably in line with their aptitudes or what they were good at. For the second highest level of

academic achievement in the specialized major courses ( $X_3$ ), it was likely that this was due to the fact that individual students had studied the subjects or courses that they were good at when they sat their University Entrance Examinations to attend their favorite subjects or courses at Prince of Songkla University. The lowest level of academic achievement among those in science foundations major courses ( $X_2$ ), could be accounted for by the fact that individual students were to take the subjects they did not like or they were not good at, so the academic achievement in such courses naturally became quite low.

## 2. Statistics of Teaching Competency

The statistical results relating to teaching competency are shown in Table 3.

From Table 3, the teaching competencies of students in all majors were of the same trend; that is, the students in all majors had the highest skill level in conclusion skills ( $Y_5$ ) and the lowest skill level in reinforcement skills ( $Y_4$ ), except the biology major students, who had the lowest skill level in questioning skills ( $Y_3$ ). When considered overall, the teaching competencies of

**Table 2 Subject Courses Versus the Major Fields of Study Taken by the Samples**

Subject Courses Taken Major Fields of Study	01	02	03	04	05	06	18
Mathematics	/	/	/	/	/	-	/
Physics	/	/	/	/	/	-	/
Chemistry	/	/	/	/	/	-	/
Biology	/	/	/	-	/	/	/
General Science I	/	/	/	/	/	-	/
General Science II	/	/	-	/	/	/	/
General Science III	/	/	/	-	/	/	/

Subject Code:

01 : General Knowledge

02 : Mathematics A & B

03 : Chemistry

04 : Physics

05 : English A & B

06 : Biology

18 : Aptitude Test for the Teaching Profession

**Table 3** Statistics of teaching competency.

Major Skills	Mathematics		Physics		Chemistry		Biology		General Sci		Total	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Y <sub>1</sub>	3.785	0.416	3.873	0.235	3.872	0.269	3.758	0.360	4.047	0.345	3.845	0.364
Y <sub>2</sub>	3.801	0.404	3.933	0.282	4.002	0.310	3.762	0.322	4.132	0.332	3.896	0.372
Y <sub>3</sub>	3.749	0.485	3.911	0.239	3.913	0.363	3.674	0.383	4.027	0.416	3.827	0.427
Y <sub>4</sub>	3.680	0.537	3.777	0.210	3.826	0.390	3.744	0.333	3.883	0.490	3.757	0.449
Y <sub>5</sub>	3.902	0.466	3.945	0.219	4.067	0.321	3.840	0.327	4.194	0.362	3.963	0.398
Y <sub>6</sub>	3.877	0.390	3.899	0.276	3.935	0.294	3.812	0.210	4.066	0.450	3.912	0.352

students from maximum to minimum were as follows: conclusion skills (Y<sub>5</sub>), evaluation skills (Y<sub>6</sub>), manipulation of instructional activities skills (Y<sub>2</sub>), introduction to lesson skills (Y<sub>1</sub>), questioning skills (Y<sub>3</sub>) and reinforcement skills (Y<sub>4</sub>) respectively.

It was found that the teaching competency of students in Science Degree Programs was of the same trend in each major and all majors. This trend might be due to the fact that all students in all major fields were required to take the same courses as well as the practical laboratory courses as requirements under the Science Degree Programs, including educational profession courses and foundations major courses, the only difference being in specialized major courses. The findings of the two lowest areas of teaching competency, namely questioning skills (Y<sub>3</sub>) and reinforcement skill (Y<sub>4</sub>) were cohesively in line with that of the research conducted by Somwang Piriyanuwat and others (1986, 82), revealing the skills that the majority of teachers made least use of were questioning skills and reinforcement skills. Such a finding could be due to the fact that

the majority of teachers were habitually attached to the teacher-centered instruction method, which constituted less interaction between teachers and students, including a lesser degree of questioning participation on the part of students and less reinforcement for students.

### 3. Testing Differences of Academic Achievement

Results of testing of the differences of academic achievement using the one-way ANOVA are shown in Table 3 and Table 4

There were significant differences at the .05 level in academic achievement between educational profession courses (X<sub>1</sub>), science foundations major courses (X<sub>2</sub>) and the specialized major courses (X<sub>3</sub>) among students in the Science Degree Programs in the Faculty of Education at Prince of Songkla University.

The significant differences in academic achievement in the three-group courses among students were due to the differences in students' aptitudes in the major fields of study they had taken. This finding was similar to that shown in Table 1, which revealed that the students had the

**Table 4** Testing results concerning differences in academic achievement

Source of variation	SS	df	MS	F	Sig
Between Groups	60.85	2	30.43	120.21	0.000
Within Groups	113.91	450	0.25		
<b>Total</b>	<b>174.76</b>	<b>452</b>			

**Table 5 Multiple comparison results using Scheffe' technique**

Among courses	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>
X <sub>1</sub>	-	0.8737*	0.6157*
X <sub>2</sub>		-	-0.2580*
X <sub>3</sub>			-

\* The mean difference is significant at the .05 level

highest mean scores in academic achievement in educational profession courses (X<sub>1</sub>), which was particularly in line with the subject course number 18 (Aptitude Test in Teaching Profession) required to be taken by all students. The second highest mean scores for academic achievement were in specialized major courses (X<sub>3</sub>), the subject courses most students were good at. As for the academic achievement in foundations major courses (X<sub>2</sub>), they were the courses at which a great number of students might not be good at. Since students were required to take them to fulfil the requirement of the Science Degree Programs, their academic achievement in such courses unfortunately became the lowest.

#### 4. Testing Differences of Teaching Competency

Results of testing of the differences in teaching competency using the one-way ANOVA are shown in Table 6

There were significant differences at the .05 level in teaching competency of six specific skills of students in the Science Degree Programs in the Faculty of Education at Prince of Songkla University.

The findings revealed some variation among the specific teaching competency skills.

This could be accounted for by the fact that student teachers had been habitually attached to the teacher-centered manipulation of instructional activities, even though several educational profession courses were of student-centered orientation in nature and were regularly offered to them prior to the student teaching practicum in the hope that the student teachers would get familiar with and be fully equipped with student-centered instruction skills. The lowest mean scores of academic achievement in teaching competency among student teachers might be due to the easy-to-manage nature of the teacher-centered instructional approach and their being accustomed to this type of instruction while they themselves were students in primary and secondary schools. When they were to be teachers themselves, they strongly felt at home with this type of teacher-centered instruction and they had some difficulty getting rid of the old habit. This finding was similar to that of the research conducted by Somwang Piriyanuwat and others (1986, 82), revealing that in actual teaching situations the majority of teachers tended to fall back on the easy-to-manage teacher-centered instruction, which did not allow the teachers to make much use of questioning skills and reinforcement skills

**Table 6 Testing results of the differences in teaching competency**

Source of variation	SS	df	MS	F	Sig
Between Groups	3.972	5	0.794	5.085	0.000
Within Groups	140.614	900	0.156		
<b>Total</b>	<b>144.586</b>	<b>905</b>			

**Table 7 Multiple comparison of results using Scheffe' technique**

Among courses	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>3</sub>	Y <sub>4</sub>	Y <sub>5</sub>	Y <sub>6</sub>
Y <sub>1</sub>	-	-0.0509	0.0183	0.0883	-0.1179	-0.0665
Y <sub>2</sub>		-	0.0692	0.1393	-0.0670	-0.0155
Y <sub>3</sub>			-	0.0700	-0.1363	-0.0848
Y <sub>4</sub>				-	-0.2063*	-0.1548*
Y <sub>5</sub>					-	0.05148
Y <sub>6</sub>						-

\* The mean difference was significant at the .05 level

at all. This could be one of the reasons why these two areas of teaching competency produced lower standards.

**5. The Multiple Linear Regression Analysis**

The multiple linear regression analysis for teaching competency prediction from each skill using the stepwise approach.

5.1 The multiple linear regression for competency prediction from the introduction to the lesson skills.

The multiple linear regression analysis results for competency prediction from the introduction to the lesson skills are as follows:

1. By using the enter technique  
Raw score equation:

$$\hat{y}_1 = 3.16 + 0.212X_1 + 0.05X_2 - 0.03X_3$$

Standardized equation:

$$\hat{z}_1 = 0.182Z_1 + 0.087Z_2 - 0.048Z_3$$

The efficiency of this model

was 3.90%

2. By using the stepwise technique

Raw score equation:

$$\hat{y}_1 = 3.175 + 0.215X_1$$

Standardized equation:

$$\hat{z}_1 = 0.185Z_1$$

The efficiency of this model

was 2.80%

- 5.2 The multiple linear regression for competency prediction from manipulation of

**Table 8 The multiple linear regression analysis results for competency prediction from the introduction to the lesson skills**

Variables	Enter			Variables	Stepwise		
	b	β	t		b	β	T
Constant	3.160		10.70*	Constant	3.175		10.84*
X <sub>1</sub>	0.212	0.182	1.890	X <sub>1</sub>	0.215	0.185	2.299*
X <sub>2</sub>	0.050	0.087	0.874				
X <sub>3</sub>	-0.030	-0.048	-0.432				
N = 151				N = 151			
F = 2.001				F = 5.283*			
R <sup>2</sup> = 0.039				R <sup>2</sup> = 0.028			

\* P < .05

**Table 9 The multiple linear regression analysis results for competency prediction from manipulation of instructional activities skills**

Variables	Enter			Variables	Stepwise		
	b	$\beta$	t		b	$\beta$	T
Constant	3.257		10.77*	Constant	3.242		10.82*
X <sub>1</sub>	0.173	0.146	1.510	X <sub>1</sub>	0.210	0.177	2.194*
X <sub>2</sub>	-0.010	-0.020	-0.205				
X <sub>3</sub>	0.050	0.070	0.621				
N = 151 F = 1.721 R <sup>2</sup> = 0.034				N = 151 F = 4.812* R <sup>2</sup> = 0.031			

\* P < .05

instructional activities skills.

The multiple linear regression analysis results for competency prediction from manipulation of instructional activities skills are as follows:

1. By using the enter technique

Raw score equation:

$$\hat{y}_2 = 3.257 + 0.173X_1 - 0.01X_2 + 0.05X_3$$

Standardized equation:

$$\hat{z}_2 = 0.146Z_1 - 0.020Z_2 + 0.070Z_3$$

The efficiency of this model is

3.40%

2. By using the stepwise technique

Raw score equation:

$$\hat{y}_2 = 3.242 + 0.21X_1$$

Standardized equation:

$$\hat{z}_2 = 0.177Z_1$$

The efficiency of this model is

3.10%

- 5.3 The multiple linear regression for competency prediction from questioning skills.

The multiple linear regression analysis results for competency prediction from questioning skills are as follows:

1. By using the enter technique

Raw score equation:

**Table 10 The multiple linear regression analysis results for competency prediction from questioning skills**

Variables	Enter			Variables	Stepwise		
	b	$\beta$	t		b	$\beta$	T
Constant	3.026		8.709*	Constant	3.039		8.833*
X <sub>1</sub>	0.270	0.198	2.048*	X <sub>1</sub>	0.253	0.185	2.301*
X <sub>2</sub>	0.030	0.038	0.386				
X <sub>3</sub>	-0.050	-0.047	-0.418				
N = 151 F = 1.815 R <sup>2</sup> = 0.036				N = 151 F = 5.293* R <sup>2</sup> = 0.034			

\* P < .05

$\hat{y}_3 = 3.026 + 0.27X_1 + 0.03X_2 - 0.05X_3$   
 Standardized equation:  
 $\hat{z}_3 = 0.198Z_1 + 0.038Z_2 - 0.047Z_3$   
 The efficiency of this model is 3.60%

2. By using the stepwise technique  
 Raw score equation:  
 $\hat{y}_3 = 3.039 + 0.253X_1$   
 Standardized equation:  
 $\hat{z}_3 = 0.185Z_1$   
 The efficiency of this model is 3.40%

5.4 The multiple linear regression for competency prediction from reinforcement skills.  
 The multiple linear regression analysis results for competency prediction from reinforcement skills are as follows:

1. By using the enter technique  
 Raw score equation:  
 $\hat{y}_4 = 2.849 + 0.285X_1 - 0.03X_2 + 0.04X_3$   
 Standardized equation:  
 $\hat{z}_4 = 0.199Z_1 - 0.047Z_2 + 0.042Z_3$   
 The efficiency of this model was 4.40%

2. By using the stepwise technique  
 Raw score equation:  
 $\hat{y}_4 = 2.835 + 0.296X_1$   
 Standardized equation:  
 $\hat{z}_4 = 0.207Z_1$   
 The efficiency of this model was 4.30%

5.5 The multiple linear regression for competency prediction from conclusion skills.  
 The multiple linear regression analysis results for competency prediction from conclusion skills are as follows:

1. By using the enter technique  
 Raw score equation:  
 $\hat{y}_5 = 3.407 + 0.153X_1 - 0.02X_2 + 0.05X_3$   
 Standardized equation:  
 $\hat{z}_5 = 0.12Z_1 - 0.031Z_2 + 0.063Z_3$   
 The efficiency of this model was 2.30%

2. By using the stepwise technique  
 From this analysis, the multiple linear regression could not be constructed.

5.6 The multiple linear regression for competency prediction from evaluation skills.  
 The multiple linear regression analysis results for competency prediction from evaluation skills are as follows:

1. By using the enter technique

**Table 11 The multiple linear regression analysis results for competency prediction from Reinforcement skills**

Variables	Enter			Variables	Stepwise		
	b	$\beta$	t		b	$\beta$	T
Constant	2.849		7.845*	Constant	2.835		7.882*
X <sub>1</sub>	0.285	0.199	2.072*	X <sub>1</sub>	0.296	0.207	2.301*
X <sub>2</sub>	-0.030	-0.047	-0.470				
X <sub>3</sub>	0.040	0.042	0.380				
N = 151				N = 151			
F = 2.269				F = 6.637*			
R <sup>2</sup> = 0.044				R <sup>2</sup> = 0.043			

\* P < .05

**Table 12 The multiple linear regression analysis results for competency prediction from conclusion skills**

Variables	Enter			Variables	Stepwise		
	b	$\beta$	t		b	$\beta$	T
Constant	3.407		10.45*	Constant	-		-
X <sub>1</sub>	0.153	0.120	1.239	-	-		-
X <sub>2</sub>	-0.020	-0.031	-0.312				
X <sub>3</sub>	0.050	0.063	0.559				
N = 151 F = 1.146 R <sup>2</sup> = 0.023							

\* P < .05

**Table 13 The multiple linear regression analysis results for competency prediction from evaluation skills**

Variables	Enter			Variables	Stepwise		
	b	$\beta$	t		b	$\beta$	T
Constant	3.371		11.77*	Constant	3.630		25.50*
X <sub>1</sub>	0.119	0.106	1.096	X <sub>1</sub>	0.113	0.163	2.022*
X <sub>2</sub>	-0.030	-0.054	-0.542				
X <sub>3</sub>	0.100	0.137	1.228				
N = 151 F = 1.845 R <sup>2</sup> = 0.036				N = 151 F = 4.088* R <sup>2</sup> = 0.027			

\* P < .05

Raw score equation:

$$\hat{y}_6 = 3.371 + 0.119X_1 - 0.03X_2 + 0.1X_3$$

Standardized equation:

$$\hat{z}_6 = 0.106Z_1 - 0.054Z_2 + 0.137Z_3$$

The efficiency of this model

was 3.60%

2. By using the stepwise technique

Raw score equation:

$$\hat{y}_6 = 3.63 + 0.113X_1$$

Standardized equation:

$$\hat{z}_6 = 0.163Z_1$$

The efficiency of this model

was 2.70%

The multiple linear regression analysis for teaching competency prediction using the stepwise approach revealed that the academic achievement which could predict teaching competency was academic achievement in educational profession courses. This could predict five teaching competencies: introduction to the lesson skills, manipulation of instructional activities skills, questioning skills, reinforcement skills and evaluation skills. The only competency that could not be predicted was conclusion skills. Such results could be accounted for by the fact that only the teaching competency of student teachers directly resulting from the effects of academic achievement in educational profession courses

could be clearly seen. Academic achievement in foundations major courses and academic achievement in specialized courses had no clear effects on the teaching competency. This was so because over the three-year period of their studying in the Faculty of Education at Prince of Songkla University prior to their student teaching practicum, the Faculty of Education had offered related courses on educational professions, so that the student teachers would be well-prepared with theoretical and practical foundations of good teacherhood. All of these required backgrounds had clearly brought about the teaching competency, showing cohesive agreement with the findings of the study conducted by Wichai Wongyai and others (1986, 95) revealing that the subjects or courses with most effects on teaching competency were the educational profession courses, especially Educational Psychology, Principles of Teaching and Child Development. The results suggested, the academic achievement in science foundations major courses and specialized major courses had no effect on teaching competency. This can be explained by the fact that the main teaching competencies studied related to educational profession courses more than to science foundation major courses and specialized major courses. In the case of the academic achievement in educational profession courses, which could not predict the conclusion skill, it could be explained that the conclusion skill depended on many factors such as good contents, the techniques of conclusion and the experience of the teacher. The student teachers were not precise in their contents, and this was relevant to the results in Table 1. It was found that the lowest academic achievement was in science foundation major courses and specialized major courses especially related to the teaching contents of the secondary level at which the student teachers were training. In addition, good teaching conclusion depended on experience and various techniques which usually only the experienced teacher possessed. For the student teachers, conclusion skills may have depended on individual competency.

### Recommendations

The following are some suggestions for further research.

1. We should continue conducting research in this area by choosing students in the Science Degree Programs in the Faculty of Education, Prince of Songkla University for more than one academic year in order to compare the results.

2. The evaluation for teaching competency should be finished within the first month of teacher training. If the teaching competency was not evaluated early, the result of the evaluations may not reflect their teaching reparation, which was managed by the Faculty but their self-development after real teaching.

3. We should study the teaching competency relating to the subject contents to see how well the student teachers who passed the curriculum in the Faculty of Education, Prince of Songkla University gained knowledge and performed in their teaching.

4. We should also conduct research using teacher trainees in the Art Degree Program in the Faculty of Education, Prince of Songkla University to compare the results.

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