Determinants of Success in Mathematics Student Teaching at the UP Integrated School

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Student teaching is a vital component of teacher education. The program gives student teachers the opportunity to learn the basic skills needed to become expert teachers, and provides them determinants of success in the teaching profession. In terms of mathematics student teaching, two of the determinants of success theorized were (1) the mode of entry into the UP College of Education (CoEd), whether as an original freshman of the college or as a "shiftee" from another college, and (2) performance in (a) content courses, (b) methods courses, and (c) test and measurement courses. Success in mathematics student teaching is ultimately measured through the final grade in EDUC 180, the student-teaching course.

For the purposes of this study, Mathematics student teachers for two consecutive academic years, 2005-2006 and 2006-2007, were engaged.

The results of the study indicated that the mode of entry into the CoEd and the performance of the student teacher in all his/her content courses (grades in all the required courses in Mathematics) are determinants of success in student teaching. Moreover, the study revealed that the student teachers' performance in student teaching is significantly correlated with their performance in their content and methods courses.

Introduction

It has been observed that more and more students shift or transfer from courses in other colleges to the courses found at UP CoEd. In fact, during the academic years 2005-2006 and 2006-2007, 23 out of the 37, or about 62%, of the mathematics majors who were sampled were non-original education students ("shiftees"). Seventeen, or about 74%, of those non-original education students came from mathematics related courses, mostly from the College of Engineering and the School of Statistics.

According to its website, the CoEd which officially started as School of Education in 1913 admitted students who wanted to pursue a teaching career after completing a preparatory course or an equivalent course at the College of Liberal Arts. Three years after, the University High School was formed to cater to the practice-teaching needs of these students. In 1918, the School of Education became what it is now today.

Under the administration of the then Dean Alfredo Morales who took his deanship in 1959, the Bachelor of Science in Elementary Education (BEEd) was offered in 1961. With this development, the UP Elementary School was formed to cater to the needs of BEEd students. Note that the UP Elementary School and the University High School were merged in 1976 to form the UP Integrated School (UPIS).

At present, the UP CoEd is accepting undergraduate students in three different modes: as a new freshman (an UPCAT passer), as a "shiftee" from another UP unit or college of the university (an UPCAT passer), or as a transferee from another university. The college offers two degrees for its undergraduates: BEEd and Bachelor of Secondary Education (BSE).

After finishing all the preparatory courses, all students from the UP CoEd have to go through EDUC 180 (Student Teaching) to be able to get a degree in education. This program is an intermediary stage from being a full-time student to a full-time teacher (Brown, 1968). This program helps the prospective teachers to have a gradual transition as college students to full-fledged teachers.

As a laboratory school of the CoEd, UPIS accepts students from the CoEd every semester to serve as student teachers. During this stage, the student teachers are provided with the opportunity to be exposed to a real classroom setting where they can apply the theories they have learned in their education courses by directly experiencing what it feels to be a teacher (Byers and Irish, 1961).

Having these students teach should not pose a problem to the students and should not bother the students' parents. In fact, a research, entitled "The Performance of Students under the Student Teachers and Supervising Teachers: A Comparative Study (Pambid, 1971)," revealed that there is no significant difference in the performance of students in UP High School who were taught by student teachers and those who were taught under the cooperating teacher, specifically in Mathematics II, Biology and World History. The researcher recognized that this non-difference is because of the "quality supervision" received by student teachers from their cooperating teachers.

However, for the past years, during which "shiftees" in the UP CoEd became prevalent, it was observed that UPIS students generally dislike having student teachers and often, would rather have the UPIS faculty teach them. Also, UPIS students generally have a "low perception" of student teachers and were thus observed giving student teachers less respect than what they would actually give the UPIS faculty. UPIS teachers also observed that in general, student teachers do not perform as well as expected.

These perceptions of UPIS students and faculty may have stemmed from the problems that the student teachers encounter during their practicum. It was recognized that student teachers are beset with conflicting feelings once they enter student teaching. They may be enthusiastic to begin teaching, but at the same time, they may be apprehensive of their capability to meet the expectations of the people around them. They are also concerned about whether students will be fond of them or doubt their inability to handle the class. Consequently, the performance of student teachers may be greatly affected by these fears (39th Yearbook of the Association of Student Teaching, 1960).

Another possible problem that student teachers may encounter is dealing with fear of accountability in teaching other people (Brown, 1968). This accountability is supported by Byers and Irish stating that a student teacher is directly accountable to the students and indirectly to their parents. Student learning depends largely on the teacher. Student teachers' fear of this responsibility may lead to insecurity on their part, and consequently affect their performance.

These problems therefore raise some questions regarding the ability of student teachers to become successful in their practice teaching. The most pressing issue, however, is whether these problems are a consequence of the student teachers' mode of entry to the CoEd since at present, most of the students at the UP CoEd are "shiftees" from other colleges.

Statement of the Problem

Student teaching is a vital component in teacher education (*Olaso, 1966*). It is through this program that student teachers are given the opportunity to learn the basic skills needed to become expert teachers. Also, the performance of the student teacher in his practicum offers a basis for his success in the teaching profession (Byers, Irish, 1961). On this note, this study was conducted with the aim of identifying the factors that determine the success of mathematics student teachers in their student teaching at the UPIS. In particular, this research aims to answer the following questions:

1. Do original education students and non-original education students differ in terms of performance in student teaching as measured by their grades in EDUC 180?
2. Does mode of entry into the college affect the performance of student teachers in
   a. content courses (average grade in undergraduate mathematics courses and qualifying rate or QR, which is defined as the number of required mathematics subjects divided by the number of mathematics subjects taken, including the number of times the course was taken)?
   b. methods course (Fundamental Mathematics Concepts and Methods for Elementary Teachers or EDSC 126 for BEEd, and The Teaching of Mathematics or EDSC 121 for BSE mathematics majors in UP CoEd)?
   c. test and measurement course (EDRE 146 for UP CoEd students)?
2. Is there a relationship between performance in student teaching as measured by the grade in EDUC 180 and performance in
   a. content courses?
   b. methods course?
   c. test and measurement course?

Significance of the Study

This study aims to determine if the mode of entry to the UP CoEd is a determinant of success in student teaching. If proven as such, this research could provide important data for the strengthening the student-teaching program through consideration of the possibility of differentiating the content and method preparations of original mathe-

matics education students and those of the non-original ones.

This research may also be used as a basis for determining which areas student teachers need to improve on. It may assist supervisors of the student-teaching program in the re-evaluation of the prerequisite courses of student teaching or the possible inclusion of some courses prior to student teaching to help aid student teachers in their practicum.

Theoretical Basis

Evaluating student teachers and the student-teaching program is a necessity. The presence of a competent teacher is an indispensable aspect in the teaching-learning environment. Although there are many obstacles in evaluating a good teacher, it is clear that a good teacher should be intellectually capable. The teaching profession requires the "best informed, best prepared, and best qualified individuals (39th Yearbook of the Association of Student Teaching, 1960)." The student teachers' knowledge in the subject area or the lack of it has an adverse effect in student learning. It is therefore important that student teachers have a good educational background, especially in the subject area that they are going to teach. It can then be inferred that the performance in the content area, in this case in mathematics courses, is indeed one of the possible determinants of success in student teaching.

In a research done by Ignacia B. Olaso, entitled "Problems Identified by the Student Teachers in Student Teaching," she acknowledged that student teachers indeed face various problems in student teaching.

In fact, one-third to about one-half of the 264 student teachers from Luzon, Visayas and Mindanao who were sampled identified student behavior as one of the main problems encountered by student teachers. The be-

haviors mentioned included lack of interest, and lack of initiative and attentiveness on the part of the students (Olaso, 1966). This problem may be addressed by the knowledge of the strategies and methods in teaching. How student teachers plan their lessons in order to make them interesting and informative at the same time relies greatly on their broad knowledge and fuller understanding of the strategies in teaching. Thus, preparation of student teachers in methods and strategies can also be named as another determinant of success in student teaching.

On the other hand, since EDRE 146 primarily deals with constructing examinations and evaluating student achievement, and is one of the main aspects in student teaching, this course can also be a considered as a possible determinant of success in student teaching.

Lastly, the student teachers' passion and inclination to teach may also be considered as another determinant. This may be attributed to whether they are original mathematics education students or "shiftees" from other colleges. Therefore, it can be said that the student teachers' preference for education as a course may be another determinant of success in student teaching.

How Student Teachers are Evaluated

Student teachers should be continuously assessed and evaluated. If possible, student teachers should be evaluated even before they pursue teacher education (39th Yearbook of the Association of Student Teaching, 1960). In a study done by Kosintr Rungsayapun in 1966, entitled "Practices for Grading and Evaluating Student Teachers in Public Primary and Teacher Training Institutions of the Philippines," the need to constantly observe and appraise student teachers is stressed as one of the essentials in the evaluation of student teachers. However, it showed that in each institution in the Philip-

pines, there is a different way of grading and evaluating student teachers, the common practice of which is the utilization of the following:

1. evaluation forms and written reports
2. cooperating teachers' observations
3. student teachers' evaluation of their own teaching performance
4. actual classroom performance
5. successful classroom instruction

Student teachers are then given a grade based on a numerical scale, such as a 1.0, for excellent, and so on.

As for the student teachers in UPIS, student teacher performance is evaluated through the following:

1. cooperating teacher's observations in terms of lesson planning, lesson preparation, work ethics etc.
2. student evaluation results, including comments about the student teacher based on the following criteria:
    a. ability to explain things
    b. extent to which the student teacher assists in making class work interesting
    c. ability to plan and organize work
    d. knowledge and understanding of the subject matter
    e. extent to which the student teacher understands his/her students
    f. ability to discipline the class
3. student teacher evaluation of own teaching progress
4. evaluation form from the UP CoEd

The form given by the UP CoEd is then completed and a grade is then equated to the 11-point system with the corresponding score from 1 to 100.

Methodology

This study made use of the quantita-

tive approach for its research design. The quantitative data came from the 37 BEEd and BSE mathematics majors from the UP CoEd for two consecutive school years, 2005-2006 and 2006-2007, in their mathematics core courses, methods course (EDSC 126 for BEEd and EDSC 121 for BSE students), test and measurement course (EDRE 146) and in their practice teaching (EDUC 180).

These student teachers were categorized as original mathematics major education students (fresh high school graduates who are UPCAT passers and whose entry point to the University is through the UP CoEd) and non-original mathematics major education students (UPCAT passers who are "shiftees" and "transferees" from other universities). The researcher grouped the student teachers as such since there is only one transferee student out of the 37 students sampled.

While gathering the grades of the student teachers via the University's Computerized Registration System (CRS), the researcher found some students lacking grades in some mathematics subjects. For example, one student teacher lacked a grade in Math 53 but had a passing mark in Math 54 and the student teacher already graduated. Considering that some of the mathematics subjects are pre-requisites of other mathematics subjects, the researcher assumed that the student teacher passed Math 53 so a grade of 3.0 was assigned to that subject. The same procedure was done to the other subjects without grades except for one student teacher with no grade in both methods course and EDRE 146, and got a grade of 4.0 in student teaching.

Using **SPSS**, the grades of the student teachers were encoded. The average of all the grades in all the mathematics courses of each student is obtained. This is then labeled as the mathematics average. A QR was also computed. The QR will show that student teachers who passed all the mathemat-

ics subjects they took only once had higher qualifying rates than those who had to take one or more mathematics subject/s more than once.

The T-test was used to compare the grades of the student teachers in EDUC 180 in terms of mode of entry.

The same test was used to compare the grades in EDRE 146 and methods course in terms of the student teachers' mode of entry. The same test was also used to compare the qualifying rate of the two groups. Correlation was used to determine the relationship between the grade in EDUC 180 and the three variables: mathematics average grade, EDSC 126 or EDSC 121 grade, and EDRE 146 grade.

Discussion of Findings

Mode of Entry as Determinant

Table 1 shows the mean grades of the student teachers in EDUC 180 based on the University's 11-point system (i.e. 1.0 as highest, 5.0 lowest, and 3.0 as passing). Student teachers were differentiated based on mode of entry.

Table 1. Mean Grades of Original and Non-original Education Students in EDUC 180

Subject	Mode of Entry	N	Mean	Standard Deviation	Std. Error Mean
EDUC 180*	Original	14	1.4107	.31936	.08535
	Non-Original	23	1.8587	.92572	.19303

*mean grades significantly different at 0.05 level.

Note that there is quite a large difference in the mean grades of original education and non-original education students in EDUC 180. The difference in mean grades is about 0.448 in favor of the original math major education students. The Levene's Test for Equality of Variance resulted in an F-value of 6.571 with a p-value of 0.015, indicating unequal variances. A subsequent T-test assuming unequal variances resulted in a t-value of 2.123 with 29.533 degrees of freedom and a p-value of 0.042 for a two-tailed test. This indicates that **the mean difference in EDUC 180 is indeed significant in favor of the original education students** at a 0.05 level of significance.

This result implies that the mode of entry, which is being an original education student, is a determinant of success in student teaching.

Other Determinants of Success

Another determinant of success in student teaching is the student teachers' performance in preparation courses. Table 2 shows the average grade in content courses (as well as QRs based on content subjects taken), and grades in test and measurement course, and methods course using the University's 11-point system.

Table 2. Performance in Preparation Courses of Original and Non-Original Education Students

	Mode of Entry	N	Mean	Standard Deviation	Std. Error Mean
QR*	Original	14	92.81	10.495	2.805
	Non-Original	23	73.81	21.508	4.485
Math Average*	Original	14	2.41	.5510	.1472
	Non-Original	23	2.94	.7810	.1628
EDRE 146	Original	14	1.4464	.28043	.07495
	Non-Original	22**	1.6023	.43410	.09255
EDSC 126 or 121	Original	14	1.5893	.33408	.08929
	Non-Original	23	1.7174	.56056	.11689

*mean grade and QR are significantly different at 0.05 level
**one non-original education student had no grade in EDRE 146

Note that there is a big difference in the mean grades of original education students (2.41) and that of the non-original education students (2.94) in their mathematics average. The difference in the mean grades in their mathematics average is about 0.531, in favor of the original education students. The Levene's Test for equality of variance yielded an F-value of 6.273 with a p-value of 0.017, implying unequal variances. The subsequent T-test yielded a t-value of 3.592 with 33.82 degrees of freedom and a p-value of 0.001. This implies that **there is a significant difference in the average grade in Mathematics between original education students with that of the non-original education students** even at 0.01 level of significance.

The same observation was found in the mean QR of the two groups. A mean difference of 19 in favor of original education students was observed. The Levene's Test for equality of variance yielded an F-value of 2.441 with a p-value of 0.127 implying equal variances. The subsequent T-test yielded a t-value of 2.224 with 35 degrees of freedom and a p-value of 0.033. This implies that **there is a significant difference in the qualifying rates between the grades of original education students and that of non-original education students** at 0.05 level of significance.

On the other hand, the difference between the mean grades of original education students and that of "shiftees" in EDRE 146 is only 0.15 in favor of original education students. The Levene's Test for Equality of Variance resulted in an F-value of 4.425 with a p-value of 0.043, indicating unequal variances. A subsequent T-test assuming unequal variances resulted in a t-value of 1.309 with 33.973 degrees of freedom and a p-value 0.199 for a two-tailed test. This indicates that despite the 0.15 difference in mean, there is **no significant difference between the mean grades of original and non-original education students in terms of their grades in EDRE 146** at a 0.05 level of significance.

In a similar manner, the difference in the mean grades in the methods courses of original education students and that of the "shiftees" is only 0.13 in favor of the original ones. A Levene's Test for Equality of Variance resulted in an F-value of 1.051 with a p-

value of 0.312, indicating equal variances. Subsequent T-test assuming equal variances resulted in a t-value of 0.773 with 35 degrees of freedom and a p-value 0.445 for a two-tailed test. This indicates that despite the 0.13 difference in mean, there is **no significant difference between the mean grades of original and non-original education students in terms of their grades in EDRE 126 or 121** at a 0.05 level of significance.

Since mode of entry was found to be a determinant, and average grade and QR in the content courses can be differentiated by mode of entry, there is a possibility that the average grade and QR in the content courses may also be determinants of success in student teaching.

Relationship of the Identified Determinants in Student Teaching

Correlations were used to measure association between the grades in EDUC 180 and the grades in the other three variables, which were EDRE 146, EDSC 126 or EDSC 121, and the mathematics average of the student teachers sampled. This was done to determine if the student teachers' grades in practice teaching correlate with their grades in the methods course, and mathematics average. Table 3 shows Pearson's correlation coefficients of the various preparation courses and the student-teaching course, including the significance values of the coefficients.

Table 3. Correlation of Student Teaching with the Methods Course, Content Courses, and Test and Measurement Course

		EDUC 180	Methods	Content	Test Devt
Pearson Correlation	EDUC 180	1.000	.360	.456	.183
	Methods		1.000	.471	.437
	Content			1.000	.554
	Test Dev't				1.000
Sig. (1-tailed)	EDUC 180		.015	.003	.143
	Methods			.002	.004
	Content				.000
	Test Dev't				
N	EDUC 180	36	36	36	36
	Methods		36	36	36
	Content			36	36
	Test Dev't				36

Table 3 shows that linear associations exist among the four variables. The strongest association (0.554) was between average in content courses and EDRE 146. The weakest association (0.183) was between EDUC 180 and EDRE 146.

Unsurprisingly, **the association between student teaching, and the test and measurement course was found to be not significant** (r = 0.183, p = 0.143) at 0.05 level of significance. On the other hand, all the other associations were found to be significant at 0.05 level of significance. Thus, **the methods course has a significant association with student teaching** (r = 0.360, p = 0.015). Similarly, **content courses have a significant association with student teaching** (r = 0.456, p = 0.003). Therefore, performance in the methods and content courses are determinants of success in student teaching.

Conclusions and Implications

Based on the results of the study, it can be concluded that mode of entry is indeed a determinant of success in student teaching as shown by the significant difference in the mean grades of original and non-original education students in EDUC 180. This implies that original education students perform better in their practice-teaching course, and consequently, receive higher grades than their non-original counterparts. This would probably prove the assumption that original education students have the passion and the inclination to teach after graduation as reflected by their choice of college course than non-original ones whose possible reason for shifting to an education course is to be able to obtain a college degree at the soonest possible time and not really to teach after graduation.

On the other hand, the mode of entry of the student teachers to the UP CoEd is independent of their performance in the methods, and test and measurement courses. This means that being an original education student does not guarantee a high grade in EDRE 146, and EDSC 126 or EDSC 121. In a similar manner, one cannot conclude that being a non-original education student guarantees a low grade in EDRE 146, and EDSC 126 or EDSC 121. The observed difference of mean grades between the two groups may simply be due to chance.

However, performance in content courses was found to be dependent on mode of entry. From the data, it was observed that original education students have a higher QR and average grade in content courses than non-original education students, and that the difference is significant. This implies that original education students are more likely to pass all their mathematics subjects in one take than the non-original education students. This is of course expected since failure in meeting the required grade point average (GPA) in their original degree programs is the primary reason why students from Mathematics, Statistics, and Engineering shift to BSE or BEEd Mathematics. They opt to shift to BSE or BEEd Mathematics since these programs will credit the mathematics subjects that they have already passed.

Of the three preparatory courses, two were found to be determinants of success in student teaching. These are the content and methods courses. It was seen that students who perform better in their mathematics courses also perform well in their practice-teaching course. This may probably be because student teachers who had a good mathematics content background only have to worry about the techniques and strategies of teaching. This was supported by the fact that the average mathematics grades of original education students were higher compared to that of the non-original education students. This might be attributed to the fact that original education students knew from the time they entered the UP CoEd that they wanted

to teach a subject where they are good at, in this case Mathematics.

It also seems that student teachers who performed well in their methods course, which deals with lesson planning, demo teaching, strategies in teaching, also did well in practice teaching. This is expected since theories and strategies learned in the methods course are essential to practice teaching.

To summarize, the courses offered in the content area and the methods area indeed support the needs of the student-teaching program.

One preparatory subject not found to be a determinant of success in student teaching was the test and measurement course. Performance in EDRE 146 does not guarantee a student teacher's success in practice teaching. One possible interpretation of this finding is that the student teacher does not or cannot use his/her knowledge of testing and measurement in practice teaching. Another possible explanation could be that the practice-teaching course's main basis for grading deals with teaching per se and not the student teacher's ability to construct a test or evaluate students.

Recommendations

This study was done using a limited group of 37 mathematics major student teachers who have had their practice teaching in the academic years 2005-2006 and 2006-2007. Further studies may be done not only engaging mathematics majors in the CoEd but also other students in other subject areas for a much longer period.

Moreover, the study would have yielded a stronger result if the quantitative study was supported by qualitative data from original education students compared to their non-original counterparts through the student teachers' evaluation results as accomplished by the UPIS students who were under student teachers.

This study should serve as a basis for the college to re-evaluate its admission policy for "shiftees." Having seen the trend that the CoEd seems to be serving as a "diploma mill" for students who were not able to meet the required cut off grade of their original programs, the administration may consider imposing a cut-off grade as well for shifting or transferring students to produce quality student teachers, and consequently, highly qualified teachers.

In addition, having seen the relationship between the student-teaching program with that of the methods course, the CoEd may try to strengthen its methods courses more by revising or updating the syllabus from time to time and teaching more strategies to its students. Also, since there seems to be no correlation between the practice-teaching program, and the test and measurement course, it is probably high time that they strengthen the test and measurement evaluation in the practice-teaching program.

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