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# Do Agricultural Teachers Differ in Professional Knowledge?

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**ABSTRAK**

Tujuan utama kajian adalah untuk membandingkan kecekapan pengetahuan profesional yang diperolehi oleh dua kumpulan guru. Kumpulan pertama terdiri daripada para guru yang mempunyai kelayakan guru prakhidmat manakala satu kumpulan lagi tidak mempunyai kelayakan sedemikian. Kajian berkenaan telah menggunakan reka bentuk penyelidikan *ex post facto*. Pembolehubah sandar, kecekapan pengetahuan profesional telah diukur dengan menggunakan ujian yang mengandungi 50 soalan aneka pilihan. Tujuh pembolehubah ekstraneus telah dikenalpasti dan diuji.

Tujuh puluh satu orang guru yang berkelayakan guru prakhidmat dan tujuh puluh orang guru tanpa kelayakan sedemikian telah mengambil bahagian di dalam kajian. Dapatan kajian menunjukkan guru-guru yang berkelayakan guru prakhidmat memperolehi markah yang lebih tinggi dan bererti daripada mereka yang tidak berkelayakan guru prakhidmat. Berasaskan analisis keputusan ujian keertian ke atas pembolehubah-pembolehubah ekstraneus, adalah disimpulkan bahawa kelayakan guru boleh memberi penjelasan yang munasabah tentang perbezaan kecekapan pengetahuan profesional di kalangan dua kumpulan guru berkenaan. Oleh itu, adalah dicadangkan supaya kecekapan pengetahuan profesional guru pertanian harus dibezakan berdasar jenis kelayakan guru yang mereka perolehi.

**ABSTRACT**

The study compares the professional competency of two groups of agricultural teachers. The first group comprised teachers with preservice teacher preparation and the other consisted of teachers without such preparation. The study utilised an *ex post facto* type of research design. The dependent variable, professional knowledge competence, was measured by a 50-item, multiple-choice test. Seven extraneous variables were identified and tested.

Seventy-one teachers with preservice preparation and seventy teachers without such preparation participated in the study. The findings showed that teachers with preservice teacher preparation scored significantly higher than teachers without such preparation. Based on the analysis of results of the significance tests on the extraneous variables, it was concluded that teacher qualification could offer a plausible explanation for the difference in professional knowledge competence among the two groups of teachers. Therefore, it is recommended that the professional knowledge competence of agricultural teachers be recognised as the basis of teacher preparation.

## INTRODUCTION

The development of agriculture in Malaysia depends greatly on its trained manpower. Realising the importance of having adequate and competent agricultural manpower, Malaysia has designed a multi-dimensional system of agricultural education and training. Presently, the technical preparation of agricultural manpower occurs at four main levels: (a) professional or degree level, (b) subprofessional or diploma level, (c) operative or certificate level, and (d) suboperative or skill level. The first two levels are generally referred to as the education for high- and middle-level agricultural personnel. They involve university-level education which prepares agricultural administrators, scientists and supervisors. The third and fourth levels are more appropriately described as secondary-level education designed to prepare agricultural technicians, extension agents, field assistants and highly skilled workers for specific job functions. Various government ministries, agencies and private bodies are involved in the technical preparation of agricultural manpower.

The successful implementation of agricultural education and training programmes in Malaysia depends greatly on its trained teachers. Realising the importance of having competent agricultural teachers in adequate numbers, Malaysia offers several means by which a prospective teacher may gain access to the teaching profession. Generally, teachers are employed on the basis of preservice teacher qualification. Under this practice, a teacher can be employed upon the completion of a preservice teacher education programme. Another alternative for teachers to be employed also exists. In this alternative, persons aspiring to become teachers are not required to possess a preservice teacher qualification. Instead, these persons are employed as teachers based on an academic qualification in a chosen teaching subject or based upon their occupational qualification. Hence, at present there are two groups of teachers who are actively teaching agriculture in Malaysia. The first group comprises those who possess a preservice teacher qualification whereas the second group comprises those who do not possess such a qualification.

Do teachers with teacher preparation differ from those without such preparation in professional competence? Professional competence in teaching refers to the pedagogical knowledge and skills needed for the successful practice of teaching (Watts 1982). Studies on the problem of professional competence of teachers with and those without preservice teacher preparation seem to be minimal. Bledsoe *et al.* (1967), Popham (1968), E.A. Moore (1974) and G.E. Moore (1975) compared the professional competence of teachers who underwent different certification programmes. In every case teachers with preservice teacher preparation were found to be more professionally competent than their counterparts who did not have such preparation. Meanwhile, preservice teacher qualification has been shown to be one of the significant factors contributing to a high level of teacher competence in developing countries (Husen *et al.* 1978).

Apparently, agricultural education and training institutions in Malaysia currently adopt different hiring practices for their teachers. However, virtually no research is being done to compare and assess the effectiveness of such a practice. This study was undertaken to examine the inpact of the current practice in staffing agricultural institutions in Malaysia.

## PURPOSE AND OBJECTIVES

The main objective of the study was to compare the professional knowledge competence of agricultural teachers with and those without preservice teacher preparation. The specific objectives were: (1) to identify and describe the background characteristics of teachers of agricultural science at the upper-secondary school level in Peninsular Malaysia, (2) to compare teachers' achievements on a professional knowledge competency test according to selected background characteristics, (3) to determine the relationship between the type of teacher preparation (with and without preservice teacher education) and selected background characteristics, and (4) to compare the achievement of teachers with and those without preservice teacher preparation in a professional knowledge competency test.

## PROCEDURE

### *Design*

The research was designed to be an *ex post facto* type of research utilising the static-group comparison design (Campbell and Stanley 1963). In this design, type of teacher preparation was the naturally occurring event. Teachers with and those without preservice teacher preparation were compared in terms of professional knowledge competence as measured by their achievement on a multiple-choice test. The major research hypothesis was: Teachers with preservice teacher preparation will have significantly higher professional knowledge competence than those teachers without such preparation. Following the advice of Kerlinger (1973), alternate or control hypotheses were formulated to describe the anticipated relationships between seven extraneous variables (race, age, gender, teacher experience, teaching location, teaching specialty area, and inservice courses completed) and professional knowledge achievement.

### *Instrumentation*

The dependent variable, professional knowledge competence, was measured by a 50-item, multiple-choice test. The test covered seven areas of pedagogical knowledge: educational foundation, adolescent growth and development, principles

of instruction, principles of learning, planning of instruction, implementation of instruction, and evaluation of instruction. The KR-20 value of the test was 0.67 with a standard error of measurement of 3.13. Prior to administration, the test was reviewed for its content validity by selected teacher educators and education officers at the Ohio State University and in Malaysia. An item analysis procedure was performed on the test to improve the items. The test was administered in the Malaysian national language. Background variables were obtained by means of a brief questionnaire.

*Population*

The target population were teachers who taught agricultural science at the upper-secondary school level at the time of the study. The teachers were identified by means of a current list provided by the Ministry of Education, Malaysia and the Ministry of Agriculture, Malaysia. There were 143 teachers listed. However, only 141 were accessible when data were gathered. Out of 141 teachers, 71 had preservice teacher preparation and 70 did not have such preparation.

*Data Gathering*

Prior approval for conducting the research was obtained from the Ministry of Education Malaysia and the Ministry of Agriculture Malaysia. Upon the approval from both Ministries, each teacher and his or her respective principal were notified about the research. The researcher met personally with each of the 141 teachers. The answer sheets and the questionnaires were collected at the completion of each meeting.

*Data Analysis*

The professional knowledge achievement was measured in terms of percent of correct items. One point was given for each correct item and zero for each incorrect response. The independent variables were analysed in terms of frequencies, percentages, and means. The t-test and one-way analysis of variance were used to compare the dependent variable with the independent variables. Both t-test and chi-square were used to compare type of teacher preparation with the extraneous variables. Hypothesis testing was performed at a predetermined alpha level of .05.

## FINDINGS

*Background Variables*

The participants in the study were predominantly of Malay race. There were 108 Malay teachers, 32 Chinese teachers and one Indian teacher. Three out of four teachers were male. The mean years of teaching experience were 7.3 with a standard deviation of 4.05. There were four types of schools in the study. The 64 academic schools employed 52 agriculture teachers; three vocational schools employed 30 agriculture teachers; three technical schools employed four agriculture teachers; and six agricultural institutes employed 55 agriculture teachers. Nearly two-thirds of the participants taught only one agriculturally-related subject. The remaining one-third taught either two or three agricultural subjects or taught non-agricultural subjects in addition to agricultural ones. Percentages of teachers completing inservice courses in the following areas were: teaching methods (41%), audiovisuals (35%), educational philosophy (27%), educational sociology (15%), testing and evaluation (23%), principles of teaching and learning (26%), classroom management (13%), and adolescent growth and development (18%).

*Analysis of Differences*

The procedure described by Warmbrod and Miller (1974) was followed in analysing the differences among variables. Three sets of differences were examined: (1) those between the extraneous variable and the dependent variable, (2) those between the extraneous variable and the major independent variable, and (3) between the major independent variable and the dependent variable.

*Differences between the extraneous variable and professional knowledge achievement.* Findings concerning the relationships between the extraneous variables and professional knowledge achievement are reported in Table 1.

Teachers in academic and technical schools achieved higher professional knowledge scores than teachers from vocational schools and agricultural institutes. Positive and significant differences were found between professional knowledge achievement and inservice courses in the area of educational sociology and in classroom management. The dependent variable was unrelated to race, age, gender, teaching experience, teaching speciality area, and inservice

TABLE 1
Summary of differences between extraneous variables and professional knowledge

| extraneous variables | n | M[a] | Test statistic and value | p |
|---|---|---|---|---|
| Race | | | | |
| Malay | 108 | 56.70 | t | p>.05 |
| Non-Malay | 33 | 60.00 | -1.48 | |
| Age | | | | |
| 24-27 | 36 | 57.05 | | |
| 28-31 | 41 | 58.19 | | |
| 32-35 | 42 | 56.24 | F | p>.05 |
| 36-39 | 16 | 58.12 | 0.43 | |
| 40-48 | 6 | 62.00 | | |
| Gender | | | | |
| Male | 106 | 56.51 | t | p>.05 |
| Female | 35 | 60.40 | -1.79 | |
| Teaching Experience | | | | |
| 1-4 years | 41 | 57.51 | | |
| 5-8 years | 52 | 58.11 | F | p>.05 |
| 9-12 years | 31 | 55.61 | 0.42 | |
| 13-20 years | 17 | 58.82 | | |
| Teaching Location | | | | |
| Academic school | 52 | 62.85 | | |
| Technical school | 4 | 61.00 | F | p<.05 |
| Vocational school | 30 | 54.67 | 7.79 | |
| Agricultural institute | 55 | 53.67 | | |
| Teaching Speciality Areas[b] | | | | |
| 1 | 93 | 58.24 | | |
| 2 | 23 | 55.91 | F | p>.05 |
| 3 | 18 | 54.55 | 0.81 | |
| 4 | 7 | | | |
| Inservice Courses Completed | | | | |
| Teaching Methods | | | | |
| Completers | 58 | 58.83 | t | p>.05 |
| Noncompleters | 83 | 56.53 | -1.20 | |
| Audiovisuals | | | | |
| Completers | 49 | 56.53 | t | p>.05 |
| Noncompleters | 92 | 57.98 | 0.73 | |
| Educational Philosophy | | | | |
| Completers | 38 | 58.79 | t | p>.05 |
| Noncompleters | 103 | 56.99 | -0.84 | |
| Educational Sociology | | | | |
| Completers | 21 | 63.05 | t | p<.05 |
| Noncompleters | 120 | 56.50 | -3.65 | |
| Test and Evaluation | | | | |
| Completers | 33 | 60.48 | t | p>.05 |
| Noncompleters | 108 | 56.55 | -1.77 | |
| Principles of Teaching/ Learning | | | | |
| Completers | 37 | 58.05 | t | p>.05 |
| Noncompleters | 104 | 57.27 | -0.36 | |
| Classroom Management | | | | |
| Completers | 19 | 62.74 | t | p<.05 |
| Noncompleters | 122 | 56.65 | -3.40 | |
| Adolescent Growth and Development | | | | |
| Completers | 26 | 60.69 | t | p>.05 |
| Noncompleters | 115 | 56.75 | -1.62 | |

[a] Mean per cent of items correct

[b] (1: one agriculturally-related subject, 2: two agriculturally-related subjects, 3: three agriculturally-related subjects, 4: combination of agriculturally and non-agriculturally-related subjects)

courses in teaching methods, audiovisuals, educational philosophy, testing and evaluation, principles of teaching and learning and adolescent growth and development.

*Differences between the extraneous variables and type of teacher qualification.* Findings concerning the differences between the extraneous variables and type of teacher qualification are reported in Table 2. The type of teacher qualification was divided into two categories, those with preservice teacher preparation and those without preservice teacher preparation. Positive and significant differences were found between the type of teacher qualification and four extraneous variables: race, teaching location, teaching speciality area, and inservice course in audiovisuals. Malay teachers were less likely to have completed a preservice teacher preparation programme than teachers of other races. A preservice teacher preparation pro-

TABLE 2
Summary of differences between extraneous variables and type of teacher qualification

| Extraneous variables | Qualification Type[a] | | | | stat. and value | p |
|---|---|---|---|---|---|---|
| | 1 | | 2 | | | |
| | n | %[b] | n | %[b] | | |
| Race | | | | | | |
| Malay | 45 | 63 | 63 | 90 | chi sq. | p<.05 |
| Non-Malay | 26 | 37 | 7 | 10 | 12.49 | |
| Age | | | | | | |
| 24–27 years | 13 | 18 | 23 | 33 | | |
| 28–32 years | 23 | 32 | 18 | 26 | | |
| 32–36 years | 21 | 30 | 21 | 30 | chi sq. | p>.05 |
| 36–39 years | 8 | 11 | 8 | 11 | 9.38 | |
| 40–48 years | 6 | 9 | – | – | | |
| Gender | | | | | | |
| Male | 56 | 79 | 50 | 71 | chi sq. | p>.05 |
| Female | 15 | 21 | 20 | 29 | 0.68 | |
| Teaching Experience[c] | 71 | 7.49 | 70 | 7.10 | t 0.57 | p>.05 |
| Teaching Location | | | | | | |
| Academic school | 48 | 68 | 4 | 6 | | |
| Technical school | 4 | 5 | – | – | | |
| Vocational school | 19 | 27 | 11 | 16 | chi sq. | p<.05 |
| Agricultural institute | – | – | 55 | 78 | 98.36 | |
| Teaching Speciality Areas[d] | | | | | | |
| 1 | 62 | 87 | 31 | 44 | | |
| 2 | 1 | 1 | 22 | 32 | chi sq. | p<.05 |
| 3 | 4 | 6 | 14 | 20 | 35.20 | |
| 4 | 4 | 6 | 3 | 4 | | |
| Inservice Courses Completed | | | | | | |
| Teaching Methods | | | | | | |
| Completers | 28 | 39 | 30 | 43 | chi sq. | p>.05 |
| Noncompleters | 43 | 61 | 40 | 57 | 0.06 | |
| Audiovisuals | | | | | | |
| Completers | 18 | 25 | 53 | 44 | chi sq. | p<.05 |
| Noncompleters | 53 | 75 | 39 | 56 | 4.77 | |
| Educational Philosophy | | | | | | |
| Completers | 16 | 22 | 22 | 31 | chi sq. | p>.05 |
| Noncompleters | 55 | 78 | 48 | 69 | 1.00 | |

Table 2 (*continued*)

| | | | | | | |
|---|---|---|---|---|---|---|
| Educational Sociology | | | | | | |
| Completers | 13 | 18 | 8 | 11 | chi sq. | p>.05 |
| Noncompleters | 58 | 82 | 62 | 89 | 0.83 | |
| Test and Evaluation | | | | | | |
| Completers | 18 | 25 | 15 | 21 | chi sq. | p>.05 |
| Noncompleters | 53 | 75 | 55 | 79 | 0.12 | |
| Principles of Teaching/Learning | | | | | | |
| Completers | 14 | 20 | 23 | 33 | chi sq. | p>.05 |
| Noncompleters | 57 | 80 | 47 | 67 | 2.50 | |
| Classroom Management | | | | | | |
| Completers | 11 | 15 | 8 | 11 | chi sq. | p>.05 |
| Noncompleters | 60 | 85 | 62 | 89 | 0.21 | |
| Adolescent Growth and Development | | | | | | |
| Completers | 14 | 20 | 12 | 17 | chi sq. | p>.05 |
| Noncompleters | 57 | 80 | 58 | 83 | 0.03 | |

[a] (1: with preservice teacher preparation; 2: without preservice teacher preparation)
[b] Percentages of respondents in each category of the extraneous variables by type of teacher qualification
[c] Numbers in the column labelled "%" are mean number of years of teaching experience
[d] (1: one agriculturally–related subject; 2: two agriculturally–related subjects; 3: three agciruluturally–related subjects; 4: combination of agriculturally and non–agriculturally–related subjects)

gramme had been completed by most teachers from academic schools, all teachers from technical schools, most teachers from vocational schools, and no teacher from agricultural institutes. Teachers without a preservice teacher preparation programme were more likely to have completed an inservice course in audiovisuals than teachers with preservice teacher preparation.

Teaching location was the only extraneous variable which was found to be significant in the above analyses. According to Warmbrod and Miller (1974), extraneous variables which are significant in the above analyses could pose a serious threat to the internal validity of the major hypothesis.

*Comparison of professional knowledge achievement with type of teacher qualification.* The comparison of teachers with and those without preservice teacher preparation is reported in Table 3. Teachers with preservice teacher preparation scored significantly higher than teachers without such preparation.

As academic school teachers invariably had preservice teacher preparation, it was difficult to discern the independent contribution of each of these two variables in explaining the dependent variable score in this study.

TABLE 3
Professional knowledge achievement by type of teacher qualification

| Teacher Qualification | n | Mean[a] | SD | t |
|---|---|---|---|---|
| With preservice teacher preparation | 71 | 60.79 | 10.79 | 3.68* |
| Without preservice teacher preparation | 70 | 54.11 | 10.74 | |

* p<.05, one-tailed
[a] Mean percent of items correct

## CONCLUSIONS

The findings support the major hypothesis that preservice teacher preparation offers a plausible explanation for achieving higher professional knowledge competence scores. However, caution needs to be exercised in regard to the close

association between teaching in an academic school and completion of a preservice teacher preparation programme. Teaching in an academic school environment offers another plausible explanation for achieving higher professional knowledge competence scores.

## RECOMMENDATIONS

It is recommended that candidates for teaching should possess a preservice qualification in teaching before being considered for a teaching position. Agricultural institutes in Malaysia should re-evaluate their hiring practices. By hiring only teachers without preservice qualification in teaching, they would have teachers with a lower professional knowledge competence than teachers who have had preservice training.

Teacher testing is recommended as one means for assessing teacher competence. Scores on competency examinations may be used to screen and select agriculture teachers. However, before this recommendation is adopted, additional test development and validity justification are needed. Test results need to be correlated with the results of other assessment strategies such as observation and ratings by peers, school principals, supervisors, and students.

Further research is needed to identify and test the relationship of other independent variables, particularly teacher socio-economic background, marital status, academic achievement, grade level taught, region and setting (formal and nonformal) with professional knowledge achievement. Comparative research is also needed to determine the extent to which these findings are applicable in other locations and cultures.

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