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Perceptions of an Effective Mathematics Teacher

Lim Suat Khoh
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ABSTRACT

The purpose of the study was to identify the characteristics of an effective teacher in secondary mathematics as perceived by trainee teachers. A questionnaire in which they were asked to rate 40 teacher characteristics according to the extent to which they perceived each to be associated with an effective mathematics teacher was completed by 121 trainee teachers from the 1987 intake and 67 trainee teachers from the 1988 intake of Diploma in Education students at the Institute of Education. For comparison, the ques-

tionnaire was also completed by 76 mathematics teachers from various secondary schools in Singapore. The characteristic with the highest mean rating was the ability "to explain concepts, methods, etc. clearly". Other characteristics that are highly rated were "is confident and at ease in teaching" and "conveys an enthusiasm for mathematics to pupils". Lowest ratings were given to the characteristics "maintains a degree of aloofness in relationships with pupils" and "makes frequent use of criticism to motivate pupils".

Introduction

The importance of teachers being effective is obvious to teachers, principals, teacher educators and pupils. Numerous studies have looked at teacher effectiveness in the secondary school (e.g. Porter & Brophy, 1988). It is certainly desirable to determine those characteristics which effective teachers have in common.

Kyriacou (1986) points out two major problems in conducting research in this area. Firstly, there is the variety of criteria of effectiveness: do we measure a teacher's effectiveness by the gain in his pupils' attainment such as examination results or by the pupils' interest in the subject? Secondly, the characteristics of effective teaching may vary across the various subject areas and grade levels.

This study sought to identify perceptions of an effective mathematics teacher as held by a sample of teacher trainees and qualified teachers. Although perceptions are subjective and idiosyncratic, they can provide useful information about the nature of teacher thinking that may affect the planning of lessons and decision making in the classroom. For the teacher educators, any major deviations of trainees' perceptions from established research findings serve to highlight areas for intervention which must be provided for in their training.

Instrumentation

Data were gathered by means of a question-

naire which was adapted from those used in Kyriacou's studies (1986). The questionnaire consists of a list of 40 teacher characteristics which cover (a) organising and planning of lessons and materials, (b) communication skills, (c) inducting and motivating skills, (d) management styles, (e) mathematical knowledge, (f) uses of evaluation and (g) personality traits.

they associated each characteristic with the effectiveness of a mathematics teacher on a 4-point scale.

Sample

The questionnaire was administered to 188 Diploma in Education students (121 from the 1987 intake and 67 from the 1988 intake) at the Institute of Education. They were graduates who had done mathematics up to university level. The study was conducted at the beginning of their training course, so at that time, they had not received any formal training in teaching. However, some of them had done relief teaching in schools or tutoring at the university. The results from the survey were subsequently discussed with the students to provide motivation in the mathematics methodology course.

The questionnaire was also completed by 76 qualified secondary mathematics teachers. They served as cooperating teachers to the Dip Ed students during their 10 weeks of teaching practice.

Findings

The 40 characteristics are ranked in the order of the trainee teachers' means, as shown in Table 1.

It can be seen from Table 1 that 85% of the items have means greater than 3. Hence, most of these characteristics were perceived as relevant to effectiveness in teaching mathematics. The three most important characteristics as rated by both the trainees and the qualified teachers are: "Able to explain concepts, methods, etc. clearly", "Is confident and at ease when teaching" and "Conveys an enthusiasm for mathematics to pupils".

In terms of relationship with pupils, the trainees tended to stress patience (item 31), respect (item 14) and warmth (item 37) more than friendliness (item 9) and a sense of humour (item 25). Ability to deal with discipline, such as being fair (item 19), remaining calm (item 28) and being firm (item 6) were considered as less important than ability to generate interest and enthusiasm in the subject matter (items 4, 40, 30, 33). This perception is particularly encouraging as it suggests that the trainees may have the implicit understanding that discipline problems are likely to arise when the pupils have lost interest in the subject. It is to be hoped that this understanding can be developed to become a firm conviction that guides the trainees in the planning of their lessons.

Using a mean difference of more than 0.20 as indicating substantive difference in perceptions, the teachers stressed the following characteristics more than the trainees: "Teaches at right level for most of the pupils", "Is firm with regard to discipline" and "Plans with exams always in mind". However, the teachers believed less in "frequently revising earlier work" than the trainees.

On the other hand, both groups also agreed on the three characteristics with the lowest ratings: "Maintains a degree of aloofness in relationship with pupils", "Makes frequent use of criticism to motivate pupils" and "Provides lots of notes and materials". However, the trainees tended to believe more in giving notes and materials than the teachers.

The relatively low ratings for "Conveys high expectations of pupils' work" (item 35) may be a matter of concern especially when the teachers and trainees handle the Normal stream pupils. It is important especially for the trainees to understand what the Pygmalion effect can have on pupils' achievement and conduct.

Conclusion

The perceptions as reported here and based on the teachers' point of view, agree fairly well with those of Kyriacou (1986) which were based on pupils' responses. Hence, from both the teaching and learning perspectives, there is

TABLE 1: TEACHER CHARACTERISTICS: MEANS AND STANDARD DEVIATIONS

| Item No. | Characteristics | Trainee | | Qualified | |
|----------|--|---------|------|-----------|------|
| | | Mean | S.D. | Mean | S.D. |
| 5 | Able to explain concepts, methods etc. clearly | 3.89 | 0.36 | 3.91 | 0.29 |
| 23 | Is confident & at ease in teaching | 3.82 | 0.47 | 3.88 | 0.33 |
| 4 | Conveys an enthusiasm for maths to pupils | 3.80 | 0.46 | 3.87 | 0.34 |
| 31 | Has patience when dealing with pupils | 3.79 | 0.49 | 3.75 | 0.47 |
| 40 | Leads students to enjoy doing maths | 3.77 | 0.53 | 3.73 | 0.44 |
| 30 | Tries to develop pupils' interest in maths | 3.76 | 0.52 | 3.68 | 0.52 |
| 33 | Tries to make lessons interesting | 3.75 | 0.53 | 3.70 | 0.46 |
| 17 | Has genuine interest in maths | 3.72 | 0.56 | 3.70 | 0.57 |
| 11 | Stimulates pupils to think for themselves | 3.71 | 0.60 | 3.86 | 0.35 |
| 2 | Teaches for understanding | 3.63 | 0.67 | 3.72 | 0.67 |
| 8 | Has a strong knowledge of maths | 3.61 | 0.60 | 3.61 | 0.57 |
| 14 | Shows respect for pupils as individuals | 3.58 | 0.62 | 3.66 | 0.53 |
| 12 | Teaches at right level for most of pupils | 3.58 | 0.62 | 3.80 | 0.43 |
| 13 | Works towards specific objectives | 3.54 | 0.63 | 3.60 | 0.54 |
| 37 | Conveys warmth in relationship with pupils | 3.54 | 0.64 | 3.42 | 0.62 |
| 26 | Imaginative & effective in use of activities | 3.52 | 0.68 | 3.47 | 0.66 |
| 34 | Frequent use of questions to develop understanding | 3.51 | 0.64 | 3.55 | 0.53 |
| 22 | Encourages pupils to show initiative | 3.50 | 0.65 | 3.58 | 0.52 |
| 39 | Encourages pupils to find alternative solutions | 3.48 | 0.64 | 3.53 | 0.64 |
| 15 | Relates new learning to pupils' own experience | 3.48 | 0.70 | 3.51 | 0.66 |
| 19 | Is consistently fair when enforcing rules | 3.46 | 0.67 | 3.62 | 0.59 |
| 27 | Gives detailed feedback to pupils in various ways | 3.44 | 0.69 | 3.46 | 0.60 |
| 16 | Knows how to deal with serious discipline problems | 3.43 | 0.70 | 3.60 | 0.55 |

Table 1 (contd)

| Item No. | Characteristics | Trainee | | Qualified | |
|----------|---|---------|------|-----------|------|
| | | Mean | S.D. | Mean | S.D. |
| 10 | Constructive & helpful in criticism of pupils | 3.42 | 0.72 | 3.58 | 0.59 |
| 24 | Pays attention to revision and exam technique | 3.42 | 0.64 | 3.53 | 0.53 |
| 38 | Makes frequent use of praise to encourage | 3.40 | 0.67 | 3.42 | 0.64 |
| 18 | Applies psychology of learning to teaching | 3.39 | 0.68 | 3.24 | 0.61 |
| 3 | Uses various methods of evaluating pupils | 3.37 | 0.67 | 3.39 | 0.59 |
| 29 | Frequently revises earlier work | 3.36 | 0.72 | 3.13 | 0.72 |
| 9 | Maintains friendly relationship with pupils | 3.34 | 0.66 | 3.29 | 0.67 |
| 28 | Is emotionally calm when enforcing rules | 3.28 | 0.76 | 3.41 | 0.64 |
| 25 | Displays a sense of humour to pupils | 3.18 | 0.70 | 3.04 | 0.74 |
| 6 | Firm with regard to discipline | 3.18 | 0.72 | 3.43 | 0.57 |
| 32 | Uses tests to diagnose rather than to assess | 3.12 | 0.79 | 3.21 | 0.68 |
| 35 | Conveys high expectations of pupils' work | 2.98 | 0.62 | 3.15 | 0.71 |
| 36 | Teaches with great concern for syllabus | 2.91 | 0.72 | 2.75 | 0.80 |
| 1 | Plans with exams always in mind | 2.78 | 0.75 | 3.12 | 0.69 |
| 7 | Provides lots of notes & materials | 2.60 | 0.66 | 2.38 | 0.78 |
| 20 | Frequent use of criticism to motivate pupils | 2.45 | 0.84 | 2.30 | 0.92 |
| 21 | Maintains a degree of aloofness with pupils | 1.95 | 0.85 | 1.97 | 0.94 |

consensus on the desirable characteristics of an effective mathematics teacher. For the trainees, these valid perceptions need to be translated into actual teaching skills that can make their lessons really effective. How the training can be effected is the main challenge of the teacher educators and at the same time the responsibility of the trainees.

The reported means provide only a global description of an effective mathematics teacher, whereas actual teaching is a very personal activity. There could be a judicious combination of various characteristics that define different *types*

of effective teacher. However, the search for these different types cannot be achieved through the use of questionnaires. Intensive study of practising teachers (e.g. Hoyles et al, 1985) can provide rich data to build up a model of good teaching (e.g. Porter & Brophy, 1988). This is the direction for future research that requires the cooperation of both the researchers and the practising teachers.

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