Prioritization of Criteria in Teacher-Candidate Selection Process by a Pairwise Comparison Method

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ABSTRACT

Teacher quality is the most important single variable in students' learning process. As the country is moving towards a knowledge-based society, selecting qualified teachers to enter the training programs is very crucial. This paper reviews and identifies the criteria used in the teacher-candidate selection process. A group of experts which consists of those who have experience in conducting the related interviews was asked to give opinions and to judge the criteria and the sub-criteria according to their importance. A multi-criteria method, Analytic Hierarchy Process (AHP) is used to analyze the judgments. Generally, the results of the analysis show that 'communication skills' and 'personality' as the most and second most important criteria respectively, followed by 'content of knowledge' as in the third position. The analysis of the importance of the sub-criteria of these three main criteria is also included.

Keywords: analytic hierarchy process (AHP), importance, multi-criteria, selection, teacher, weights.

I INTRODUCTION

The demand of trained teachers in Malaysia is increasing every year due to the increment of the number of schools since its independence. Many local universities and teacher training institutes are offering teacher training programs throughout Malaysia. These teaching institutes and universities are offering training programs at diploma, undergraduate and postgraduate levels. Besides meeting the increasing demand of teachers, the quality of the teachers should be given a serious attention. Qualified and capable candidates should be selected who may contribute towards achieving the Education Philosophy of Malaysia (Sang, 2005). Therefore, a selection process is done with the aim of selecting best teacher candidates for the teacher training programs.

In Malaysia, the teacher candidates are selected by the Ministry of Higher Education for local university entries, whereas the Ministry of Education is in charge of teaching institutes entries. Basically, there are three components in the selection procedures. Initially, teacher training or education program applicants are filtered based on their academic achievements. The second stage is the selected candidates must sit for an examination arranged by the authority concerned and the last stage is the interview session (Universiti Pendidikan Sultan Idris, 2008). In the interview session, the interviewers will evaluate the applicants. The good performers in the interview will be short-listed to pursue the teacher training programs.

It is learned that part of the decision making in the selection process is still highly dependent on a subjective human judgement especially during the interviews. This may lead to certain inconsistencies. Hence, a study to explore the selection criteria used in the current selection process is deemed necessary. It is hoped that this study will be able to answer the questions being posed regarding the selection criteria and these selected can later be used as a basis for the development of the selection model of teacher candidates.

II SELECTION CRITERIA

In Malaysia, there exist different sets of criteria used by different authorities. For example, in the Malaysia Educators Selection Inventory (MedSI) exam, the applicants are evaluated on intrinsic qualities such as personality, interest towards teaching career, integrity and emotional. The selection criteria used during the interview session by Ministry of Education is different from the one used by Ministry of Higher Education. In addition, the prioritization given to the criteria is also different among these authorities.

Many researches (Goldhaber, 2002: Walker, 2008; Harslett et al., 1998; Thompson et al., 2007; Wang et al., 2007; Donaldson et al., 1987; Hammond & Youngs, 2002) had been done to study the

evaluation criteria in teacher selection. Different concerns have been given to the criteria with various arguments. The methods used in these studies are interviews with various groups such as teachers and students, and questionnaire in Likert Scale format.

But this study has used both types of data, primary and secondary in identifying the criteria. The source of the primary data is the experts who have experience in interviewing the candidates. These experts were asked to comment and justify the criteria obtained from the secondary source, the literature. Besides that, they were asked to prioritize the criteria by comparing the criteria in terms of their importance in a pairwise manner. Their judgments were analyzed by a powerful multi-criteria method, Analytic Hierarchy Process (AHP) (Ho 2007; Saaty, 1980).

III ANALYTIC HIERARCHY PROCESS (AHP)

AHP technique has been used in solving multi-criteria problems in various fields such as in management (Liu et al., 2008; Rafikul Islam, 2007), manufacturing (Bhutta & Huq, 2002), and in solid waste treatment (Mohd Armi et al., 2007). In making judgment about the priority of criteria, the respondents were required to make comparison between one criterion and another. If there is *m* criteria to be evaluated, then the respondent has to make *m*(*m*-2)/2 comparisons. For example, if the number of criteria is 5, then there should be 10 pairs of criteria to be compared. The scale is between 1 to 9, and the meaning of the rating is given in the following table.

Table 1: Preference scale of AHP technique

Verbal Judgement	Numerical Rating
Extremely more important	9
Very Strongly More Important	7
Strongly More Important	5
Moderately More Important	3
Equally Important	1
For compromises between the above values	2,4,6,8

Suppose criterion 1 is compared with criterion 2. If criterion 1 is 'very strongly more important' than criterion 2, then $m_{12} = 7$, and $m_{21} = 1/7$. All the pairwise comparison collected from each respondent were transferred into matrix form, *M*, where $m_{jk} = 1/m_{kj,} \;\; k > j$, such as in Figure 1.

Figure 1: Matrix *M*

$$M = \begin{bmatrix} 1 & m_{12} \dots & m_{1n} \\ m_{21} & 1 \;\dots & m_{2n} \\ \vdots & \vdots \;\; \vdots & \vdots \\ m_{n1} & m_{n2} \dots & 1 \end{bmatrix}$$

Then, weight for criterion *j* for each respondent's evaluation is calculated by using the following formula.

$$w_j = \frac{1}{n}\sum_{k=1}^{n} \frac{m_{jk}}{\sum_{i=1}^{n} m_{ik}} \qquad (1)$$

This study involves more than one respondent, so in order to obtain the final single value of weight of each criteria, the geometric mean is used to aggregate the individual judgments. From the weight values, the ranking of the criteria can be determined with the consideration that the criteria which is more important that the other criteria must have higher weights and higher ranking. (Forman & Peniwati 1998; Ramanathan & Ganesh 1994;Van Den Honert & Lootsma, 1996).

If *p* respondents were involved in the evaluation, so the final weight for criteria *j* is obtained as geometric mean, that is by taking the *p*th root of the product of all *p* weights of that criterion, as follows.

$$w_j = \sqrt[p]{w_{j(1)} \times \dots \times w_{j(p)}} \qquad (2)$$

This process is repeated for every criterion considered. Another matter which has to be settled in using AHP is the consistency of the judgment. The consistency test is used to measure the degree of inconsistency in pairwise comparison (Taylor, 2004). The consistency of index for *M* is

$$CI = \frac{\lambda_{max} - n}{n-1} \qquad (3)$$

where λ_{max} is the maximum eigen vector of matrix *M*. If *CI/RI < 0.10*, then the degree of consistency is satisfactory, where the random index, *RI* values are given in Table 2.

Table 2: Random index, *RI*, values

Number of Criteria, (*n*)	Random Index (*RI*)
2	0.00
3	0.58
4	0.90
5	1.12
6	1.24
7	1.32
8	1.41

III **RESULTS AND DISCUSSION**

Twelve respondents were involved in the study, where all of them have formal training as teachers. About 40% of them are with doctorate of philosophy (PhD) degrees, and the others are with master's degree. All of them have experience in conducting interview, where more than 40% of

them have become interviewers for more than six years.

A The Criteria

In terms of the criteria, three main criteria are identified, namely, content of knowledge (CK), communication skill (CS) and personality (P). Figure 1 shows the summary of the sub-criteria.

Table 3: Teacher Selection Criteria

CK	CS	P
General K	Pronunciation	Attire
Subject matter K	Clarity	Behaviours & Ethics Poise
Current Issue	Constructive Ideas	Leadership
Real/Authentic Situation	Language Proficiency	Motivation
	Fluency	Confidence
	Completeness of Statement	Tolerance
		Sensitivity
		Creativity

B Weights and Ranking of the Main Criteria

After the criteria had been identified, each respondent was asked to compare the importance of each criterion to another criterion, and the evaluation is transformed in a matrix as in Figure 1. Then the weights of the criteria would be calculated by using Eq.(1). Since twelve respondents were involved in this study, final weight for each criterion is obtained by taking the 12^{th} root of the product of all weights for each criterion. For example, for the main criteria, the weights obtained and the consistency index for each evaluation is illustrated in Table 4, and Table 5 summarized the final weights and rankings of the three main criteria.

Table 4: Weights and consistency ratio for main criteria

Respondent	C_1	C_2	C_3	CI/RI
1	0.106	0.633	0.261	0.033
2	0.057	0.649	0.295	0.07
3	0.074	0.643	0.283	0.057
4	0.074	0.643	0.283	0.057
5	0.283	0.643	0.074	0.057
6	0.261	0.633	0.106	0.033
7	0.106	0.633	0.261	0.033
8	0.106	0.633	0.261	0.033
9	0.106	0.633	0.261	0.033
10	0.106	0.633	0.261	0.033
11	0.261	0.633	0.106	0.033
12	0.126	0.416	0.458	0.008

For the consistency index, CI/RI, as in column 5 of Table 4, if the value is unsatisfactory, where the value is greater than 0.10, then the corresponding evaluation would be dropped and would not be included in computing the final values. But in Table 4, all evaluations were included since all consistency index values met the satisfactory requirement.

Table 5: weights and ranking of main criteria

Criteria	Weights	Rank
Content of knowledge	0.121	3
Communication skills	0.615	1
Personality	0.217	2

Based on Table 5,' communication skill' is chosen by the respondents to be the most important criterion with a very high weight value, that is 0.615, and followed by 'content of knowledge' and 'personality'.

C Weights and Ranks of the Sub-criteria

Table 6, 7 and 8 show the normalized weights of the sub-criteria and represent the final weights and rankings of sub-criteria of content of knowledge (CK), communication skill (CS) and personality (P). respectively.

For the sub-criteria CK, 'subject matter knowledge' is agreed by the respondents to be the most important one, followed by real/authentic situation'. 'current issues', and 'general knowledge' as summarized in Table 6.

Table 6: Weights and Rank for Content of Knowledge Sub-criteria

Criteria	Weight	Rank
General knowledge	0.063	4
Subject matter knowledge	0.530	1
Current issues	0.121	3
Real/authentic situations	0.286	2

Table 7 shows the weights and rankings for sub-criteria CS, where 'constructive idea' is selected as the most important sub-criteria, while pronunciation is ranked at the last position. For the sub-criteria P, as illustrated in Table 8, 'confidence', and tolerance are in the first and second importance respectively, while attire or appearance is the least important.

Table 7: Weights and Rank for Communication Skill Sub-criteria

Criteria	Weights	Rank
Pronunciations	0.031	6
Clarity	0.053	5
Constructive ideas	0.442	1
Language Proficiency	0.246	2
Fluency	0.127	3
Completeness of statement	0.100	4

Table 8: Weights and Ranks for Personality Sub-criteria

Criteria	Weights	Rank
Attire/Appearance	0.006	8
Behaviour &Ethics/Poise	0.009	7
Leadership	0.022	5
Motivation	0.042	3
Confidence	0.084	1
Tolerance	0.063	2
Sensitivity	0.017	6
Creativity)	0.034	4

IV **SUMMARY AND CONCLUSION**

This study has successfully identified three main criteria and the corresponding sub-criteria in selecting teacher candidate to enter the training programs. These criteria are reliable, valid and can be used during the interview session since the criteria were determined after a thorough literature and experts' review. These criteria and the rankings are also very much significant to those who are interested to become teachers in the future.

These criteria weights can later be combined with the achievement of teacher candidates with respect to each criterion and sub-criterion and can become the basis in constructing a teacher-selection model. To make the model more usable, it can be upgraded as decision support system and can be used by the interviewers who will conduct the related interview.

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