

ANALYSING STUDENTS' PERCEPTION ON THE EFFECTIVE TUTORS USING FUZZY SET OF GROUP DECISION MAKING

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ABSTRACT

This study is carried out to analyse learners' perception of effective tutors in Open University Malaysia (OUM) based on various criterion that we have identified. We analysed their perception using method known as Fuzzy Set of Group Decision Making Model. This method usually conducted in a multi-criteria environment, which mostly dependent on the subjective judgment of decision makers and is influenced by the uncertainty and vagueness of each individual preference. The model is proven suitable for quantifying imprecise information, reasoning and decision making based on vague data. This study aims to provide OUM an insight look and further knowledge on the attributes of effective tutors. It can be used as a rule of thumb when appointing external tutors. Effective tutors are vital in enhancing and achieving the objectives of teaching and learning process. The findings show that the proposed evaluation model allows decision makers to express their opinions about tutors' performance by using a more realistic qualitative and fuzzy decision making. It is a suitable tool that can assist decision makers to better evaluate tutors in order to select suitable and effective tutors so that teaching and learning process can takes place.

Keywords: Fuzzy Set Of Group Decision Making, Effective Tutors, Decision Makers, Linguistic Variable, Triangular Fuzzy Number, Group Decision Making

1. Introduction

Distance education is becoming one of the most widespread and prevalent modes of continuing and furthering education. Teaching in open and distance mode is an extremely challenging function. Tutors and teaching staffs' support is essential for learners to successfully engage in the learning process. Due to recent developments in education such as demanding parents or students, governmental policy with respect to accountability and accreditation, education providers had increased their efforts to measure and improve the effectiveness of the educational processes they offered. As a result of this, there is a growing need for an instrument or procedure that can be used to measure the effectiveness of teaching and learning specifically for open and distance learning (ODL) institutions.

Tutors' role are significant to enhance teaching and learning in open and distance institutions because tutors are the one whom interact directly with learners. An effective tutor would be able to lead a group of learners through analysis phase and discussion regarding practical and realistic theories that are likely to be encountered. Effective teaching produces beneficial and purposeful learner learning through the use of appropriate procedures, Diamond (1987).

Meanwhile according to Wotruba and Wright (1975), effective tutors should demonstrate (i) knowledge of subject and enthusiasm in teaching, (ii) good organisation of subject matter, (iii) effective communication (iv) positive attitudes toward students, (v) fairness in evaluation and grading and (vi) flexibility approach in teaching.

This paper identify the factors that are important to learners on their tutors using Fuzzy Set of Group Decision Making Model for January 2008 learners in OUM without gender and subject taken as consideration. Two important steps in Fuzzy Set of Group Decision Making Model are identifying the characteristics of effective tutors and determining the weightage of each characteristic given by learners. However, students' perception of the characteristics will varies due to individual personality, learning style preference etc. It is very subjective and it may be perceived differently by different learners for a particular tutor. What are the main attributes of effectiveness seek by Open University Malaysia learners in their tutors? Parayitam, Desai and Phelps (2007) study showed there is an extremely high correlation between construction of the course content, communication, satisfaction and effectiveness.

It is a widely accepted practice for most American universities and colleges to use student's evaluation of faculty (SEF) to measure instructional effectiveness of tutors. On the positive side, academicians, argue that the SEF are highly reliable, moderately valid, and can assist tutors in improving their methods of instructions. Available empirical evidence suggests that learners' ratings can lead to changes in course delivery and thus making it a favourable method of evaluation (Mc Keachie, 1996). On the other hand, critics argue that (i) SEF are biased in that learners tend to give higher ratings when they expect higher grades in the course, (ii) SEF encourage tutors to lower down the level of courses to keep learners happy at all costs (iii) SEF ratings are often leveraged by cosmetic factors that have no effect on student learning, and (iv) SEF are a threat to academic freedom in the sense tutors may feel inhibited from discussing controversial ideas and presenting challenging questions to students because they fear that learners may express disagreement through SEF (Braskamp & Ory, 1994). Despite these arguments, SEF continue to be an important and frequently used approach in assessing tutors' performance in most higher learning institutions.

Edward Sheffield (1974) had listed ten characteristics of effective teachers most often mentioned for teaching in universities are:

- Master of the subject;
- Lectures well prepared;
- Subject related to life , practical;
- Students' questions and opinions are encouraged;
- Enthusiastic about the subject;
- Approachable and friendly;
- Concerned for students' progress;
- Has sense of humour, amusing;
- Warm, kind, sympathetic; and
- Teaching aids used effectively.

Feldman (1988) further described the characteristics of "Best" or 'Ideal" teachers as:

- sensitive to and concern with class level and progress;
- prepared and organised the course;
- knowledge of the subject;
- enthusiastic;
- clear explanation;
- available and helpful;

- fair;
- impartiality in the evaluation of students; and
- the quality of examinations

According to Siti Rahayah and Noriah (2002), preparation, delivery style, skills, enthusiasm and evaluation are the characteristics to be considered to form and deliver an effective teaching.

The main objectives of this pilot study are to:

- identify the characteristics of effective tutors based on OUM learners' perception;
- determine the weightage of each characteristic; and
- provide knowledge and awareness to OUM in appointing external tutors.

Bortolan & Degani (1985) and Wang & Kerre (2001) have comprehensively discussed on the use of fuzzy set ranking methods. Each method has its pitfalls in some area; this is due to inconsistency of human intuition, indiscrimination and difficulty of interpretation. All these factors contributed to the belief that a unique or best fuzzy set ranking method is of non-existence. Bortolan and Degani, 1985 suggested a reasonable ranking method adopted must account for several characteristics: complexity, robustness, flexibility, transitivity, and ease of interpretation. These characteristics are detailed as follows:

- Complexity means the amount of computation and the difficulties in implementing the ranking method;
- Robustness refers to the ability of consistent ranking for a diversity of cases, including the ability to compare fuzzy and crisp numbers;
- Flexibility means the ability to compare different shapes of fuzzy numbers and allow participation of decision makers in the process;
- Transitivity refers to the ability of giving a consistent conclusion in the comparison of more than two fuzzy numbers; and
- Ease of interpretation is important to decision-makers.

2. Conceptual Framework

Computational matrices and vectors are used to analyse 47 samples with 9 characteristics modified from Edward Sheffield (1974). The 9 characteristics are defined as follows:

- A_1 : Mastering the subject, competent
- A_2 : Teaching materials are well prepared and orderly
- A_3 : The subject is related to life, practical
- A_4 : Students' questions and opinions are encouraged
- A_5 : Enthusiastic about the subject
- A_6 : Approachable, friendly
- A_7 : Concerned for students' progress of the subject
- A_8 : Tutor has a sense of humour, amusing
- A_9 : Teaching aids are used effectively

The data collected were analysed by using the fuzzy set model. The fuzzy set model for group decision making was introduced by Zhou et al. (1997) which combines the individual selection and later aggregate it by group. Fuzzy set A in the universal set X , is

characterised with the fuzzy membership function μ_A that took the value in the closed alternate $[0, 1]$, which is $\mu_A : X \rightarrow [0, 1]$. μ_A represents the membership value for x inside A . Fuzzy set A in X can be represented by pairwise for element x and the value of its membership is $A = \{(x, \mu_A(x)) | x \in X\}$. Dubois and Prade (1980) also provided definition to the triangular fuzzy number: fuzzy number M in \mathbf{R} becomes triangular fuzzy number if its membership functions $\mu_A(x) : \mathbf{R} \rightarrow [0, 1]$ are:

$$\mu_A(x) = \left\{ \begin{array}{ll} \frac{x}{m-l} - \frac{l}{m-l}, & x \in [l, m] \\ \frac{x}{m-u} - \frac{u}{m-u}, & x \in [m, u] \\ 0, & \text{others} \end{array} \right\}$$

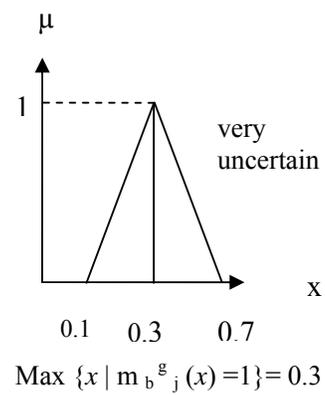
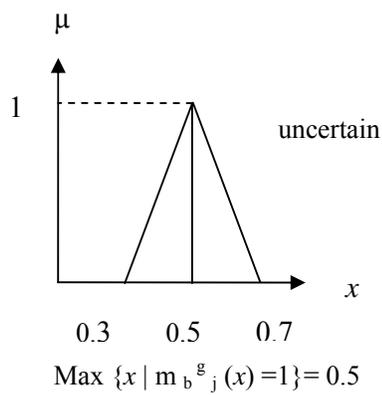
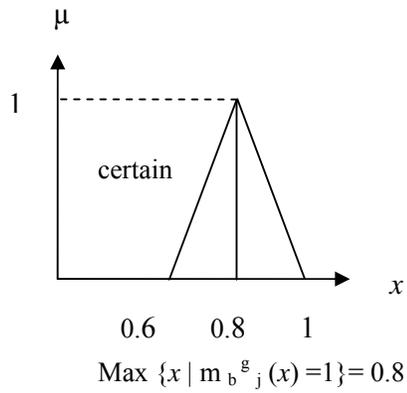
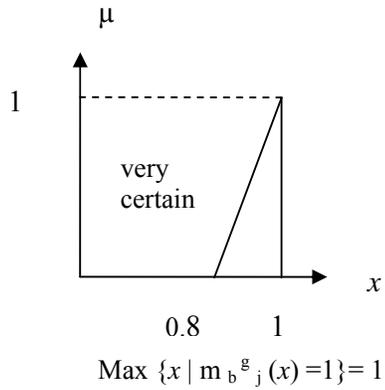
with $l \leq m \leq u$. Symbols such as l , m and u respectively known as the lower value, mid value and upper value for M .

Let $A = \{A_1, A_2, \dots, A_m\}$, $m \geq 3$ be the definite criteria set and $L = \{L_1, L_2, \dots, L_n\}$, $n \geq 2$ are decision makers. Each decision maker can have the same or different preferences with the condition of weightage is $Q = (q_1, q_2, \dots, q_n)$, $\sum q_i = 1$. The main procedure is individual preference; combining selection method and fuzzy set theory. There are 4 steps to be taken in order to analyse the data collected using fuzzy set model.

Step 1 :

For each criterion A_j , ($j = 1, 2, \dots, m$), the decision makers or learner must determine which criterion is important (1) and least important (0). This grading is subjective for each learner. They have to indicate a reliability value for each criterion for each statement : very certain, certain, uncertain or very uncertain. The level of certainty is shown by the linguistic value in Figure 1, where μ is membership function of linguistic value and x is linguistic variable.

Figure 1 : The Fuzzy Membership Value of Linguistic Variable



Step 2 :

All the individual judgment vector and individual reliability vector will be composed via group judgment matrix $[v_{ij}^g]$ and reliability matrix $[b_{ij}^g]$ with $v_{ij}^g \in \hat{\mathbf{I}}\{0,1\}$ and $b_{ij}^g \in \hat{\mathbf{I}}\mathbf{Z}$, ($i = 1, 2, \dots, n; j = 1, 2, \dots, m$). Since there are 47 respondents in this study, the weightage of each decision maker is the same, which is $\frac{1}{47}$. The aggregation v_{ij}^g and b_{ij}^g are determined by the following operations:

$$v_{ij}^g = w_1 * v_{1j} + w_2 * v_{2j} + \dots + w_n * v_{nj}$$

$$b_{ij}^g = w_1 \bullet b_{1j} \oplus w_2 \bullet b_{2j} \oplus \dots \oplus w_n \bullet b_{nj}$$

where \bullet = addition operation for fuzzy linguistic value
 \oplus = multiplication operation for fuzzy linguistic value.
 w = weightage of each decision maker

Step 3:

Both vectors are integrated into a group preference vector r_j , where

$$r_j = v_{ij}^g * \text{Max} \{x \mid m_{b_{ij}^g}(x) = 1\}, (j = 1, 2, \dots, m).$$

Step 4:

The above vector will be in the ascending order for all alternatives scores so that a group decision can be obtained.

3. Findings and Discussions

These 9 criteria, $A = \{A_1, A_2, A_3, \dots, A_9\}$ are ranked and there are 47 decision makers

$P = \{P_1, P_2, P_3, \dots, P_{47}\}$ with the weightage $Q = (\frac{1}{47}, \frac{1}{47}, \frac{1}{47}, \dots, \frac{1}{47})$.

Thus, we obtained the fuzzy judgment matrix as below:

$$v_{ij}^g = (1, 1, 0.8, 0.7, 0.8, 0.9, 0.9, 0.7, 0.9),$$

and the reliability matrix will be transformed to fuzzy numbers:

$$b_{ij}^g = \begin{pmatrix} (0.7, 0.9, 1), (0.7, 0.9, 1), (0.5, 0.7, 0.8), \\ (0.5, 0.7, 0.8), (0.5, 0.7, 0.8), (0.6, 0.8, 0.9), \\ (0.6, 0.8, 0.9), (0.5, 0.6, 0.7), (0.6, 0.8, 0.9) \end{pmatrix}$$

Hence, we obtained

$$\text{Max}\{x \mid m_b^g(x)=1\}=(1,1,0.8,0.8,0.9,0.9,0.7,0.9).$$

Then, we will obtain the group preference vector by the following formula:

$$r_j = v_j^g * \text{Max}\{x \mid m_b^g(x)=1\}, j = 1, 2, \dots, 9.$$

it yields

$$\begin{aligned} r_j &= (1,1,0.8,0.7,0.8,0.9,0.9,0.7,0.9) * (1,1,0.8,0.8,0.9,0.9,0.7,0.9) \\ &= (1,1,0.64,0.56,0.64,0.81,0.81,0.49,0.81). \end{aligned}$$

The result of r_j is interpreted in Table 1 below:

Table 1: The Important Criteria Results

| Criterion | Weight | Importance |
|--|--------|------------|
| Mastering the subject, competent | 1 | 1 |
| Teaching materials are well prepared and orderly | 1 | 1 |
| Teaching aids are used effectively | 0.81 | 2 |
| Approachable, friendly | 0.81 | 2 |
| Concerned for students' progress of the subject | 0.81 | 2 |
| The subject is related to life, practical | 0.64 | 3 |
| Enthusiastic about the subject | 0.64 | 3 |
| Students' questions and opinions are encouraged | 0.56 | 4 |
| Tutor has a sense of humour, amusing | 0.49 | 5 |

The result summarised in Table 1 show OUM learners chose mastering of the subject and adequate preparation for teaching materials as the most important characteristics of effective tutors (value 1). Learners need knowledgeable tutors who cared for their learning and guide them as individuals to move their knowledge forward. This is followed by the characteristics of the tutors: approachable and concerned for students' performance. Ability to use teaching aids effectively are also ranked as important. In other words, learners appreciate tutors who knew their subject well, organised and have an interesting teaching style. Learners ranked relationship with tutors as second priority as they appreciate tutors who were easy to be with and helped them to learn. Thus, tutors have to be interactive, supportive as well as able to communicate effectively with learners. However, learners are less appreciative of tutors who a humorous and providing jokes all the time in the class to gain the learners' attention.

4. Suggestions and Recommendations

The themes that emerged from this empirical study shows learners value their tutors and the quality of their educational experience are influenced by tutors' expertise and guidance in the classroom. They need knowledgeable individuals who cared for their learning and guide them as individual in the learning process in order to obtain or acquire further knowledge. Individual teaching excellence needs to be promoted and sustained by higher institutions themselves by ensuring that the right tutors are employed for the right subjects.

Learning institution should aim to add value to its excellent tutors so that they can easily continue to meet the needs of the institution's stakeholders (Clark et al, 2002). Tutors must be given opportunities to reflect their teaching skills upon their teaching experiences and general pedagogical issues through teaching and learning programmes conducted. These can be further supplemented and complemented by discipline-specific workshops which encourage the sharing of ideas amongst the participants.

Based on our findings, we would like to make several recommendations:

1. OUM must take steps to encourage learners evaluate their tutors each semester;
2. The result of learners' feedback or evaluation of tutors must be known to tutors, this is to ensure that tutors know their weaknesses and hopefully they will try to improve their teaching approach in the following semester;
3. Working relationships between faculty and Centre of Tutor Management and Development (CTMD) must be enhanced. Immediate action must be taken on receiving the feedback from tutor monitoring activities by lead tutors. This will ensure weak tutor can be given remedial training and also good tutors to be identified for future appointment;
4. Faculty should conduct mock tutorial session during the selection of tutors to ensure they are able to impart knowledge and assist learners;
5. Centre of Tutor Management and Development (CTMD) should organise tutor training at least twice a year (particularly before January and September semester); and
6. OUM must continuously improve of the facility and infrastructure available at the learning centre. Ensure the availability and adequacy of quality teaching for example Overhead projectors, LCD projectors, extension cables, clean duster, white boards etc.

Further Research

This pilot study can be a pathway for another research on a parallel level with several chosen tutors using Fuzzy Analytical Hierarchy Process (AHP) model in order to ensure the criterion identified in this study.

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