



An Analytical Hierarchy Process Model for the Evaluation of University Teaching Quality

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Abstract: University teaching quality varies according to various parameters. It is vital to assess the teaching in order to enhance university teaching quality through investigation and examination by evaluating quality parameters of teachers. The Analytical Hierarchy Process (AHP) model was utilized in order to measure the relative weight of each quality parameters. The relative weights and consistency of educator's performance have accomplished.

In Mehran University of Engineering and technology(MUET), Jamshoro, Pakistan, we had established the assessment model for mathematics faculty in department of Basic Science & Related Studies department based on the students feedback reports (2015, 2016) taken from the undergraduate and post graduate students, which added to the formation of expert's norms in the categories of competencies that meet the goals of education. The AHP model can be utilized to assess the quality factors in evaluation need areas.

Keywords: Student Evaluation Of Teacher, AHP, University Quality, Expert Choice Software.

1. INTRODUCTION

Education is a multidimensional phenomenon involving various distinct measurements or teacher characteristics, which at times are hard to assess quantitatively. Our aim is to examine "quality education", which is one of the major issues in educational system.

The Higher Education Commission (HEC) is an autonomous body under the Pakistani government. The HEC is supervising quality assurance cell which is established in order to ensure the quality education in higher studies. Students' satisfaction towards teaching is comprised of different factors such as assessment, curriculum activities, qualities and evaluation of university facilities.

2. METHODOLOGY

multidimensional, reliable and dependable, mainly a component of the educator who trains a course instead of the course that will be instructed. The principal aim of this work is to assess the teaching performance of Mathematics Faculty in Department of Basic Sciences and Related Studies(BSRS),in MUET. The AHP is a mathematical model which is used for arranging and to observing complex decisions (in view of mathematics and psychology). Thomas L. Saaty in 1970 built up this model. While applying the AHP, first we have to breakdown the problem into hierarchy of sub problems, each of which can be analyzed independently. The Analytic Hierarchy Process (AHP) contains following steps:

Table 1.AHP model for teaching evaluation

Goal A	Criteria B	Alternatives C
Evaluation of university teaching quality	Knowledge capacity:B ₁	C ₁₁ :Teacher is prepared for each class and demonstrate knowledge of the subject C ₁₂ :The matter presented in the course has increased my subject knowledge C ₁₃ :The course integrates theoretical course concepts with real world application C ₁₄ :Teacher provided citations regarding current C ₁₅ :Teacher provided citations regarding current situations with reference to Pakistani context
	Professional skills:B ₂	C ₂₁ :The course material was modern and updated C ₂₂ :Teacher completed the course according to the teaching plan C ₂₃ :Teacher communicated the subject matter effectively C ₂₄ :The syllabus states course objective, procedures and grading criteria C ₂₅ :The voice of teacher was clear and audible C ₂₆ :Teacher delivered lecture in English C ₂₇ :Teacher appreciated active participations of students during class
	Teaching attributes:B ₃	C ₃₁ :Teacher remained punctual in class C ₃₂ :Teacher maintained an environment that is conducive to learning C ₃₃ :Teacher provided guidance even after the class(during contact/consulting hours) C ₃₄ :Teacher is fair in assignments, tests and examinations C ₃₅ :The assignments, tests and exams covered the material presented in the course C ₃₆ :Teacher announced test results within 08-days after the conduct of test

(b) Weight evaluation using pair wise comparisons.

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(a) Problem hierarchy formation.

The process requires comparison matrices which are developed through the fundamental scale of absolute numbers (Saaty's scale 2008). These matrices not only categorize the weights but also have much impact on overall results. Furthermore, they are very vital and sensitive characteristics of AHP.

Table 2. The fundamental scale of absolute numbers

Intensity of importance	Definition
1	Equal importance
3	Somewhat more important
5	Much more important
7	Very much more important
9	Absolutely more important
2, 4, 6, 8	Intermediate values

In comparison square matrix, entry U_{ij} is an estimation of row i contrasted with column j .

$$A = \begin{pmatrix} 1 & u_{12} & u_{13} & u_{14} & \dots & u_{1m} \\ & 1/u_{12} & 1 & u_{23} & \dots & u_{2m} \\ & & 1/u_{13} & 1/u_{23} & 1 & u_{34} \dots u_{3m} \\ & 1/u_{14} & 1/u_{24} & 1/u_{34} & 1 & \dots & u_{4m} \\ & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ 1/u_{1m} & 1/u_{2m} & 1/u_{3m} & 1/u_{4m} & \dots & 1 \end{pmatrix} \quad (1)$$

A = Pairwise comparison matrix

When the comparison matrix for the required goal is developed, latter local priorities of criteria and consistency of the judgements is determined as.

Priorities of the criteria can be determined with the help of Principal Eigen vector V of the matrix A described by Saaty (1980,2000), and that is:

$$AV = \lambda_{\max} V$$

If the vector v is normalized, it shows the priorities with respect to criteria/goal. The largest eigen value is λ_{\max} of matrix A that possess positive values. The consistency of the comparison matrix may be found by consistency ratio (CR) given by

$$CR = \frac{CI}{RI}, \quad CI = \text{Consistency Index}, \quad RI = \text{Random index}$$

$$CI = (\lambda_{\max} - n) / (n - 1) \quad RI = 1.98(n - 2) / n$$

The consistency comparisons will be acceptable if the CR is less than 0.1 otherwise comparisons should be reconsidered.

3. RESULTS AND DISCUSSIONS

The AHP model has been designed on the basis of students' feedback. This model is used to evaluate teaching quality in Muet, Jamshoro. Initial point of the AHP method is development of hierarchical structure.

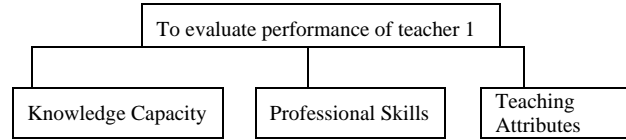


Fig:1 The view of the basic hierarchy

After the development of the hierarchical structure, we have to allocate a weights to every criterion. Weights of the each criteria/alternatives are calculated by AHP model and Expert Choice Software. The values in the comparison matrices were based on the questionnaires evaluation.

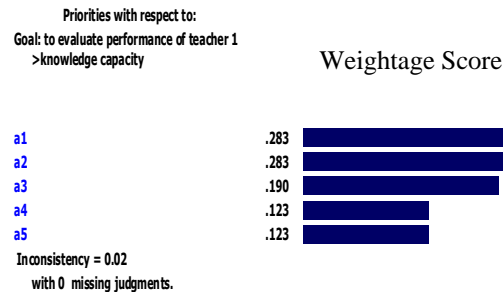


Fig. 2. Analysis of the consistency and assessing weightage score in knowledge capacity

In (Fig. 2) we can see weightage scores and consistency of first criteria (knowledge capacity) of Teacher 1. The most important and equal parameters are a_1 and a_2 because they possess highest weights while a_4 and a_5 have lowest weights.

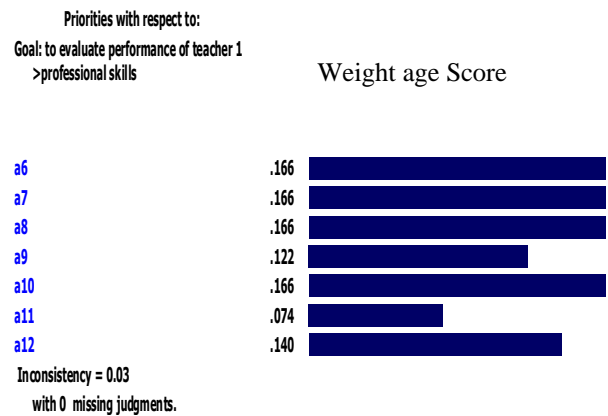


Fig. 3 Analysis of the consistency and assessing the weightage score in professional skills

In (Fig. 3). We can see that weightage scores of a_6 , a_7 , a_8 & a_{10} are highest and equal. Whereas a_{11} has the lowest rate, given by students to teacher1 in professional skills.

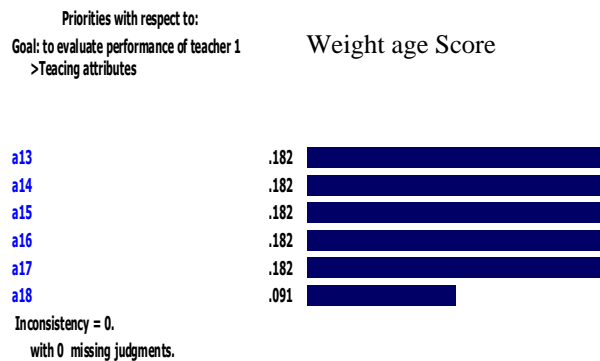


Fig. 4 Analysis of the consistency and assessing the weightage score in teaching attributes

In (Fig. 4) it is shown that students rate teacher1 in a_{13} , a_{14} , a_{15} , a_{16} , & a_{17} equally and highest weights. Whereas a_{18} has lowest weight.

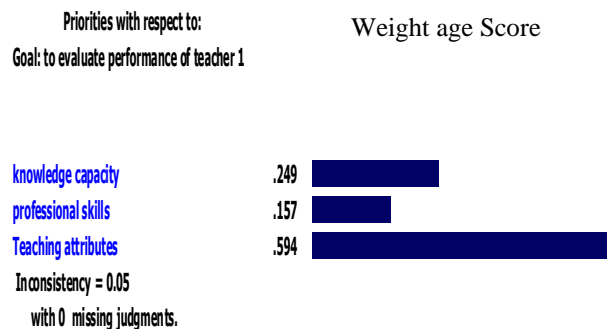


Fig. 5. Analysis of the consistency and weight age scores of every criterion with respect to goal.

In (Fig. 5). it is observed that for students, “Teaching Attributes” is the most important criterion as compare to Knowledge capacity and Professional skills. Consistency level is acceptable because $0.05 < 0.1$.

4. CONCLUSION

The assessment indicators and their weights of university teaching quality are produced by AHP model. The assessment aftereffects of the AHP strategy are more objective and scientific, and it has been demonstrated that the AHP technique is the most fitting when overviews need to represent a high degree intuition and subjectively. The evaluation results for the Teacher 1 are only depend on students perspective .The model used in this paper can be further used for the

promotion and selection of faculty members, selection of university major/minors and evaluation of text books.

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