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Fuzzy Evaluation and Decision Making for Indigenous Physical Curriculum

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Abstract

This paper sets up a fuzzy evaluation decision system for course management in aboriginal physical curriculum. We employ the soft computing techniques and rule-base process to provide the strategy of policy evaluation as well as decision making. A new technique for fuzzy answering with two dimensional type are used in our sampling survey. By developing an interpretive structure process for the decision makers, we integrates fuzzy statistical analysis and distance measurement to achieve the goal. Empirical studies illustrate the realistic and efficiency of computation with fuzzy data in physical education curriculum. The result of this research will contribute to the development and implementation of a usable frame work strategy in the policy evaluation.

Keywords: Fuzzy evaluation, decision making, indigenous physical curriculum.

1. Introduction

Recently, sociologists have conducted a lot of studies about indigenous education in Taiwan such as language, religion, sport and music. However, there are little literatures investigate the performance of the indigenous educational outcomes. Especially for the physical curriculum in education system, it is often suffer of cultural change through the process of acculturation for the indigenous people. What kind of Physical Curriculum design will be most fit for the indigenous education in Taiwan?

Since the 2000s we face the problems how to process the new education reform on physical curriculum for Taiwan aboriginal. From 2014 Ministry of Education in Taiwan will promote 12 basic education policy, aboriginal educational studies system will be affected. How to reconcile aboriginal students advantages in physical education will be an important work. Indigenous physical curriculum is an important area which sociologists can contribute their knowledge and cooperate with educators to find solutions of physical curriculum problems for indigenous people in Taiwan. In fact, the real problems of indigenous physical education which is not easy to solve through the structure of current education bureaucracy. This paper provides the sampling survey data about how indigenous education research are taking place in Taiwan and records the process of negotiation among academic research.

This paper used a systematic way to examine physical curriculum from both of the demand and supply point of view. Via fuzzy sampling survey investigation we will derive more clear information for the educational decision makers. A new approach is that we fuzzy statistical analysis to compute the human thinking that are incomplete and uncertain. This is a difficult task in the traditional sampling asking/answer process. Since traditional survey are using binary logic system to perform the asking/answer process, while it seems not realistic when people meet with continuous logic answer in the records. We will give illustrating and motivating important examples, to illustrate our new technique, in which, fuzzy rule-based technology provided. As previously stated, this issue applied fuzzy conception for evaluation and decision making for indigenous physical curriculum which worthy study issue.

2. Literature Review

This research is to understand the indigenous areas serving elementary and high education principals and then propose some strategies for policies decision making. In the quantitative analysis, since real value (single value) answer can not illustrate the human being's idea, we will use fuzzy statistical methods, subject to re-design the high education sex and membership in two directions.

Fuzzy theory is generated by Zadeh [15], the application in every research field of fuzzy statistics grows vigorously like the mushrooms after rain. It regards fuzzy logic as theoretical foundation, and extend the logic concept of the two- values logic of traditional mathematics, break through the limitation thinking of binary logic way. Just as the fuzzy statistics scholar's concern, the human thinking can't be measured or described with the single option. In other words, it should have membership of each option revealing its relative importance (Nguyen and Wu [6]). The use of a membership-function to establish a fuzzy-interval region and assess the value and grade is considered. While it is relatively easy to model the leisure resource, this is not the case where skills are job-specific to some degree.

There are more and more researches focus on the fuzzy statistical analysis and applications in the social science fields, such as Wu and Hsu [9, 10] identified the model construction through qualitative simulation; Chen and Wang [2] proposed fuzzy statistical testing method to discuss the stability of Taiwan short-term money demand function; Wu and Sun [12], demonstrated the concepts of fuzzy statistic and applied it to social survey; Wu and Tseng [11] used fuzzy regression method of coefficient estimation to analyze Taiwan monitoring index of economic. For an extensive treatment of the theory of fuzzy statistics the interested reader may refer to see Nguyen and colleague [6]. In addition, Chen and Niou [1], Yeh [14] Fuzzy relative weights of the analysis of fuzzy numbers, these studies are to obtain good results. However, we found above study, which all make one dimension whether have exploring to two dimension conditions. Recently Tien-Liu, Hsu, and Wu [8] investigated fuzzy function calculate that two-dimensions which exploring and application. As well as, Lai and Tien-Liu [5] evaluated the employability of higher education by fuzzy data. Rudas [7] considered fuzz logic-based risk assessment framework can evaluated physiological parameters. Hagras, Alghazzawi, and Aldabbagh [4] studies applied fuzzy number in intelligent machine vision systems can observed human behaviors. As previously stated, this study applied fuzzy conception when indigenous physical curriculum be accurately defined for evaluation and decision making

3. Research Method

3.1. Ordering the fuzzy data

A trapezoid fuzzy set can be viewed as a continuous fuzzy set, which further represents uncertain events. When a sample of trapezoid-data is presented, we are interesting in scaling its value on the real line. In some practical applications, however, it is reasonable to consider, instead of the original class of all linear re-scaling, a more general class of non-linear transformations between scales. For example, the energy of an earthquake can be described both in the usual energy units and in the logarithmic (Richter) scale.

Similarly, the power of a signal and/or of a sound can be measured in watts and it can also be measured in the logarithmic scale, in decibels. When we consider the reasonable and meaningful conditions to map trapezoid-data into the real line, we need to identify two conditions. This means that the transformation data should be (1) finite-dimensional (2) the dependence on these parameters should be smoothing (differentiable). In mathematical terms, this means that our transformation group is a Lie group.

Once such a transformation is selected, instead of the original trapezoid-data, we have a new value $y = f(x)$. In the ideal situation, this new quantity y is normally distributed. (In practice, a normal distribution for y may be a good first approximation.) When selecting the transformation, we must take into account that, due to the possibility of a rescaling, the numerical values of the quantity x is not uniquely determined.

Definition 3.1 (Scaling for a trapezoid fuzzy number on R)**.** Let $A = [a, b, c, d]$ be a trapezoid fuzzy number on U with its centroid

$$(cx, cy) = \Big(\frac{\int x u_A(x)dx}{\int u_A(x)dx}, \frac{\int \frac{1}{2}(u_A(x))^2 dx}{\int u_A(x)dx}\Big).$$

Then the defuzzification value RA of $A = [a, b, c, d]$ is defined as

$$RA = cx + \frac{\|A\|}{2\ln(e + \|A\|)};$$

where, $\|A\|$ is the area of the trapezoid.

Note that for convenience we will write $\|A\| = \frac{a+b+c+d}{4}$, if A is a trapezoid; $\|A\| = \frac{a+b+c}{3}$, if A is a triangle; $\|A\| = \frac{b+c}{2}$, if A is an interval.

Example 3.1. Let $A_1 = [2, 2, 3, 3]$, $A_2 = [1, 1, 4, 4]$, $A_3 = [1, 2.5, 2.5, 4]$, $A_4 = [1, 2.5, 2.5, 8]$, $A_5 = [1, 2, 3, 4]$, $A_6 = [1, 2, 3, 8]$ be the fuzzy data. According to Definition 4.1 we illustrate the defuzzification values on the following Table 3.1

Table 3.1: Defuzzification for the fuzzy data.

Fuzzy data	cx	$\frac{\|A\|}{\ln(e+cx\|)}$	RA
$A_1 = [2, 2, 3, 3]$	2.5	0.31	3.11
$A_2 = [1, 1, 4, 4]$	2.5	0.91	4.32
$A_3 = [1, 2.5, 2.5, 4]$	2.5	0.46	3.41
$A_4 = [1, 2.5, 2.5, 8]$	3.83	0.96	5.75
$A_5 = [1, 2, 3, 4]$	2.5	0.61	3.71
$A_6 = [1, 2, 3, 6]$	3.79	1.10	5.98

Table 3.2: The distance between of fuzzy data.

$d(A_i, A_j)$	A_1=[2, 2, 3, 3]	A_2=[1, 1, 4, 4]	A_3=[1, 2.5, 2.5, 4]	A_4=[1, 2.5, 2.5, 8]	A_5=[1, 2, 3, 4]	A_6=[1, 2, 3, 8]
A_1=[2, 2, 3, 3]	0	0.6	0.15	1.98	0.3	2.08
A_2=[1, 1, 4, 4]		0	0.45	1.38	0.3	1.48
A_3=[1, 2.5, 2.5, 4]			0	1.83	0.15	1.93
A_4=[1, 2.5, 2.5, 8]				0	1.68	0.18
A_5=[1, 2, 3, 4]					0	1.78
A_6=[1, 2, 3, 8]						0

3.2. Distance among fuzzy data

There are few literatures and definitions appeared in the measurement system. In this section, we will propose a well-defined distance for trapezoid data.

Definition 3.2. Let $A_i = [a_i, b_i, c_i, d_i]$ be a sequence of trapezoid fuzzy number on U with its centroid

$$(cx, cy) = \Big(\frac{\int x u_A(x)dx}{\int u_A(x)dx}, \frac{\int \frac{1}{2}(u_A(x))^2 dx}{\int u_A(x)dx}\Big).$$

Then the distance between the trapezoid fuzzy number A_i and A_j is defined as

$$d(A_i, A_j) =\mid cx_i - cx_j \mid + \left| \frac{\|A_i\|}{2\ln(e + \|A_i\|)} - \frac{\|A_j\|}{2\ln(e + \|A_j\|)} \right|.$$

Example 3.2. Let the fuzzy data be $A_1 = [2, 2, 3, 3]$, $A_2 = [1, 1, 4, 4]$, $A_3 = [1, 2.5, 2.5, 4]$, $A_4 = [1, 2.5, 2.5, 8]$, $A_5 = [1, 2, 3, 4]$, $A_6 = [1, 2, 3, 8]$. Then the distance of fuzzy data can be demonstrated at Table 3.2.

The distance states the gap between observed data and expected value; the smaller the distance demonstrates that observed data is more fit for the expected values.

3.3. Fuzzy Sampling Survey by two-dimensional questionnaire

In this research, we ask the subject to record with two dimensional questionnaire (X, Y). The two dimensional questionnaire means that the subject answers not only the

Table 3.3: High education Leader's Fuzzy Satisfactory Indicators.

Factor	Factor one $(w;(a,b))$	Factor two $(w;(a,b))$	Factor three $(w;(a,b))$	Factor four $(w;(a,b))$	Factor five $(w;(a,b))$
$\mu_{U,A}(X,Y)$	(.4; (50,55))	(.3; (56, 60))	(.2; (31, 34))	(.1; (70, 77))	(.1; (41, 43))
$\mu_{U,A}(X,Y)$	(.1; (45, 49))	(.1; (40,55))	(0; (36, 43))	(.8; (66, 70))	(.8; (70, 90))
$\mu_{U,A}(X,Y)$	(.2; (43, 40))	(.2; (43, 60))	(.5; (55, 66))	(0; (73, 80))	(0; (60, 70))
Fuzzy Mean	(.23; (46,48))	(.2; (46, 58))	(.23; (41, 48))	(.3; (70, 76))	(.3; (57, 68))

relative weight X for the factor but also the membership (degree of the feeling) for the factor Y.

For instance, let U be the discussion domain with k linguistic factors $(x_1, x_2, \ldots, x_k)$. And $(y_1, y_2, \ldots, y_k)$ stands for the membership (degree of the feeling) for corresponding factor x_i; Where $\sum_{i=1}^{k} \mu_i(x) = 1$ and $\mu_i(y) \to (0,1)$. Hence we can write the two dimensional sample as

$$\mu_U(X,Y) = \frac{(\mu_1(x);\mu_1(y))}{x_1} + \frac{(\mu_2(x);\mu_2(y))}{x_2} + \cdots + \frac{(\mu_k(x);\mu_k(y))}{x_k}.$$

Where "+" means "or" instead of the traditional meaning "addition".

For the real computation, suppose

$$(x, y_j) = \frac{(\mu_1(x);\mu_1(y_j))}{x_1} + \frac{(\mu_2(x);\mu_2(y_j))}{x_2} + \cdots + \frac{(\mu_k(x);\mu_k(y_j))}{x_k}, \quad j = 1, 2, \ldots, n,$$

be a series of random sample. Then the fuzzy mean F_s for this data will be

$$F_s = \frac{\left(\frac{1}{n}\sum_{j=1}^{n} x_{1j}, \frac{1}{n}\sum_{j=1}^{n} y_{1j}\right)}{x_1} + \frac{\left(\frac{1}{n}\sum_{j=1}^{n} x_{2j}, \frac{1}{n}\sum_{j=1}^{n} y_{2j}\right)}{x_2} + \cdots + \frac{\left(\frac{1}{n}\sum_{j=1}^{n} x_{kj}, \frac{1}{n}\sum_{j=1}^{n} y_{kj}\right)}{x_k}$$

where (x_i, y_i) is the recorded data for weight of factors and the feeling for peoples thinking.

Example 3.3. Suppose there are three principles are doing the survey. They are asked to write down the weight as well as the fuzzy satisfactory based on the factors of the discussion domain. Table 3.1 shows the result.

The index of linguistic variable is defined as $IS = \prod_{i=1}^{k} (S_i)^{\mu_i(x)}$; where (x_i, y_i) is the sample for weight and memberships (degree of the linguistic variables). When applying these factors into satisfactory judgement, subjective opinions are also involved. It makes a difference from the evaluative ratio, therefore we make a geometric average to get a more appropriate evaluation.

If the fuzzy data is recorded as a discrete type, we will transform it into a real value between 0 and one. That is,

$$S_i = \frac{1}{m-1}\Big[\sum_{j=1}^{m} j\mu_j(y_i) + \frac{1}{m-1}\Big(\sum_{j=1}^{m} \mu_j(y_i)\Big|j - \sum_{j=1}^{m} j\mu_j(y_i)\Big|\Big)\Big]$$

where $\mu_j(x_i)$ is the weight of the factor j. In order to find the general index of satisfactory, we just calculate the mean of the sample IS through population, that is, general index

$$GIS = \frac{1}{n}\sum_{i=1}^{n} IS_i.$$

3.4. A rule-base system

A rule base system (RBS) is a natural knowledge representation, in the form of '*IF* $\cdots$ *Then* $\cdots$' structure. It is popular for real applications among expert systems. Each module is able to inference sequentially and independently with inference engine. It is a different domain knowledge that can be placed in different modules created by new functions. Logically, related rules and facts can be collected into one module, which provides better maintenance and performance.

Using RBS in an evaluation and decision process has many advantages. Firstly, it can directly reflect regressive result from human being's observation. Secondly, the RBS modularity is easy to construct, to debug, and to maintain. Third the RBS can be revised and adjust on line according to the structure change. Restricted syntax and ability of explanation are also the advantages of RBS. Many researches aim to integrate object-oriented and rule-based programming paradigms to take advantage of skill technology. There are two paradigms on the integration of objects and rules: incorporating rules into objects and embedding objects into rules.

Knowledge objects are an integration of the object-oriented paradigm with logic rules (Wu [13]). Furthermore, many rule-base tools, which cooperate with skill technology, are developed, e.g. COOL (CLIPS object-oriented language) (CLIPS [3]). The rule-base system in aboriginal physical curriculum policy is a method of finding a rule in a rule-base. In order to make the demand side and supply side can go up with it, we derive the information from the sampling survey and calculate their distance. Then we can set up an RBS on the aboriginal physical curriculum policy as below:

Rule 1 : *If* $|Demand - Supply| \le \alpha$, *we will maintain the courses or object.*

Rule 2 : *If* $\alpha < |Demand - Supply| \le \beta$, *we will minutely adjust the courses.*

Rule 3 : *If* $\beta < |Demand - Supply|$, *we will substantially adjust the courses.*

4. Empirical Studies

4.1. Fuzzy Statistical Analysis of aboriginal policy of physical education

In this study, we will build aboriginal physical curriculum management indicators by their demand and supply. We separate the issues into two dimensions: view from student request, and view from teaching leadership. Then we develop factors for courses management including aboriginal technical subject, discipline education, student confidence, admissions ratio system, and ethnic life culture. The purposes of this researcher are as follows:

(1) How to evaluate the situation of courses supply and demand in aboriginal physical curriculum.
(2) How to establish the indicators of course management in aboriginal physical curriculum.
(3) How to analyze the rule-base course management strategies for aboriginal physical curriculum.

We use fuzzy Delphi methods by 23 students and 23 scholars to confirm 5 factors by questionnaires were distributed. In order to understand the relationship between supply and demand of the aboriginal physical curriculum, firstly we use the concept of logistics in marketing, to analyze aboriginal physical curriculum demand and supply. Table 4.1 illustrates the weight as well as the membership for the aboriginal physical education

4.2 Discussion and result

In this section, we focus on three factors of course management that involves as students' request, curriculum planning, teaching professional, considerate service, and interpersonal communication teacher satisfaction as important indicators. The threshold levels we suggest are: $\alpha = 0.12$, $\beta = 0.20$.

In general, the weighted aboriginal physical curriculum supply and demand is 0.23 and 0.16, which has the difference $|0.23 - 0.16| = 0.07 \leq 0.12$ (Table 4.1 and Table 4.2). This value means that we will not do any change at the present. However if we want to examine each factor's status, we can find formant, Scholars of factors and weight for the aboriginal physical curriculum: Table 4.3

Aboriginal technical subject: $|0.28-0.20| = 0.05 < 0.12$, we will maintain the courses or object; discipline education: $|0.20 - 0.20| = 0 < 0.12$, we will maintain the courses or object; student confidence: $|0.17 - 0.22| = -0.05 < 0.12$, we will maintain the courses or object; admissions ratio system: $|0.21 - 0.20| = 0.01 < 0.12$, we will maintain the courses or object; ethnic life culture: $|0.20 - 0.21| = -0.01 < 0.12$, we will maintain the courses or object. Hence, Based on the results presented scholars a uniform considered a uniform maintain the courses or object.

In addition, sinces aboriginal technical subject is $|0.31-0.21| = 0.21 > 0.2$, see Table 4.4, we will substantially adjust the courses; discipline education is $|0.23-0.17| = 0.06 < 0.12$, we will maintain the courses or object; student confidence is $|0.22 - 0.18| = 0.04 <$

Table 4.1: Evaluating supply factors for the aboriginal physical education in Taiwan.

Supply	A	B	C	D	E
a	(0.40;(0,0,0.3,0,0.8))	(0.30 ;(0,0,0.8,0.2,0))	(0.10 ;(0,0,0.2,0,0.8))	(0.20;(0,0.8,0.2,0,0))	(0.00 ;(0,0,0.2,0.1,0.2))
b	(0.30; (0,0,0,0.2,0.8))	(0.20 ;(0.8,0.2,0,0,0))	(0.20 ;(0,0.3,0.7,0,0))	(0.20;(0,0,0.4,0.6,0))	(0.10 ;(0.2 ,0.2,0,0,0.6))
c	(0.20; (0,0.2,0,0,0.8))	(0.40 ;(0,0,0.3,0.7,0))	(0.10 ;(0,0.5,0.5,0,0))	(0.10 ;(0,0.7,0.3,0,0))	(0.20 ;(0,0.7,0.3,0,0))
d	(0.10;(0,0,0.2,0,0.8))	(0.20 ;(0,0,0.2,0.8,0))	(0.30 ;(0,0,0.30 ,0,0.7))	(0.20 ;(0,0,0.2,0.8,0))	(0.20 ;(0,0.7,0.3,0,0))
e	(0.50 ;(0,0.2,0,0,0.8))	(0.20 ;(0,0,0.2,0.5,0.3))	(0.00 ;(0,0.5,0.3,0.2,0))	(0.20 ;(0.6,0.4,0,0,0))	(0.10 ;(0.5,0.3,0.2,0,0))
f	(0.20 ;(0.1,0,0,0,0.9))	(0.30 ;(0,0,0.3,0.7,0))	(0.20 ;(0,0.5,0.5,0,0))	(0.10 ;(0,0,0.4,0.6,0))	(0.20 ;(0,0.5,0.5,0,0))
g	(0.70 ;(0,0,0,0.2,0.8))	(0.30 ;(0,0,0,0.1,0.9))	(0.00 ;(0,0.1,0,0,0.9))	(0.00 ;(0.9,0.1,0,0,0))	(0.00 ;(0.9,0.1, 0,0,0))
h	(0.10 ;(,0,0,0.2,0,0.8))	(0.40 ;(0,0,0.1,0.2,0.7))	(0.30 ;(0,0.5,0.3,0.2,0))	(0.10 ;(0.2,0.5,0.3,0,0))	(0.10 ;(0,0,0.2,0,0.8))
i	(0.00 ;(0,0,0.1,0,0.9))	(0.80 ;(0,0.2,0.3,0.5,0))	(0.00 ;(0,0,0,0.3,0.7))	(0.00 ;(0,0,0.2,0.7,0.1))	(0.20 ;(0,0,0.2,0.5,0.3))
j	(0.20 ;(0,0.1,0,0.9,0))	(0.40 ;(0.3,0.4,0.2,0.1,0))	(0.00 ;(0,0.3,0.3,0.4,0))	(0.10 ;(0,0,0.2,0.4,0.4))	(0.30 ;(0,0.3,0.3,0.3,0.1))
k	(0.50 ;(0,0.2,0,0,0.8))	(0.20 ;(0,0,0.1,0.5,0.4))	(0.10 ;(0,0.10 ,0,0,0.9))	(0.10 ;(0,0,0,0,1.0))	(0.10 ;(0,0,0,0.4,0.6))
l	(0.10 ;(0.2,0,0,0,0.8))	(0.10 ;(0,0.2,0.3,0.5,0))	(0.10 ;(0.5,0.3,0.2,0,0))	(0.60 ;(0.5,0.3,0.2,0,0))	(0.10 ;(0,0,0.2,0.3,0.5))
m	(0.00 ;(0,0,0.1,0,0.9))	(0.00 ;(0,0.1,0.8,0.1,0))	(0.30 ;(0,0.2,0.8,0,0))	(0.40 ;(0.2,0.4,0.4,0,0))	(0.30 ;(0,0,0,0.2,0.8))
n	(0.00 ;(0,0,0.2,0,0.8))	(0.00 ;(0,0,0.2,0.3,0.5))	(0.00 ;(0,0,0,0.2,0.8))	(0.60 ;(0,0.4,0.3,0.3,0))	(0.40 ;(0,0,0.2,0.6,0.2))
o	(0.20 ;(0,0,0.2,0,0.8))	(0.30 ;(0,0,0,0.8,0.2))	(0.10 ;(0.2,0.8,0,0,0))	(0.10 ;(0.2,0.8,0,0,0))	(0.30 ;(0,0, 0,0.8,0.2))
p	(0.10 ;(0,0,0,0.3,0.7))	(0.10 ;(0,0,0.8,0.2,0))	(0.20 ;(0,0.1,0.4,0.5,0))	(0.30 ;(0,0,0.7,0.3,0))	(0.30 ;(0,0,0.7,0.3,0))
q	(0.20 ;(0,0,0.2,0,0.8))	(0.10 ;(0,0.4,0.4,0.2,0))	(0.30 ;(0,0,0.2,0.3,0.5))	(0.30 ;(0,0.1,0.5,0.4,0))	(0.10 ;(0,0.2,0.3,0.3,0.2))
r	(0.30 ;(0,0,0,0.1,0.9))	(0.00 ;(0,0.8,0.2,0,0))	(0.10 ;(0,0.2,0.4,0.4,0))	(0.20 ;(0,0.4,0.2,0.4,0))	(0.40 ;(0,0,0.1,0.8,0.1))
s	(0.00 ;(0,0,0.2,0,0.8))	(0.00 ;(0,0.8,0.2,0,0))	(0.10 ;(0,0,0.2,0.8,0))	(0.40 ;(0,0,0,0.1,0.9))	(0.50 ;(0,0.1,0,0,0.9))
t	(0.00 ;(0,0,0.1,0,0.9))	(0.00 ;(0,0,0.5,0.5,0))	(0.30 ;(0,0,0.6,0.4,0))	(0.20 ;(0,0,0.7,0.3,0))	(0.50 ;(0,0,0.2,0.8,0))
u	(0.30 ;(0,0,0.1,0,0.9))	(0.20 ;(0,0.3,0.7,0,0))	(0.40 ;(0.3,0.7,0,0,0))	(0.10 ;(0,0.5,0.5,0,0))	(0.00 ;(0,0.5,0.5,0,0))
v	(0.40 ;(0,0,0,0.1,0.9))	(0.00 ;(0,0,0,0.1,0.9))	(0.10 ;(0,0,0.5,0.5,0))	(0.30 ;(0,0.7,0.3,0,0))	(0.20 ;(0,0.2,0.5,0.3,0))
w	(0.30 ;(0,0,0.2,0,0.8))	(0.20 ;(0,0,0.2,0.8,0))	(0.50 ;(0,0,1.0,0,0))	(0.00 ;(0,0,0.2,0.8,0))	(0.00 ;(0,0,0.2,0.8,0))
FT	(5.10;(0.3,0.9,1.9,1.7, 18.20))	(4.7;(1.1,3.4,6.8,7.8, 3.9))	(3.8(1.0,5.1,7.4,4.2, 5.3))	(4.8;(2.6,6.1,6.2,5.7, 2.4))	(4.6;(1.6,3.6,5.3,6.4, 6.1))
FM	(.22;(.01,.04,.08,.07, .79))	(.20;(.05,.15,.30,.34, .17))	(.17(.04,.22,.32,.18, .23))	(.21;(.11,.27,.27,.25, .10))	(.20(.07,.16,.23,.28, .27))
TFM	(0.22; 0.31)	(0.20; 0.23)	(0.17; 0.22)	(0.21; 0.20)	(0.20; 0.23)
OAFM			0.23		

Note: A = Aboriginal Technical Subject, B = Discipline Education, C = Student Confidence, D = Admissions Ratio System, E = Ethnic Life Culture, FT = Fuzzy Total, FM = Fuzzy Mean, TFM = Total Function Membership, OAFM = Over All Fuzzy Membership.

0.12, we will maintain the courses or object; admissions ratio system is $|0.20 - 0.13| = 0.07 < 0.12$, we will maintain the courses or object; ethnic life culture is $|0.23 - 0.12| = 0.11 < 0.12$, we will maintain the courses or object.

The study presented scholars condition of curriculum status a uniform ideas than student's condition on curriculum. However, the study presented students in aboriginal technical subject considered deriving substantially adjust the courses which increase more course and learning opportunities.

5. Conclusion

This paper sets up the fuzzy decision system for better course management in aboriginal physical curriculum. We use a rule-base system to evaluate the performance of the aboriginal physical curriculum. Further, the designed fuzzy decision system and the practical case study may provide an example for better managing course demand and supply in aboriginal physical curriculum. These items are aboriginal technical subject, discipline education, student confidence, admissions ratio system and ethnic life culture that results supply is greater than demand. The Government offer more than them increasing has satisfaction aboriginal relation policy. Three important suggestions are:

Table 4.2: Evaluating demand factors for the aboriginal physical education in Taiwan.

Demand	A	B	C	D	E
a	(0.10;(0.9,0,0.1,0,0))	(0.00 ;(0.8,0.2,0,0,0))	(0.40 ;(0,0.8,0.2,0,0))	(0.30;(1.0,0,0,0,0))	(0.20 ;(0.8,0,0.2,0,0))
b	(0.20; (0.8,0,0,0.2,0))	(0.10 ;(0.8,0.2,0,0,0))	(0.30 ;(0.5,0,0.5,0,0))	(0.20 ;(0.6,0,0.4,0,0))	(0.20 ;(0.8,0,0,0.2,0))
c	(0.10; (0.9,0,0,0,0.1))	(0.20 ;(0.7,0,0.3,0,0))	(0.20 ;(0.5,0,0.5,0,0))	(0.40 ;(0.7,0,0.30 ,0,0))	(0.10 ;(0.7,0,0.3,0,0))
d	(0.30;(0.8,0,0.2,0,0))	(0.20 ;(0.8,0,0.2,0,0))	(0.10 ;(0.7,0,0.3,0,0))	(0.20 ;(0,0,0.2,0.8,0))	(0.20 ;(0,1.0,0,0,0))
e	(0.00 ;(0.8,0,0.2,0,0))	(0.10 ;(0,0,0.2,0.5,0.3))	(0.50 ;(0,0.7,0.3,0,0))	(0.20 ;(0.6,0.4,0,0,0))	(0.20 ;(0.8,0.2,0,0,0))
f	(0.20 ;(0.9,0,0.1,0,0))	(0.20 ;(0,0,0.3,0.7,0))	(0.20 ;(0.5,0,0.5,0,0))	(0.30 ;(0.4,0,0,0.6,0))	(0.10 ;(0.9,0,0.1,0,0))
g	(0.00 ;(0.8,0,0,0.2,0))	(0.00 ;(0,0.6,0,0.4,0))	(0.70 ;(0.,0.9,0.1,0,0))	(0.30 ;(0.9,0.1,0,0,0))	(0.00 ;(1.0,0,0,0,0))
h	(0.30 ;(,0.7,0,0.3,0,0))	(0.10 ;(0,0.8,0,0.2,0))	(0.10 ;(0,0.7,0.3,0,0))	(0.40 ;(0.7,0,0.30 ,0,0))	(0.10 ;(0.7,0,0.3,0,0))
i	(0.00 ;(0.9,0,0.1,0,0))	(0.20 ;(0,0.7,0,0.3,0))	(0.00 ;(0,0.7,0,0.3,0))	(0.80 ;(0.8,0,0.2,0,0))	(0.00 ;(0,0.7,0.3,0,0))
j	(0.00 ;(0,0.9,0,0.1,0))	(0.30 ;(0.8,0,0.2,0,0))	(0.20 ;(0,0.7,0,0.3,0))	(0.40 ;(0.8,0,0.2,0,0))	(0.10 ;(0.7,0,0,0.3,0.))
k	(0.10 ;(0.8,0,0,0,0.2))	(0.10 ;(0,0,0.6,0,0.40))	(0.50 ;(0,0.1,0.9,0,0))	(0.20 ;(0,1.0,0,0,0))	(0.10 ;(0.6,0,0,0.4,0))
l	(0.10 ;(0.8,0,0.2,0,0))	(0.10 ;(0,0.7,0.3,0,0))	(0.10 ;(0.5,0.3,0.2,0,0))	(0.10 ;(0.7,0.3,0,0,0))	(0.60 ;(0,0,7,0,0.3,0))
m	(0.30 ;(0.8,0,0,0.2,0))	(0.20 ;(0,0.2,0.8,0,0))	(0.00 ;(0,0.2,0.8,0,0))	(0.00 ;(0.6,0.4,0,0,0))	(0.40 ;(0.4,0,0.6,0,0))
n	(0.00 ;(0.9,0,0,0.1,0))	(0.40 ;(0,0,0.7,0.3,0))	(0.00 ;(0,0,0.8,0.2,0))	(0.00 ;(0,0.7,0.3,0,0))	(0.60 ;(0.4,0,0,0.6,0))
o	(0.10 ;(0.8,0,0.2,0,0))	(0.30 ;(0,0,0,0.8,0.2))	(0.20 ;(0.2,0.8,0,0,0))	(0.30 ;(0,0.8,0,0,0.2))	(0.10 ;(0.8,0,0,0,0.2))
p	(0.20 ;(0.7,0,0,0.3,0))	(0.30 ;(0,0,0.8,0.2,0))	(0.10;(0,0.1,0.4,0.5,0))	(0.10 ;(0.7,0,0,0.3,0))	(0.30 ;(0.3,0,0.7,0,0))
q	(0.30 ;(0.9,0,0.1,0,0))	(0.10 ;(0,0.8,0.4,0,0))	(0.20 ;(0,0.7,0,0.3,0))	(0.10 ;(0.5,0,0.5,0,0))	(0.30 ;(0.9,0,0,0.1,0))
r	(0.10 ;(0.8,0,0,0.2,0))	(0.40 ;(0,0.8,0.2,0,0))	(0.30 ;(0,0.2,0.4,0.4,0))	(0.00 ;(0.8,0,0.2,0,0))	(0.20 ;(0,0.9,0,0,0.1))
s	(0.10 ;(0.7,0,0.3,0,0))	(0.50 ;(0,0.8,0.2,0,0))	(0.00 ;(0,0,0.2,0.8,0))	(0.00 ;(0.9,0,0,0.1,0))	(0.40 ;(0.9,0,0,0.1,0))
t	(0.30 ;(0.9,0,0.1,0,0))	(0.50 ;(0.5,0,0.5,0,0))	(0.00 ;(0,0,0.6,0.4,0))	(0.20 ;(0,0,0.70 ,0.30 ,0))	(0.20 ;(0.8,0,0.2,0,0))
u	(0.40 ;(0.7,0,0.3,0,0))	(0.00 ;(0,0.3,0.7,0,0))	(0.30 ;(1.0,0,0,0,0))	(0.20 ;(0,0.5,0.5,0,0))	(0.10 ;(0.5,0,0,0,0.5))
v	(0.10 ;(0.9,0,0,0.1,0))	(0.20 ;(0,0,0.9,0.1,0))	(0.10 ;(0,0.5,0.5,0,0))	(0.00 ;(0,0.7,0.3,0,0))	(0.30 ;(0,0.7,0,0.3,0))
w	(0.50 ;(0.8,0,0.2,0,0))	(0.00 ;(0.8,0,0.2,0,0))	(0.30 ;(0,0,1.00 ,0,0))	(0.20 ;(0.8,0,0,0,0.2))	(0.00 ;(0.8,0,0.2,0,0))
FT	(3.8;(18.0,0.9,2.4,1.4 0.3))	(4.6;(5.2,5.9,7.8,3.2, 0.9))	(5.10(8.4,7.6,8.6,2.9, 0.0))	(4.70;(11.5,4.90,4.10,2.10, 0.40))	(4.80;(12.8,4.2,2.9,2.3, 0.8))
FM	(0.17;(.78,.04,.10,.06, .01))	(0.20;(.23,.26,.34,.14, .04))	(.22(.037,.33,.37,.13, .00))	(.20;(.50,.21,.18,.009, .002))	(.21;(.56,.18,.13,.10, .003))
TFM	(0.17; 0.10)	(0.20; 0.17)	(0.22; 0.18)	(0.20; 0.13)	(0.21; 0.12)
OAFM			0.16		

Note: A = Aboriginal Technical Subject, B = Discipline Education, C = Student Confidence, D = Admissions Ratio System, E = Ethnic Life Culture, FT = Fuzzy Total, FM = Fuzzy Mean, TFM = Total Function Membership, OAFM = Over All Fuzzy Membership.

Table 4.3: Scholars of Factors and weight for the aboriginal physical curriculum.

Variables	Aboriginal Technical Subject	Discipline Education	Student Confidence	Admissions Ratio System	Ethnic Life Culture
Supply	0.22	0.20	0.17	0.21	0.20
Demand	0.17	0.20	0.22	0.20	0.21
subjects	0.05	0	-0.05	0.01	-0.01

Table 4.4: Students of satisfaction degree for the aboriginal physical curriculum.

Variables	Aboriginal Technical Subject	Discipline Education	Student Confidence	Admissions Ratio System	Ethnic Life Culture
Supply	0.05	0.23	0.22	0.20	0.23
Demand	0.10	0.17	0.18	0.13	0.12
subjects	0.21	0.06	0.04	0.07	0.11

1. Since the aboriginal technical subject results the supply and demand that have greater satisfaction with cognitive gap. Government should be adjusted and modified aboriginal policy as Aboriginal technical subject to lower the unsatisfaction degree.

Table 4.5: Holistic of satisfaction degree for the aboriginal physical curriculum.

Variables	Aboriginal Technical Subject	Discipline Education	Student Confidence	Admissions Ratio System	Ethnic Life Culture
Current students	0.31	0.00	-0.05	0.01	-0.01
Current teachers	0.21	0.06	0.04	0.07	0.11
subjects	0.10	-0.06	-0.01	-0.6	-0.10

The government whether offer aboriginal relations policy need to more effort made more effective policy which to satisfy real demand and helpful.

2. The aboriginal technical subject have cognitive gap, students was more direct experience. The largest number of student's elective life skill courses as aboriginal technical subject in academic courses. Therefore, life skills classes should be promoting to increase the courses to meet student demand, and club classes are balance in the state of supply and demand.
3. Teachers of life skill classes are very good at using interactive model of course management, just like interpersonal communication and considerate service. To overcome this issue, teachers of countryside type high education thought that interpersonal communication was the most time-consuming, but it can keep students join the class stably.

How to construct an appropriate model to improve physical education curriculum policy of high education in Taiwan will be an urgent work in the future. Especially, this study result whether have difference ideas between scholar and students. As well as, difference cognitive for various knowledge, experience or ethnic status. This is worthy study of issues.

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