Jurnal Mantik, 6 (3) (2022), ISSN 2685-4236 (Online)

Published by:Institute of Computer Science (IOCS)

Jurnal Mantik

Journal homepage: www.iocscience.org/ejournal/index.php/mantik

Determination of Smart and Accurate Contest Participants at the Elementary School Level Using Profile Matching Method

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A R T I C L E I N F O

Article history:

Received Oct 6, 2022
Revised Oct 25, 2022
Accepted Nov 9, 2022

Keywords:

Smart and Accurate Contest
Elementary School Level
Determine Best Student
Profile Matching Method

ABSTRACT

Improving the quality of education for students is a key objective of school-based learning activities. A smart and accurate contest is one of the approaches and technology-based learning models utilized by teachers who actively cultivate the abilities and interests of their students. The school selects students who succeed in the academic field, as demonstrated by their results in each topic, then selects individuals based on the selection criteria and determines kids with the highest scores who are eligible to participate in the smart and accurate contest. The goal of this work is to present a decision-making model using the Profile Matching approach. Using the GAP comparison table, this method determines the GAP value between the ideal candidate and the candidate candidate. The research data shows that there are 5 alternative student candidates participating in the quiz competition and 4 assessment criteria, namely the Average Knowledge Aspect Value (C1), Skill Aspect Average Score (C2), Simulation Test Score (C3) and Test Runtime (C4). The assessment model employing the Profile Matching method was successfully applied to the problem of determining smart and accurate contest participants. The results indicated that there were three best alternatives for students participating in the smart and accurate contest: alternative A4 with a value of 4.7, followed by alternatives A1 and A2 with a value of 4.5.

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1. INTRODUCTION

In order to understand the distribution of the nation's intelligence and raise the standard of education for all social strata, the government's role in Indonesian education is crucial. Learning activities in schools are impacted by the development of the digital era and the existence of information and communication technology (Pandansari & Gafur, 2016)(Paramansyah & SE, 2020). In order to enhance the learning process and improve students' individual competences in the technology era, teachers and students today have

shifted to using ICT-based learning (Dewantara et al., 2022) (Aditya et al., 2020). To create intelligent and excellent people, it is crucial to increase student motivation in learning (Silvana et al., 2019). In order to encourage kids in growing interest in learning to grasp subjects at school, a variety of initiatives and learning methods have been developed, one of which is engaging in quiz competitions beginning at the elementary school level (Supianti, 2018). Students are given the knowledge and skills necessary to comprehend the material being covered in class, which allows them to compete both individually and in groups to identify those who are academically skill (Daheri et al., 2022). The quiz competition is a type of government program that elementary school education levels usually follow to assist initiatives to improve the caliber of education.

Every year, all schools in Indonesia participate in a group smart and accurate contest competition as a way of evaluating the quality of the country's educational system and to generate interest among other schools that also take quizzes. One of the measures to safeguard the steps toward high-quality education is the introduction of the quiz competition itself. Through competitions, students gain the skill of careful scrutiny, which boosts their confidence to voice their ideas (Novika & Harahap, 2018). A good response can be presented and the capacity to convey opinions can both be improved with careful speaking techniques. The smart and accurate contest competition is held for all topics and focuses on students' capacity (Sudipa, Wijaya, et al., 2020) to respond to a variety of questions within the permitted time. This is highly helpful for directing students' interests and talents, especially for those who perform exceptionally well in the classroom.

Obviously, the school made a selection among its students when choosing who would compete in the smart and accurate contest. The perfect candidate for the smart and accurate contest is determined by class standing and lesson grades. Students who thrive academically, as demonstrated by their results in each topic, are then chosen based on selection criteria, and the student with the best score will be permitted to compete in the smart and accurate contest. The selection of applicants for smart and accurate contest is typically based solely on class rankings and lesson scores, despite the fact that other elements, such as accuracy and speed, are required in the competitions being assessed. In addition to the aforementioned issues, teachers do not always consider all aspects when selecting students, resulting in suboptimal outcomes (Fadlan & Kurniawan, 2014). So that the school can make an objective selection based on the selection criteria, a decision-making model is required for the process of selecting participants for the smart and accurate contest.

This study proposes a decision-making model using the Profile Matching method based on the characteristics of the selection process for smart and accurate contestants whose ideal candidates for participation can be determined in advance, based on class rankings and lesson scores. This method employs a strategy to find the GAP value between the ideal candidate and the candidate candidate based on the GAP comparison table (Umar et al., 2022)(Sudipa & Sudiani, 2019), and determines that the candidate with the shortest GAP value is the best candidate. In contrast to previous decision-making models, the profile matching approach is able to determine not only the difference in values between ideal candidates and prospective prospects, but also the primary and secondary criteria that decision makers regard to be most essential (De Almeida et al., 2016). Obviously, it will be easier for decision makers to make alternative selections if the results of the selection are objective and based on predefined evaluation criteria.

2. RESEARCH METHOD

2.1. Decision Process

The decision-making process includes decision-makers' ability to select options based on many criteria. Decision-making is possible in numerous sectors, including education (Fakeeh, 2015). The capability of the decision support system to solve semi-structured and

unstructured situations might assist inexperienced decision makers (Sudipa, Astria, et al., 2020) in identifying priority criteria and weighting criteria, enabling them to make objective and transparent decisions (Yeh & Willis, 2001)(Meiryani et al., 2020)(Sudipa et al., 2021).

2.2. Profile Matching Method

The Profile Matching Model is a crucial technique in decision process (Mumtaz, 2020). These talents or skills must be met to the fullest extent or as closely as possible by potential smar and accurate contestant. In general, the profile matching procedure compares student profiles to the necessary criteria in order to identify differences (also called GAP). The weight value is bigger the smaller the resulting gap (Begum et al., 2009). Following are the procedures required to complete the Profile Matching method (Sari, 2018):

1. Competency GAP Calculation

After determining the student to be assessed, then determining the calculation of competency gap mapping where what is meant by gap here is the difference between student profiles and ideal profiles or can be shown by Equation (1) below:

GAP = Student Profile – Ideal Profile (1)

2. Determine GAP Calculation

After obtaining the Gap for each customer, each students profile is given a weighted value according to the provisions in the GAP value weight table (Budianita & Syahputra, 2016)(Wiratama et al., 2018).

Table 1. GAP Value Weight

GAP Difference	Value Weight	Description
0	5	Competence as required
1	4,5	Individual competence excess 0,1
-1	4	Individual competence deficiency 0,1
2	3,5	Individual competence excess 0,2
-2	3	Individual competence deficiency 0,2
3	2,5	Individual competence excess 0,3
-3	2	Individual competence deficiency 0,3
4	1,5	Individual competence excess 0,4
-4	1	Individual competence deficiency 0,4

3. Calculation and Grouping of Core Factors and Secondary Factors

After determining the weight of the gap value in the same way, each aspect is grouped into two groups, namely "Core Factor" and "Secondary Factor," as follows.

Core Factor Calculation:

$$NCF = \frac{\sum NC}{\sum IC} \quad (2)$$

Information :
NCF : Average Core Factor
NC : Total number of Core Factor scores
IC : Number of items

Secondary Factor Calculation:

$$NSF = \frac{\sum NS}{\sum IC} \quad (3)$$

Information :
NSF : Secondary Factor Average

NC : Total number of Secondary Factor scores
IC : Number of items

4. Calculation of Total Values

The final result of the profile matching process is the ranking of customers who are eligible for credit. Determination of ranking refers to the results of specific calculations. The total value is calculated based on the percentage of core and secondary, which is estimated to affect the students profile. The calculation can be seen in Equation (4) below:

$$(x)\%\ NCF + (x)\%\ NSF = N \quad (4)$$

Keterangan :
NCF : Average value of core factor
NSF : Average secondary factor
N : Total Values
(x)% : Percentage of value input

First, determine the percent value, namely the core factor of 60% and the second factor of 40%. Then the value of the core and secondary factors is added according to the formula.

2.3. Decision Making Model

This study's proposed model employs the Profile Matching approach. At the stage of the decision-making model employing the approach of profile matching, alternative data for student candidates who compete in the smart and accurate competition and data on the selection assessment criteria employed in the process are required. The decision-making model is depicted in Figure 1.

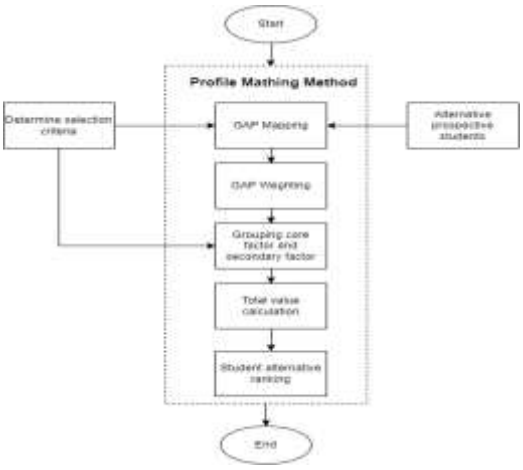

Figure 1. Decision Making Stages

It is shown in Figure 1 how alternative data from the profile matching method is inputted into the GAP mapping process to determine the value of the GAP difference between the ideal candidate and the candidate for the quiz competition. This process begins with determining alternative student candidates for the quiz competition. The next step is to decide on the assessment criteria for the selection process, which is crucial for use in the GAP mapping process and grouping of core and secondary factors with the profile matching method. Criteria data is then used to prioritize core and secondary factor criteria and to calculate the difference between alternative GAP values for each criterion.

3. RESULTS AND DISCUSSIONS

3.1 Determine Criteria and Alternative

This study using five samples of fourth-grade student data from elementary school No. 2 Ubung, alternative data for students competing in the smart and accurate competition is derived. The evaluation criteria (C) are based on the grades on the 2013 primary school report cards; however, not all report cards are utilized. The report card selection criteria are the Average Value of Knowledge Aspect (C1) and the Average Value of Skill Aspect (C2). Other criteria consist of additional criteria obtained from the Internal Value Simulation Test (C3) data on the smart and accurate competition and Test Processing Time (C4), as the speed factor in question-solving is also extremely important. In the criteria data, the value of the ideal candidate is determined; the value of the ideal candidate is based on the decision maker's judgment; the objective is to obtain a standard value from the student's ideal profile against the assessment criteria. The criteria information is displayed in Table 2 below.

Table 2. Assessment Criteria Data

Criteria	Criteria Description	Weight Value (%)	Ideal Profile Value
C1	Average Knowledge Aspect	25%	5
C2	Skill Average Score	25%	5
C3	Simulation Test Score	30%	5
C4	Test Runtime	20%	5

Each criterion is equipped with an attribute scale that facilitates the calculation of alternative values. The attribute value scale for criteria C1, C2, C3, and C4 uses a value range of 0 to 100 that is determined by applying a Likert scale to converted numbers. Table 3 provides the attribute value scale for criteria C1, C2, C3, and C4.

Table 3. Attribute Value Scale 0 -100

Attribute Value Scale	Number Conversion
>90	5
80 - 90	4
71 - 79	3
<70	2

The attribute value scale for the C4 criterion is measured in minutes because the criteria for taking the exam are calculated based on the speed with which students complete simulation test questions. The value scale for the time attribute is displayed in Table 4 below.

Table 4. Time Value Scale

Time attribute value scale (Minutes)	Number Conversion
<= 20	5
21 - 29	4
>=30	3

3.2. Alternative Values on Each Criterion

At this stage, five alternate candidates for the quiz competition are described, as well as alternate values for each of the evaluation criteria C1, C2, C3, and C4. alternative is denoted by the letter A. Five options will be chosen to determine the three options with the highest value. The alternative values for each criterion are displayed in Table 5.

Table 5. Alternative Values

Alternative	Criteria			
	C1	C2	C3	C4
A1	94	87	97	25
A2	95	90	88	24
A3	96	88	89	30
A4	98	95	92	22
A5	92	96	90	30

The alternative values for each criterion are then converted into an attribute value scale according to Table 3 and Table 4. Changes in the alternative values for each criterion can be seen in Table 6 below.

Table 6. Conversion Value Scale

Alternative	Criteria			
	C1	C2	C3	C4
A1	5	4	5	4
A2	5	4	4	4
A3	5	4	4	3
A4	5	5	5	4
A5	5	5	4	3

3.3. Alternative GAP Value Calculation

The Competency Gap is computed using Equation (1), with the ideal profile benchmark value from Table (1) and alternative values from Table (2). (6). The difference in GAP values is then calculated, as presented in Table 7:

Table 7. Alternative GAP Value

Alternative	Criteria			
	C1	C2	C3	C4
A1	5	4	5	4
A2	5	4	4	4
A3	5	4	4	3
A4	5	5	5	4
A5	5	5	4	3
Ideal Value	5	5	5	5
A1	0	-1	0	-1
A2	0	-1	-1	1
A3	0	-1	-1	-2
A4	0	0	0	-1
A5	0	0	-1	-2

After obtaining the value of the GAP difference based on the ideal value determined by the decision maker in table 1 and the alternative value in table 6, the difference is compared to the ideal value. The alternative difference value is then converted into a value based on Table 1's GAP value weight.

3.3. Calculation of Core Factor and Secondary Factor Values

Core Factor (NCF) and Secondary Factor (NSF) values are calculated based on Equation (2) and Equation (3). The core factor criteria are determined by the decision maker, namely C3 and C4 criteria, while the secondary factor criteria are C1 and C2. The values of NCF and NSF can be seen in Table 8 below.

Table 8. Core Factor dan Secondary Factor

Alternative	C1	C2	C3	C4	NFC	NSC
A1	5	4	5	4	4,5	4,5
A2	5	4	4	4	4	4,5
A3	5	4	4	3	3,5	4,5
A4	5	5	5	4	4,5	5
A5	5	5	4	3	3,5	5

3.4. Alternative Final Value Calculation

The final alternative value, which is the Ni value, is calculated using Equation (4) by adding the NFC and NSC values of each alternative. The core factor weight value is 60% and the secondary factor weight value is 40%. The outcomes of the alternative final scores are displayed in Table 9 below.

Table 9. Alternative Final Score

Alternative	NFC (60%)	NSC (40%)	Ni
A1	2,7	1,8	**4,5**
A2	2,4	1,8	**4,5**
A3	2,1	1,8	**3,9**
A4	2,7	2	**4,7**
A5	2,1	2	**4,1**

After successfully calculating the final alternative value in order to determine the final value of Ni, the alternative ranking values are sorted from largest to smallest. Can be seen in Table 10.

Table 10. Alternative Value Ranking

Alternative	Value	Rank
A4	**4,7**	1
A1	**4,5**	2
A2	**4,5**	3
A5	4,1	4
A3	3,9	5

Table 10 explains the final score of the alternative ranking of students participating in the smart and accurate contest competition. Since only the three best alternatives with the highest score were sought, from the five selected alternatives, the ranking results indicated that the three best alternatives were alternative A4 with a value of 4.7, followed by alternatives A1 and A2 with a value of 4.5. Therefore, the decision assessment model with the profile matching method has been successfully implemented to generate alternative decisions for elementary school students competing in the smart and accurate contest.

4. CONCLUSION

The research concludes that the decision assessment model with the profile matching method has been successfully applied to generate alternative decisions for elementary school students participating in the smart and accurate contest. In addition to the five alternative candidates for the smart and accurate contest and the four assessment criteria used as input data in the calculation process for the Profile Matching method, there is an additional attribute value from the criteria that makes it simpler for decision-makers to determine the weighting of the criteria values. The selection process has successfully calculated the three best alternatives based on the highest final score, so it is hoped that the profile matching decision assessment model will become an objective assessment method for multi-criteria problems.

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