Ability Assessment Competency Standards on Early Childhood with Fuzzy Logic Approac

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Ability Assessment Competency Standards on Early Childhood with Fuzzy Logic Approach (Case Study on Raudhatul RA Athfal (RA) Bunga Bangsa Parung)

[illegible]
[illegible]
[illegible]
[illegible]

Abstract. [illegible]

[illegible]

1.1. Preliminary

[illegible]

[illegible]

Many aspects that should be given a qualitative assessment on the individual students during their early childhood [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] for early childhood Kindergarten (TK), because the process of assessment is very qualitative and subjective that each teacher would have given different assessments.

1.2. Problem Formulation

[illegible] ability of the standard of competence in early childhood [illegible] administration [illegible] by using ICT-based approaches namely the Fuzzy Logic?

1.3. Objective

[illegible] known [illegible]

II. THE THEORETICAL BASIS

2.1. Early Childhood Education

Early childhood education [illegible] [illegible] [illegible] the readiness to enter further education, which was held in formal, non-formal, and informal (Act No. 20 of 2003, Chapter I:14)

Early childhood education [illegible] categories:

1. Formal education lines, which consists of three types of management education, namely Kindergarten (TK), Raudhatul Athfal (RA) or other equivalent forms.
2. Line Non-formal education, which consists of three types of management education, namely Play Group (KB), [illegible] (TPA) or other equivalent forms.
3. Informal education [illegible] Family Education or Education organized by the environment.

2.2. Fuzzy Logic

Fuzzy Logic was first introduced by prof. L. A. Zadeh of Berkeley in 1965. Fuzzy Logic [illegible] [illegible] intelligence [illegible]. [illegible] fuzzy logic [illegible] by a [illegible] process, namely the determination of fuzzy set, the application of IF-THEN rules and fuzzy inference process.

2.3. Fuzzy Inference System (FIS)

[illegible] Fuzzy Inference System is a [illegible] [illegible] fuzzy rule-based systems, fuzzy rule-based systems, fuzzy expert systems, fuzzy expert systems, fuzzy models, fuzzy associative memory, [illegible] fuzzy logic controller [illegible] of the fuzzy inference system [illegible] et al., 1997)

1) Base rule contains a number of fuzzy rules that map the fuzzy input values to the fuzzy output values. This rule is often expressed by IF-THEN format.
2) The database contains the membership functions of the fuzzy sets used as the value for each variable (system).
3) Fuzzy inference unit [illegible]
4) Unit Fuzzification [illegible]
5) Mapping [illegible]
   - Conversion of data mapped to the corresponding linguistic terms or fuzzy sets have been defined for these variables.
6) [illegible]

III. METHODOLOGY

Some of the steps taking place in the establishment of fuzzy logic systems are as follows:

1. [illegible]
   [illegible]
2. Establishment of fuzzy set (Fuzzification),
   at this stage, the input is mapped into a fuzzy set with membership function. In this Fuzzification stage it is necessary to determine the [illegible] membership [illegible]

3. Membership Degree calculation process

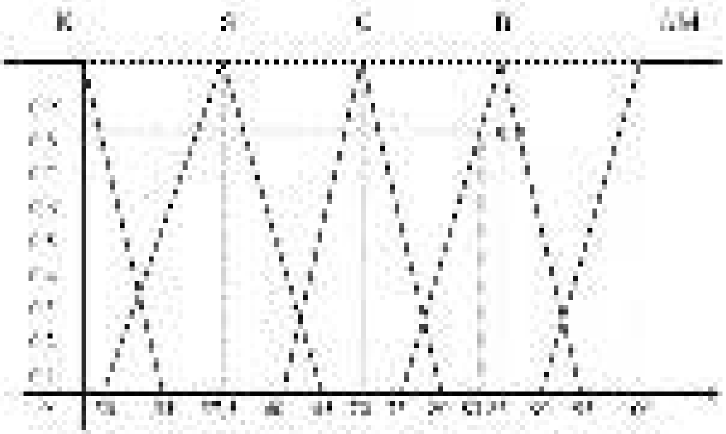


Figure 1 Membership Function Competency Standard (KST)

$$\mu[x] = \begin{cases} 0; & x \le a \text{ or } x \ge c \\ (x-a)/(b-a); & a \le x \le b \\ (c-x)/(c-b); & b \le x \le c \end{cases}$$

Note : x = the value of the parameter
a = minimum value range
b = mean value
c = maximum value range

The calculation applies equally to the other parameters using the triangular representation

4. Fuzzy Rules

Making Rules [illegible] using function following implication:

IF (x_1 is A_1) ∘ (x_2 is A_2) ∘ ... ∘ (x_n is A_n) then

y is B [illegible]

The operator used to connect [illegible] the operator AND or OR. [illegible] using AND or OR operator [illegible]. Membership value of the AND operator result is obtained by taking the smallest membership value among the elements in the sets concerned. While the result of the membership value OR operator obtained by taking the largest membership value.

Operator AND : $\mu_{A \cap B} = \min(\mu_A[x], \mu_B[y])$

$\min(\mu_A[x], \mu_B[y])$

Operator OR : $\mu_{A \cup B} = \max(\mu_A[x], \mu_B[y])$

$\max(\mu_A[x], \mu_B[y])$

example:

[illegible]

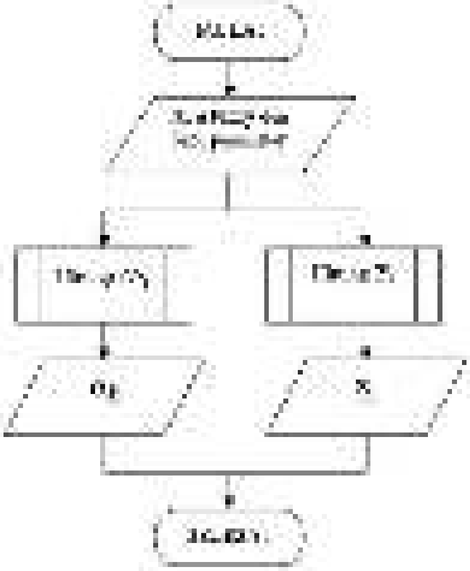
= [illegible]

[illegible]

= [illegible]

= [illegible]

7. [illegible] method of [illegible] method [illegible] and Sugeno method.



8. Defuzzification, the output stage of fuzzy mapping and the resulting output is a fuzzy set of numbers [illegible] into a specific image. This process is the process of employing the fuzzy [illegible]

IV. RESULT and DISCUSSION

4.1 Identification and Troubleshooting

4.1.1 Identification

The assessment in the form of Learning Progress Report serves to determine the level of moral development and behavior and the development of basic skills, language skills, cognitive, physical / motor, and art. Conducted a qualitative assessment that is in the report not in the form of a numeric value but in the form of narratives derived from the results of [illegible] Not Appear (BM), Starting Appear (MM), [illegible] (BSH), [illegible] (BSB). [illegible] result of the computation [illegible] for the researchers to identify all the data obtained to finally be asked whether each of the students expressed Already Ready or Not Ready to move to the next education.

4.1.2 Troubleshooting

Based on the description above, the researcher [illegible] in the assessment of students' [illegible] competency [illegible] and [illegible] evaluation of the students [illegible] basic education [illegible] reference for teachers to [illegible] get assessment category Not Appear (BM) or Start Appear (MB). The system to be developed using the Store Procedure [illegible].

4.2 System Requirements Analysis

4.2.1 Input Design

In this study the authors try to build a system Learning Progress Report. These inputs to the system in the form of the following data:

NO	DEVELOPMENT PROGRAM		NO.	PROGRAM DEVELOPMENT	
	PARAMETER	SUB PARAMETER		PARAMETER	SUB PARAMETER
I	[illegible]	1. [illegible] 2. [illegible] 3. [illegible] 4. [illegible] 5. [illegible] 6. [illegible] 7. [illegible] 8. [illegible]	IV	[illegible]	1. [illegible] 2. [illegible] 3. [illegible] 4. [illegible] 5. [illegible] Cycle 6. [illegible]

II.	[illegible] Competence Skill	1. Accustomed [illegible] and [illegible] 2. [illegible] 3. [illegible] 4. Accustomed Reading [illegible] before and after [illegible] 5. [illegible] 6. [illegible] 7. Accustomed to [illegible] 8. Departing [illegible] school	V.	Competence Physical Motor	1. [illegible] 2. Walking on the [illegible] 3. Throwing [illegible] 4. [illegible] 5. [illegible] 6. [illegible] 7. [illegible] 8. [illegible]
III.	Language Competence	1. [illegible] 2. Making Simple Sentences 3. [illegible] 4. [illegible] 5. [illegible] 6. [illegible] 7. Recognizing and Writing [illegible] 8. [illegible]	VI.	Competence Art	1. [illegible] 2. [illegible] 3. [illegible] 4. Finger Painting 5. [illegible] 6. [illegible] 7. [illegible] 8. Coloring [illegible]

Table 1. [illegible]

4.2.2 Output System

Output data information system in the form of [illegible] of students in the form of a [illegible] capability maturity level of competency that must be [illegible] by students. [illegible]

4.3. Process Design of Fuzzy Systems

4.3.1. Data Fuzzification

In this study, to be conducted fuzzification into [illegible] variables, which include: Competence [illegible] competence, language competence, [illegible]

4.3.2. Membership Functions

In the membership functions, exemplified for a single variable to be processed by fuzzy approach as follows:

[illegible]

a. X = [illegible] Linguistic (Cognitive Language Competence)
b. T = {BSB, BSH, MB, BB}
Where the value of the membership function is as follows:
- Developing Very Well (BSB) [illegible]
- Developing As Expected (BSH) [illegible]
- Starting to Develop (MB) [illegible]
- Not Developed (BB) [illegible]

c. U = [illegible]
d. H: comprising BSB, BSH, MSH and BSB with membership function as shown in the picture below

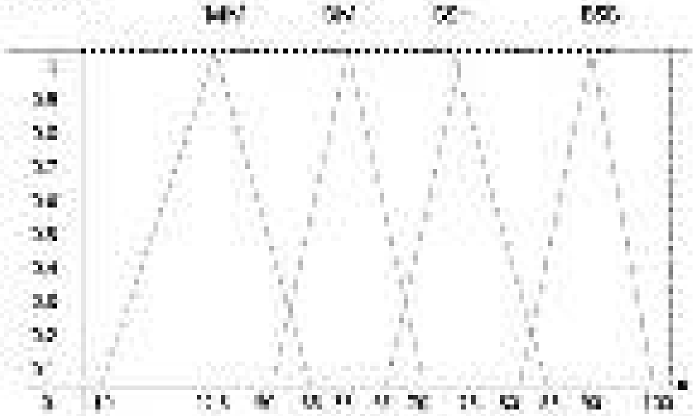


Figure 2. Membership function of [illegible] competence

Figure 2 [illegible] showing [illegible] the [illegible] competence, [illegible] linguistic [illegible]

4.3.3 Rule Base (Rule Base)

In the calculation of data from [illegible] rules [illegible] based on expert opinion. The number of rules in accordance with the number of variable parameters [illegible] development [illegible] competence [illegible] membership function [illegible]

This rule is formed according to the characteristics of sample training data [illegible] example below [illegible] rules.

[illegible]	IF Language Competence BSB AND Cognitive Competence BSB AND physical [illegible] competence BSB AND Art Competence BSB	THEN Children [illegible] Competence [illegible] Develop Very Well
[illegible]	IF Language Competence BSH AND Cognitive Competence BSH AND physical [illegible] competence BSH AND [illegible] BSH	THEN [illegible] Develop As Expected

Table 3 Rule Base

4.4. Fuzzy Calculation for the Standard of Competence in Students

4.4.1 [illegible]

[illegible]

Name : [illegible]

No. [illegible] : [illegible]

Grade : B

NO	PROGRAM DEVELOPMENT	VALUE	AVERAGE
I	[illegible]		
	1 [illegible]	75	[illegible]
	2 [illegible]	70	
	3 [illegible]	75	
	4 [illegible]	80	
	5 [illegible]	82	
	[illegible]	[illegible]	
	[illegible]	[illegible]	
	[illegible]	[illegible]	
II	[illegible]		
	1 Accustomed Start and Answer Salam	85	[illegible]
	2 Accustomed Reading [illegible] before the start of activities	80	
	3 Child be Honest	[illegible]	
	4 [illegible]	75	
	5 Responsibility for the task assigned	80	
	[illegible]	[illegible]	
	[illegible]	[illegible]	
	[illegible]	[illegible]	
III	[illegible]		
	1 [illegible]	75	[illegible]
	2 Making Simple Sentences	75	
	3 Imitate back 3 to 4 sequence numbers and words (auditory sequence)	80	
	4 Storytelling	75	
	5 [illegible]	70	
	[illegible]	70	
	[illegible]	[illegible]	
	[illegible]	[illegible]	
IV	[illegible]		
	1 [illegible]	[illegible]	[illegible]
	2 Grouping Objects	50	
	3 [illegible] numbers with the symbol of the concept of number	85	
	4 Know the size of	85	
	5 Arrange the puzzle pieces	80	
	6 Mixing Colors	80	
	7 Know the Plant Life Cycle	75	
	[illegible]	[illegible]	
V	[illegible]		
	1 [illegible]	[illegible]	[illegible]
	2 [illegible]	[illegible]	
	3 [illegible] catch and kick the ball	50	
	4 [illegible]	80	

	5	Interpreting [illegible]	75	
	6	[illegible]	80	
	7	[illegible]	75	
	8	[illegible]		
VI	[illegible]			
	1	[illegible]	75	78
	2	[illegible]	75	
	3	Dark and [illegible]	75	
	4	[illegible]	80	
	5	[illegible]	75	
	6	[illegible]	80	
	7	[illegible]	85	
	8	[illegible]	75	

Table 2. [illegible]

4.1.2 [illegible]

[illegible]

PSKAP = [illegible]

[illegible]

4.1.3 [illegible]

[illegible]

a. [illegible]

$$\mu(x) = \begin{cases} 0, & [illegible] \\ \frac{78 - 75}{[illegible]}, & [illegible] \\ \frac{85 - 78}{85 - 75}, & [illegible] \end{cases}$$

[illegible]

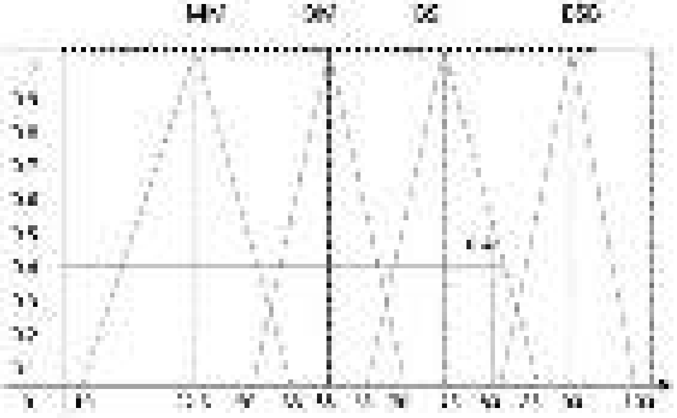


Figure 3 Membership function Representation [illegible] Competences

b. Behavioral Competence: 73
   μ(73) = (73 − 70)/(85 − 70) = [illegible] (SV)

c. Functional Competence: 77
   μ(77) = (77 − 75)/(85 − 75) = 2/10 = 0.2 (SS)

d. Cognitive Competence: 84
   μ(84) = (85 − 82.5)/(85 − 80) = [illegible] (ESS)

e. [illegible] Competence: [illegible]
   μ[illegible]

f. All Competences: 78
   μ(78) = (78 − 75)/(85 − 75) = 3/10 = 0.3 (SS)

4.4.4 Readiness process

In this process, the membership function we have proposed the readiness [illegible]. Further [illegible] using trapezoidal membership function [illegible] as shown Figure 4 [illegible] Ready, Ready, and [illegible]

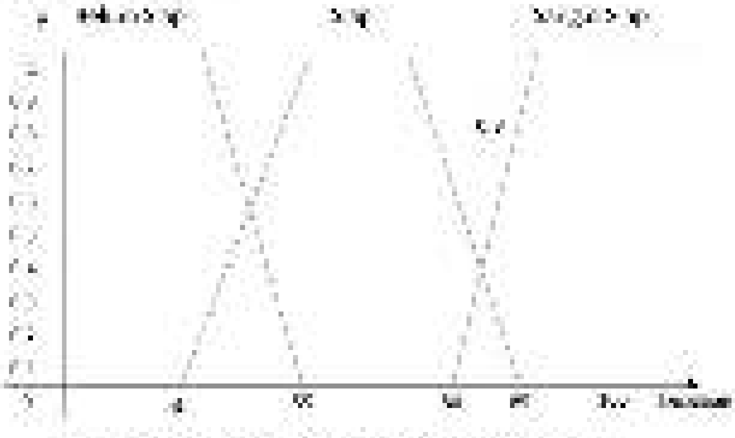


Figure 4: Trapezoidal membership function for readiness

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	0	0	0.4	0
[illegible]	[illegible]	0	0	0.4	0
[illegible]	77	0	0	0.2	0
[illegible]	[illegible]	0	0	0.2	0.2
[illegible]	[illegible]	0	0	[illegible]	0
[illegible]	75	0	0	0.2	0

[illegible]

[illegible] = [illegible]

[illegible]

= [illegible]

[illegible]

= [illegible] [illegible]

[illegible]

V. CONCLUSION AND SUGGESTION

5.1 Conclusion

Calculation of achievement standards for early childhood education using fuzzy logic approach, makes it easy for teachers to provide an objective assessment based on the variables in each assessment because there are rules (rule) applied so that there is uniformity in assessing the ability of the competence of each child in [illegible] provide recommendations to the parents of [illegible]

5.2 Suggestion

The learning system evaluation report on early childhood learning equipped [illegible] [illegible]

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