# Support System for Determining Character Assessment of Elementary School Student

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**Abstract.** The curriculum in 2013 requires an assessment of attitude or character, this confuses almost all teachers in Indonesia because they have to carry out this student assessments, to fulfil these demands, the teacher continues to carry out assessments by compiling assessment rubrics and simple observation sheets. This study aims to design a Decision Support System (DSS) for character assessment using the Simple Additive Weighting (SAW) method and implement it in Elementary Schools in the Special Region of Yogyakarta. Five-character values that become criteria, there are, religious, nationalism, integrity, independence and mutual cooperation. The study method used is research and development (R&D) while for application development using the waterfall method, this is application development techniques that begin with the Requirements phase (data collection), Design (modelling), Implementation (development), Verification (testing), and Maintenance (deployment). The study subjects were teachers and students in 1st, 2nd and 3rd grade in Demangan Gondokusuman State Elementary School and the Rejosari Kotagede Yogyakarta State Elementary School. This study was conducted for one year including initial investigations, school mapping, system design and implementation in both schools. The results obtained from this study are Decision Support System for elementary student character assessment which helps teachers assess student character without sense of injustice and can provide character development feedback according to recommendations from DSS, also facilitate reporting the results of attitude or character assessment of each student.

**Keywords**: Decision Support System, Simple Additive Weighting, Character, Elementary School and Waterfall.

## INTRODUCTION

The standards education assessment of curriculum in 2013 refer to Permendikbud Number 66 of 2013[1] concerning educational assessment standards, namely authentic assessments where the assessment is complete to assess input, process and learning outcomes. Curriculum assessment in 2013[2] emphasizes cognitive, affective, psychomotor aspects in balanced according to the characteristics of students and the level of the assessment system. On curriculum assessment in 2013[3] at the level of Elementary School mastery of knowledge and skills has a small proportion, while inculcation of attitudes have large proportions.

elementary students are in the morality of autonomy[4]. This can be seen from the assessment of children who think that something is good depending on its purpose. A child can consider lying to be right in certain situations. So, lying is not always to be something wrong. So that at this age character education is very important to internalize good values into children[4]. So that at this stage of development, elementary school teachers can provide education to form good student character.

This is according to research conducted by Eka Septic Cahyaningrum[5], that character education must be applied start at the basic education level so as to form a strong foundation for student character for the next level. The government also passed Presidential Decree Number 87 of 2017 [6], concerning Character Strengthening Education

(PPK) to streamline the role of schools in shape of the character. Strengthening Character Education is a school movement that aims to build student character through the integration of cultivate of heart (ethics), cultivate of feeling (aesthetics), cultivate of thought (literacy), and sports (kinesthetics) with cooperation between schools, families and communities.

This Character Strengthening Education (PPK) Program[7] comes from Ki Hajar Dewantara's philosophy about cultivate of heart (ethics), cultivate of thought (literacy), cultivate of feeling (aesthetics), and sports (kinesthetics). Cultivate of heart namely spirituality; cultivate of thought namely academic excellence; cultivate of feeling namely moral integrity, sense of art, and culture; also, sports, namely being healthy and able to participate actively as citizens. Character Strengthening Education (PPK) is implemented by implementing Pancasila values on character education. The values of Pancasila include religious values, honesty, tolerance, discipline, hard-working, creative, independent, democratic, curiosity, the spirit of nationalism, love of country, respect for achievement, communicative, peace-loving, fond of reading, caring for the environment, caring for the social, and responsible. At the Centre for Educational Assessment [7] these eighteen values were crystallized into five main character values, namely: (1) religious, (2) nationalism, (3) independent, (4) integrity, and (5) mutual cooperation.

From the researcher's preliminary observations, it is stated that almost all teachers feel confused in carrying out the assessments required by curriculum in 2013, especially the assessment of attitudes or character, even so to meet the demands of curriculum in 2013, the teacher still makes assessments by preparing assessment rubrics and simple observation sheets. Many of the assessment rubrics and simple observation sheets have indicators that do not match the character or attitude indicators. So that the character assessment carried out with the rubric and the instrument is not correct. The assessment is also carried out very subjectively because many factors influence this assessment, such as the acquisition of scores for cognitive aspects. The high and low scores of the cognitive aspects affect the teacher's assessment of student character. Even though the affective aspect assessment should be carried out objectively and it has nothing to do with cognitive assessment. The proximity between students and teachers factors also becomes a factor of teacher subjectivity in conducting character assessments. The teacher kinship factors with the parents of students and there are many other factors that also affect the character assessment of the teacher. Even though the character assessment must be done appropriately so that the teacher can provide feedback on the results of the assessment.

This problem must be found a solution immediately so that the implementation of learning can run according to the demands of curriculum in 2013, so that the implementation of curriculum in 2013 can be useful completely in the field according to government expectations. Character assessment is important in learning not only to assess the success of cultivating student character but also to see the development of student character. By knowing the results of the character assessment, the learning process can be continued with appropriate efforts for the development or strengthening of student character. The importance of character assessment, it is necessary to have an appropriate assessment instrument to determine the success of cultivation of character values.

Decision Support System (DSS) [8][9][10][11] is an interactive computer-based system that helps users to make assessments and selections. The system not only provides data storage and retrieval but also enhances traditional information access with support for model-making and model-based reasoning[12]. This system is very suitable for helping teachers to assess student character, which so far does not exist in Indonesia. Simple Additive weighting method (SAW)[13] is a method of aggregating the weights of the criteria. The SAW[14] [15]method is very suitable for carrying out character assessments with the five specified criteria so that teachers at schools no longer have difficulty making assessments and can provide feedback on character development appropriately according to targets.

## METHOD

Waterfall model is a classical model that is systematic, sequential in building software. The name of this model actually Linear Sequential Model and often called the classic life cycle or waterfall method. In this study the development of the system using waterfall method [16] where there are 5 phases namely phase requirement, phase design, phase implementation, phase verification and phase maintenance. Phase of waterfall method can be seen in Figure 1. Waterfall Method.

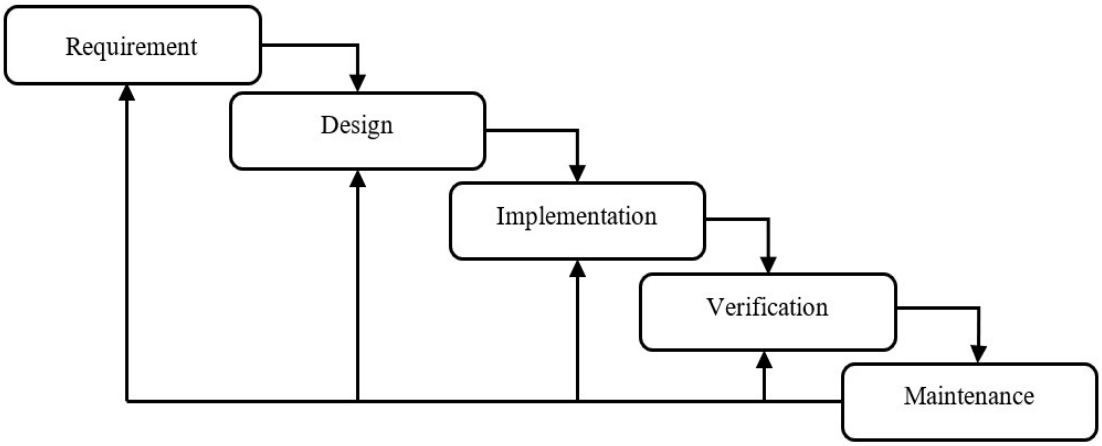


**FIGURE 1.** Waterfall Method

These phases can be described as follows:

1. Requirements phase (data collection), which in this phase the researcher of this study communicates with the Elementary School staffs which aims to understand the system expected by users and the limitations of the system. This information can usually be obtained through interviews, discussions or face-to-face surveys. The information analyzed to get the data needed by the user.
2. Design phase (modelling), the requirements specification from previous phase will be learned in this phase and system design is prepared. System Design helps in determining the hardware and defines overall system architecture.
3. Implementation Phase (development), in this phase, the system was first developed in a small program called the unit, which is integrated, in the next phase was developed and tested for functionality referred to as unit testing.
4. Verification phase (testing), after integration of entire system is tested to check for any failures or errors.
5. Maintenance phase (deployment/maintenance), final phase in waterfall method is maintenance, including correcting errors that were not found in the previous step.

## Data Method of Collecting Data

Data collection in this study uses the following steps [17]:

a. Study of literature; Literature studies are conducted to explore sources of information through literature searches, particularly research results published in national and international proceedings/journals.
b. Observation; Observations are made by direct observation of everything that has to do with the object of research
c. Interview; Interviews are used to obtain and explore information about informants' experiences in the character problems of elementary school students. The interview was conducted by the teacher concerned, with the assumption that the teacher carried out the character learning process at school.

## Research Design

In this study, required use case diagram design to describe briefly what it does and who uses the system. The system uses four actors in it, namely teachers, administrators, principals and parents of the children and there are five use case namely sign in, sub criteria weight input, view the class character assessment report, data input of students, teacher, head master and class, see the character assessment of his child. Use case diagrams are presented in Figure 2. Use case Diagram.

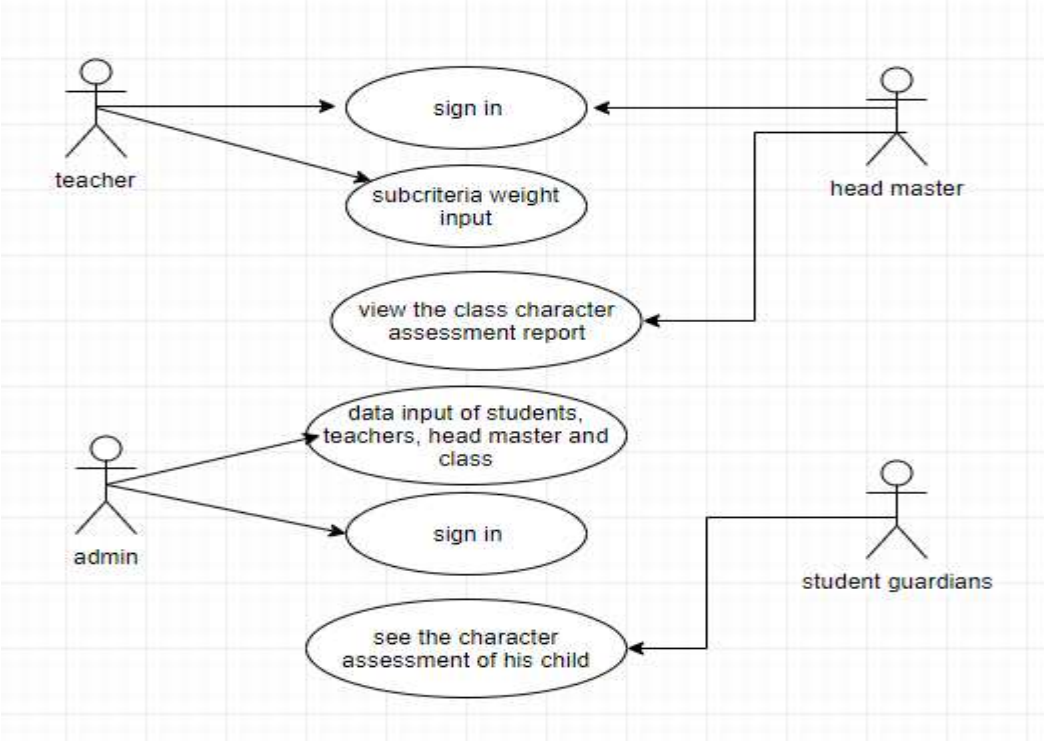


**FIGURE 2.** Use case Diagram

In figure 2 it is explained that teachers, principals and admins have their own permission access right which the admin has permission access right to input student data, input homeroom teacher data and input data for school principals, teachers have permission access rights to input the criteria weighting values of student attitudes/characters while the principal has the permission right access to view reports of student character grades per class. The parents of children can only access the character scores of their children's.

## Criteria

Based on the results of interviews with the school and references from the Education Assessment Centre, to determine the character assessment/attitudes of elementary school students, there are five assessment criteria, namely religious, nationalism, integrity, independently and mutual cooperation, which can be seen in table 1 of Assessment Criteria.

**TABLE 1.** Assessment Criteria

| Criteria | Attribute | Information |
|---|---|---|
| Religious | Benefit | Attitudes and behaviours that are obedient in carrying out the teachings of their religion, tolerant into other implementation worship religions, and live-in harmony with adherents of other religions. |
| Nationalism | Benefit | A way of thinking, behaving and acting that shows loyalty, care, concern and high appreciation of language, physical environment, social, cultural, economic and political environment of the nation and places the interests of the nation and the state above personals interests and their groups. |
| Integrity | Benefit | Behavior based on efforts to make himself a person who can always be trustworthy in words, actions, and work. |
| Independently | Benefit | Attitudes and behaviours that are not easily depend on other people and use energy, thoughts, time to realize hopes, dreams, and ideals. |
| Mutual Cooperation | Benefit | An attitude that reflects the act of appreciating spirit of cooperation and working hand in hand to solve common problems. |

In this study, there are five criteria, namely religious, nationalism, integrity, independently and mutual corporation, where each criteria has a sub criterion, while the attribute in this criterion is benefit, which means that the higher value, the better result.

## Weighting

Weighting is a decision-making technique in a process that involves various factors together by assigning weight to each of these factors. Weighting can be done objectively with statistical calculations or subjectively by assigning it based on certain considerations.

**TABLE 2.** Weights of the Sub criteria Indicators

| Scale | Weight |
|---|---|
| Priority | 5 |
| Less Priority | 4 |
| Not a Priority | 3 |

In table 2, it can be seen that the weighting behaviour indicators falls into the sub-criteria with the provisions that are considered priority to have a weight 5, less priority with a weight 4 and those that are not prioritized have a weight 3.

Value of behaviour indicator is value that given to criteria that is adjusted to behaviour indicator with a predetermined value.

**TABLE 3.** Behaviour Indicator Value

| Behavioural Indicators | Value |
|---|---|
| Cultured (C) | 4 |
| Develops (D) | 3 |
| Start Developing (SD) | 2 |
| Need Guidance (NG) | 1 |

Table 3 explains the value of indicators, namely Cultured is valued 4, Develops is valued 3, Start Developing (SD) is valued 2 and Need Guidance (NG) is valued 1), more details can be seen in table 3.

Table 4, the weights, values and behavioural indicators of sub criteria are presented

**TABLE 4.** Behavioural Indicators

| Number. | Behavioural Indicators | Weight |
|---|---|---|
| 1 | Attending the celebration of religious affair at school or outside school | 5 |
| 2 | Love fellow God's Creature | 4 |
| 3 | Attending the Flag Ceremony at School | 5 |
| 4 | Sing the national anthem | 4 |
| 5 | Always leave on your own | 4 |
| 6 | Doing your own homework | 5 |
| 7 | Cleaning the classroom | 5 |
| 8 | Dumping trash in the trash | 3 |
| 9 | Apply honesty in every activity | 5 |
| 10 | Always disciplined time at school/at home | 4 |

In table 4, it is explained about behavioural indicators of five criteria, namely religious criteria for behavioural indicators at numbers 1 and 2, nationalism criteria for behavioural indicators at numbers 3 and 4, integrity criteria for behaviour indicators at numbers 5 and 6, independent criteria for behavioural indicators at numbers 7 and 8 and criteria for mutual cooperation indicators of behaviour in numbers 9 and 10.

## RESULT AND DISCUSSION

Implementation of this system was carried out in two schools, namely Demangan Gondokusuman State Elementary School and the Rejosari Kotagede Yogyakarta State Elementary School, where trials were carried out on grade I students. In Figure 3 it is explained that there are ten attitudes/sub criteria with benefit attributes.

After assigning the weight (W) to each criterion for each character, then making a decision matrix based on the criteria (Ci) then normalizing the matrix based on the type of attribute then obtained normalized matrix (R). In Figure 6, it can be seen that the alternatives that entered at the time of implementation of the two students are also presented with a normalization table of religious criteria and calculation results. Results of normalization and data on religious criteria for two students are presented in Figure 3 below:

| Student's name | Loving fellow creatures of God | Celebrating religious days at school/outside school |
|---|---|---|
| Jennie Rumbie | 4 | 3 |
| Andi | 2 | 3 |

**Normalization Matrix**

| | Criteria | |
|---|---|---|
| Student's name | Loving fellow creatures of God | Celebrating religious days at school/outside school |
| Jennie Rumbie | 1 | 1 |
| Andi | 0.5 | 1 |

**FIGURE 3**. Normalization Matrix

In Figure 3, it explained that results of the input behaviour indicator values for religious criteria for 2 students, while the manual calculation is as follows:

The Decision Matrix is $X = \begin{Bmatrix} 4 & 3 \\ 2 & 3 \end{Bmatrix}$

Normalization process

Normalization process is carried out by calculating the normalized performance rating value from the alternatives on the criteria with using formula:

If the benefit attribute, then

$R_{ij} = (X_{ij} (\max \{X_{ij}\})$

If the cost attribute, then

$R_{ij} = (\min \{X_{ij}\}/X_{ij})$

$$R_{11} = \frac{4}{\max\{4,2\}} = \frac{4}{4} = 1 \qquad R_{12} = \frac{3}{\max\{3,3\}} = \frac{3}{3} = 1$$

$$R_{21} = \frac{2}{\max\{4,2\}} = \frac{2}{3} = 0{,}5 \qquad R_{22} = \frac{3}{\max\{2,3\}} = \frac{3}{3} = 1$$

Normalized Matrix $R = \begin{Bmatrix} 1 & 1 \\ 0{,}5 & 1 \end{Bmatrix}$

After getting the normalization matrix, then the next is to calculate the value of the religious indicator. Results of summation values of religious criteria are presented in Figure 4 below:

The calculation results

| Student's name | Criteria | | Results |
|---|---|---|---|
| | Loving fellow creatures of God | Celebrating religious days at school/outside school | |
| Jennie Rumbie | 5 | 4 | 9 |
| Andi | 2.5 | 4 | 6.5 |

Jennie Rumbie memiliki nilai terbaik dengan nilai 9

**FIGURE 4**. Calculation of Religious criteria

In Figure 4, it is explained that results of religious criteria for each student are obtained from the number of behavioural indicator values automatically in system, while the manual calculation is as follows:
As for the sum of the weights C1+C2
Data 1 = (4+1) + (3+1) = 9
Data 2 = (2+0,5) + (3+1) = 6,5

To get the summation of all criteria, a similar assessment is carried out according to indicators on these criteria. In figure 5 below shows value of each criterion that has been inputted and normalized according to the behaviour indicators for each criterion,

| Character | Score |
|---|---|
| Religious | 9 |
| Nationalist | 5.25 |
| Independent | 9 |
| Mutual cooperation | 8 |
| Integrity | 6.418 |

**FIGURE 5.** Result Report

In Figure 5, It explained that results of all criteria, namely religious, nationalist, independent, mutual cooperation and integrity which are obtained by adding up the behavioural indicator values of each criterion.

In Figure 6 below, it is explained how the achievement of a student has been assessed from behaviour indicators carried out every day. These results can be used as a reference and support for teacher decisions to make advice in acting in the classroom.

| Achievement Category | Explanation |
|---|---|
| Need Guidance | Students have not displayed the behavior stated in the behavior rubric. |
| Start Growing | Students display the behavior stated in the behavioral rubric but not yet consistent. |
| growing | Students begin to consistently display the behavior stated in the behavioral rubric. |
| Cultivate | Students always consistently display the behavior stated in the behavioral rubric. |

**FIGURE 6.** Achievements Category Results

In Figure 6, it is explained that conclusions from the achievements of each student, this system will explain the achievement categories starting from the need Guidance, start growing, growing and cultivar categories as well as an explanation of each category for the character development of students.

## CONCLUSION

Based on this study, it was found that an accountable character assessment needs to be carried out to support the Strengthening Character Education program. Character assessment can be done by observing student behaviour. This Character Assessment can be done using an observation instrument (observation) and will be more accurate if done by the closest person. The results of this study are proven to help and facilitate teachers in assessing the character of students, besides that this DSS also opens access for principals and parents of students to see how the character of students is, so that results of the assessment of the system can be a recommendation for principals and teachers in making policies related with character building. The results of this system assessment can also be a recommendation for parents to carry out their role in building children's character at home.

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