Proposed Education Quality Improvement Using the Analytical Hierarchy Process (AHP) and the Poka-yoke Method at SDS Kartini (Case Study: Grade I and Grade II)

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ABSTRACT

Since everything in this world is mortal and ultimately ends, life here is valuable for making a positive contribution. Early in life, one must obtain an educational or learning process to contribute positively. SDS Kartini is a service industrial institution in the basic education field, which consists of six levels or grades. However, in the implementation, the development of students in grades I and II at SDS Kartini is still less than optimal. Next, since human resources are mostly involved in the learning process performances, the poka yoke method is used to prepare the improvement solution. Then, at the procedure of the poka yoke method, there is a stage for choosing the best solution. The analytical hierarchy process (AHP) method can be applied to determine the best solution. Based on the opinions of several education practitioners (class teacher, Chairman of Foundation, and school accreditation assessor) and the calculations using the analytical hierarchy process (AHP) method, the best solution obtained is that the teacher must establish good relationships with the parents or guardians of the students. To reach that goal, a standard operating procedure (SOP) or workflow focused on optimizing attendance records has been proposed. That proposed solution is named "HADIR", where "HADIR" stands for harmonization, assistance, declaration, inspection, and repetition.

DOI: https://doi.org/10.24002/ijieem.v6i2.9445

Keywords: analytical hierarchy process (AHP), poka-yoke, quality of education

Research Type: Case Study

Article History: Received June 26, 2024; Revised July 28, 2024; Accepted August 8, 2024

How to cite: Wijaya, F., & Abidin. (2024). Proposed education quality improvement using the analytical hierarchy process (AHP) and the poka-yoke method at SDS Kartini (Case study: Grade I and grade II). *International Journal of Industrial Engineering and Engineering Management, 6*(2), 63-74.

1. INTRODUCTION

Everything in this world is mortal and must end. Therefore, human life is a precious thing. In filling this precious life, humans are expected to become people who contribute positively to their surroundings. This can be achieved through education or the learning process. Education is a provision to meet the future well. Education given to children (future heirs) is something of value for all parties. If the current generation educates children well, then a valuable life will continue to develop in the future. Education for children starts from the family environment. Then, education takes place in a school environment with the aim that children can develop and progress in a dynamically changing world.

The education received by students since the basic education level will make students have a solid foundation to undergo education at a higher level, as well as to live life in society. SDS Kartini is one of the industrial institutions engaged in services in the field of education, SDS Kartini acts as a basic education unit consisting of six levels or grades. However, in practice, the ability of students who take part in the teaching and learning process in elementary level grades (grade I and grade II) SDS Kartini is still not able to develop optimally.

Therefore, an improvement solution is needed that can overcome the problem of the quality of education at SDS Kartini. Then, because most of the continuity of the preparation education process involves human resources, the preparation of improvement solutions is carried out using the poka-yoke method. According to Bella et al. (2020), the poka yoke method helps in the development of repair solutions that can be integrated with the ongoing process, to prevent negligence caused by human factors. At the stage of the poka yoke method used, there is one stage of selecting the best solution. To choose the best solution, the analytical hierarchy process (AHP) method is used. According to Vivia and Dino (2019), the analytical hierarchy process (AHP) method selects the best solution by comparing the level of importance of each criterion and alternative, to produce the best solution that is most objective and relevant to the problems at hand.

2. LITERATURE REVIEW

The following is the review of the literature for the present work. Moreover, the relevant literature is reviewed under three categories, namely the quality of education, implementation of analytical hierarchy process in the decision-making process, and implementation of poka yoke in quality assurance within the industry. The following are the details of every aspect of the review:

2.1. Quality of education

In research conducted by Fenty (2020), schools must make efforts to continuously improve quality by implementing superior school programs. This is intended to improve students' academic and non-academic abilities.

Apart from that, according to research conducted by Jing (2018); Oom and Suryawahyuni (2021); Said *et al*. (2018); and also Shaikha and Hafiz (2019), the quality of education must be directly proportional to the capacity of human resources, facilities, and infrastructures that support the learning process in the school environment, as well as the support of various parties for students.

According to Lurita (2020), achieving quality education includes the objectives of the learning process experienced obstacles during the COVID-19 pandemic. But with the help of the YouTube media, then quality education can be achieved during the COVID-19 pandemic. This is because YouTube media has the benefit of being a means of delivering lesson material and assignments for teachers, a means of collecting assignments for students, as well as a means of supervision for parents or guardians of students.

Apart from that, according to Nadia *et al*. (2021), the quality of learning is expressed by the discipline carried out by students, which can be seen from their disciplined attitude in studying, obeying regulations, punctuality, and in terms of how students dress.

2.2. Implementation of analytical hierarchy process in the decision-making process

According to Saaty in Addien *et al*. (2019), analytical hierarchy process (AHP) is used to choose the best decision in various decision-making processes through simplified multi-criteria problems to a simple hierarchy.

In research conducted by Abidin (2021); Addien *et al*. (2019); Helen (2021); and also Vivia and Dino (2019), analytical hierarchy process (AHP) works by comparing each existing criterion and alternative. Therefore, logical and systematic calculations can be carried out to obtain decisions that are in accordance with the criteria and are objective.

Specifically, the analytical hierarchy process (AHP) has also been applied to improve the quality of education. According to research conducted by Ahmad and Qahmash (2020); Barcelona (2020); Fahim *et al*. (2021); Ponsiglione *et al*. (2022); Ramaditya *et al*. (2021); Wang *et al*. (2021); and also Yuan and Li (2021), analytical hierarchy process (AHP) is used to obtain objective decisions related to the factors that influence the quality of education in each research object. Where the best and most influential choice is based on calculations from factor assessments carried out by several practitioners who are directly involved with the highlighted educational research object.

2.3. Implementation of poka-yoke in quality assurance within the industry

According to Shigeo Shingo in Bella *et al*. (2020), poka yoke comes from the Japanese language, *poka* (from the *Baka* word) means a mistake, and *yoke* (*yokeru*) means to avoid. Therefore, poka yoke means avoiding the mistake. Basically, there are two approaches to the implementation of poka yoke, namely the warning approach and the supervision approach. These two approaches can be explained as follows:

2.3.1. Warning approach

Applying a warning approach to poka-yoke which was used in research conducted by Bella *et al*. (2020); Muharam and Latif (2019); Syahril et al. (2018); and also Yashini (2020), produced an improvement solution in the form of a proposal for the addition and use of sensors and alarms on production machines to automatically alert operators when machine work targets have been met. The addition of sensors and alarms can detect the occurrence of an error and provide a signal regarding the detected error. This is done to minimize and eliminate errors that may occur.

2.3.2. Supervision approach

Applying a supervision approach to poka-yoke which was used in research conducted by Ahsana *et al*. (2017); Muhammad and Noor (2018); Rio *et al*. (2019); Sasan *et al*. (2018); and also Yashini (2020), produced improvement solutions in the form of proposed additions, revisions, or preparation of components or work procedures. This is done with the principle that the components or procedures must be able to allow for no gaps for errors to occur in the ongoing process.

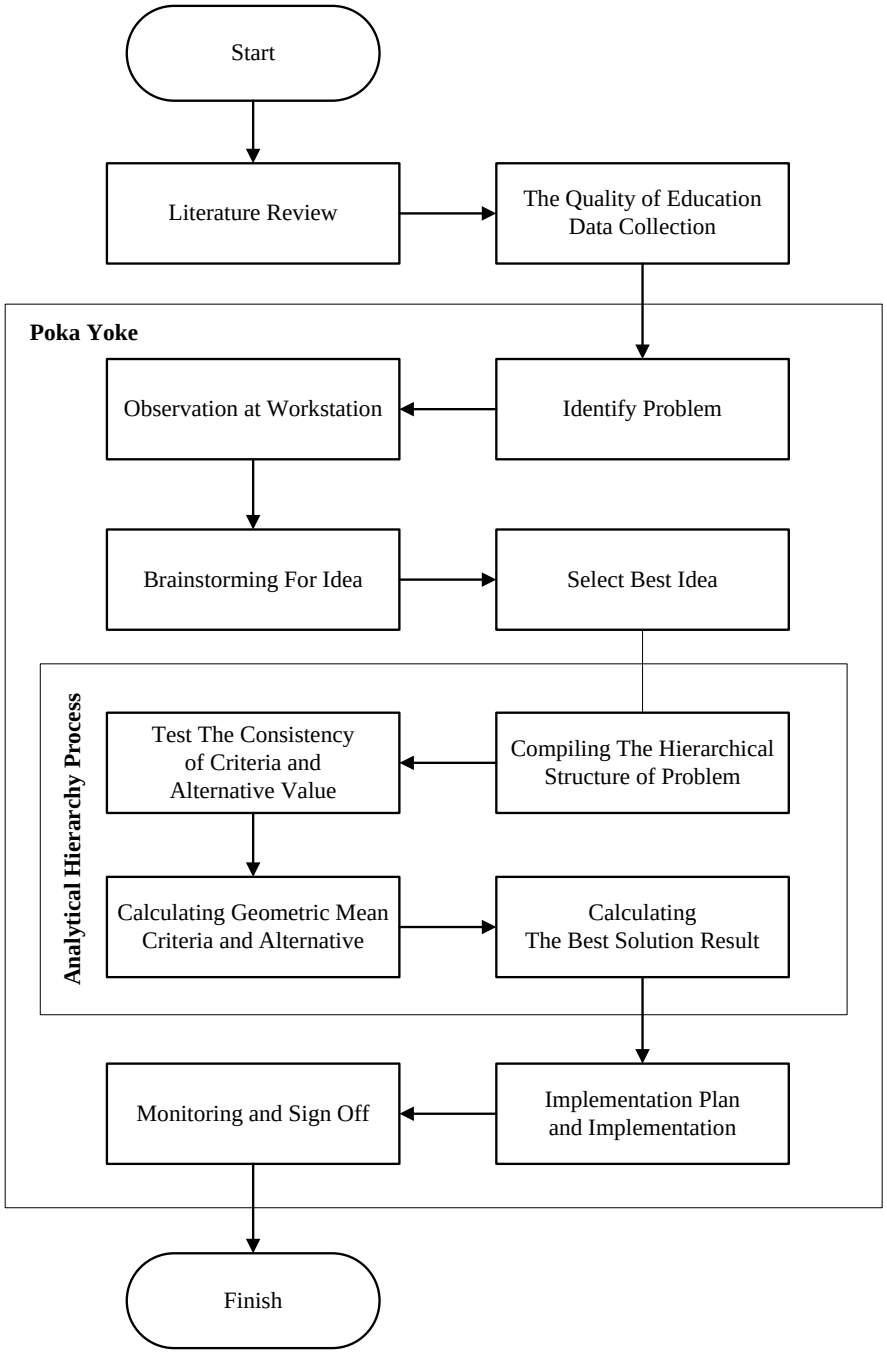


Figure 1. Research Stages Flowchart

3. METHOD

The flowchart which shows the stages in this research is shown in Figure 1. The data collection process for this research was carried out from October 25, 2021, until November 25, 2021, at SDS Kartini located at Nuri Street IV Pondok Sejahtera Number 19-20, Kutabaru, Pasar Kemis, Tangerang, Banten.

In order to be able to assess the quality of education in elementary-level grades at SDS Kartini, an assessment of the quality of education is carried out within the scope of the learning process that takes place in the classroom. The assessment is carried out using the accreditation assessment tool contained in the Guidelines for the Implementation of National Standard Schools for Elementary Schools issued by The Ministry of National Education in 2007. According to these Guidelines, to achieve maximum learning process results, there must be a learning process planning (input factor), implementation of the learning process (process factor), and assessment of the learning process (output factor) that is carried out well in an educational unit.

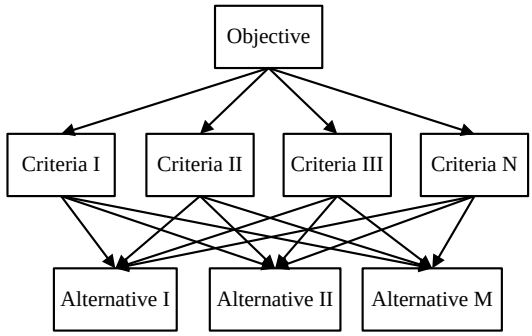
According to Kumar in Bella et al. (2020), the stages of implementing the poka yoke method in the context of quality control consist of identifying the problem, observation at the workstation, brainstorming for the idea, selecting the best idea, implementation plan and implementation, and monitoring and sign off.

At the identify problem stage, problems are identified based on an assessment of the quality of education. At the

observation workstation stage, observations are carried out to find out the causes of problems that occur.

At the brainstorming for idea stage and selecting the best idea stage, there are opinions from several practitioners in the field of education (class teachers, Chairman of Foundation, and school accreditation assessors). This is meant to be able to solve these problems objectively. The opinion-gathering process was carried out through a written questionnaire.

At the select best idea stage, one of them can use the analytical hierarchy process (AHP) method. According to Ridlan (2018), there are several stages in the implementation of the analytical hierarchy process (AHP) method, namely compiling the hierarchical structure of the problem, comparing criteria and alternatives in pairs, calculating matrix normalization, calculating priority weight, calculating maximum eigenvalue, calculating consistency index value, and calculating the value of the consistency ratio. Figure 2 below is an example of an analytical hierarchy process (AHP) hierarchical structure:



Source: Ridlan (2018)

Figure 2. Hierarchy Structure of Analytical Hierarchy Process

Pairwise comparisons are carried out using a scale of 1 to 9. The determination of the paired comparison rating scale is carried out by the decision maker with reference to the level of importance between elements with each other. Table 1 below is an example of the arrangement of elements in the pairwise comparison process carried out using a matrix or table:

Table 1. Example of a Pairwise Comparison Matrix

	A_1	A_2	A_3
A_1	1		
A_2		1	
A_3			1

Source: Helen (2021)

Normalization of the matrix is done by grouping each element with logical rules. Then, normalization of the matrix is achieved by doing:

a) Adding the values of each column in the comparison matrix, namely by the formula (Ridlan, 2018):

$$n = \sum_{i=0}^{z} x_j \quad (1)$$

where:
n = The sum of each column
z = Number of elements
x = Fixed value of the cell
j = 1, 2, 3, …, z

b) Divide the value in the column contained in the comparison matrix by the number of values from the column in question, namely by the formula (Ridlan, 2018):

$$m = \frac{x_{ij}}{n} \quad (2)$$

where:
m = Result of normalization
x_{ij} = Fixed value of the cell
n = Result of the sum of each column

The priority weight is calculated by adding up each value from the row contained in the comparison matrix and dividing the result of the sum by the number of rows concerned, namely by the formula (Ridlan, 2018):

$$PW = \frac{\sum_{i=1}^{n} x_{ij}}{n} \quad (3)$$

where:
PW = Average result or Priority Weight
j = 1, 2, 3, …, n
x_{ij} = Fixed value of the cell
n = Number of elements

The maximum eigenvalue is calculated by multiplying the matrix of the level of importance assessment with the priority weight of the criteria, then dividing the sum of the results of each row with the respective alternative priority weights. The result of the division is the eigenvalue of each row concerned eigenvalue, the eigenvalue of each row must be divided by the number of elements, with the formula (Ridlan, 2018):

$$\lambda_{max} = \frac{\sum \lambda}{n} \quad (4)$$

where:
λ_{max} = Maximum eigenvalue
λ = Eigenvalue of each row
n = Number of elements

The consistency index value is calculated by the formula (Ridlan, 2018):

$$CI = \frac{\lambda_{max} - n}{n-1} \quad (5)$$

where:
CI = Consistency Index
λ_{max} = Maximum eigenvalue
n = Number of elements

The consistency ratio value is calculated by the formula (Ridlan, 2018):

$$CR = \frac{CI}{RI} \quad (6)$$

where:
CR = Consistency Ratio
CI = Consistency Index
RI = Random Index

If the CR value > 0.1 then the data assessment is not consistent and should be improved. If the CR value ≤ 0.1, the assessment is consistent with one criterion or the respondent's main choice. Table 2 shows the random index value of each comparison matrix size.

After the calculation results from the importance level assessment show consistent results, the ranking of each alternative can be done by multiplying the weight of each criterion by the weight of each alternative, then adding up the multiplication results of each alternative separately. However, in certain circumstances, the ranking of each alternative is done by calculating the geometric mean first.

Table 2. Random Index Value

Matrix Size (n)	RI Value	Matrix Size (n)	RI Value
1 and 2	0	9	1.45
3	0.58	10	1.49
4	0.90	11	1.51
5	1.12	12	1.48
6	1.24	13	1.56
7	1.32	14	1.57
8	1.41	15	1.59

Table 3. Completeness Score of The Supporting Factors for Education Quality in Elementary Level Grades at SDS Kartini

No.	Supporting Factors for Education Quality		Score
1.	Input factor		83
a.	Subjects	87	
b.	Students	91	
c.	Teacher	89	
d.	Facilities and infrastructures	63	
2.	Process factor		66
a.	There is a life skills integration program	75	
b.	There is an active, creative, effective, and fun learning atmosphere	57	
3.	Output factor		76
a.	Affective aspect (attitude)	67	
b.	Cognitive aspect (knowledge)	73	
c.	Psychomotor aspect (skills)	87	
	Total Score		225
	Final Score		75

According to Hapsari in Helen (2021), the calculation of geometric mean is needed to support the analytical hierarchy process (AHP) to be able to smooth out the answers to the questionnaire results from more than one respondent. The calculation of the geometric mean is carried out by the formula (Ridlan, 2018):

$$GM = \sqrt[n]{X_1 + X_2 + X_3 + \cdots + X_n} \quad (7)$$

where:

GM = Geometric Mean

X_1,..., X_n = Weight of 1st, ..., n

n = Number of n (order)

Finally, at the implementation plan and implementation stage and also the monitoring and sign-off stage, a solution is designed by using the principle of the poka-yoke method, which works by maximizing the existence of the basic determinants of the teaching and learning process.

4. RESULTS AND DISCUSSIONS

The results of the assessment or score of the completeness of the supporting factors for the quality of education in the elementary level grades of SDS Kartini as measured by the Guidelines for the Implementation of National Standard Schools for Elementary Schools shown in Table 3.

The final score for the quality of education at SDS Kartini elementary level grades is 75. This score indicates that the quality of education in SDS Kartini is still not good. This is because a score of 75 is a score that is below the B accreditation score threshold (score between 81 to 90) as the level of accreditation that has been obtained by SDS Kartini.

The following are the stages of the poka-yoke method used in order to overcome the quality problems of education in elementary-level grades at SDS Kartini.

4.1. Identify problem

Based on the data that has been obtained from observations and interviews, it can be seen that the process of providing education in elementary-level grades at SDS Kartini is still lacking in quality. This is because several things still do not meet national education standards, namely:

a. Inadequate learning facilities.
b. Poor health protocol implementation.
c. Incomplete student learning materials.
d. Less maximum student development.

4.2. Observation at workstation

Based on observations made in the process of providing education at SDS Kartini, it can be seen the cause of each problem in the quality of education in elementary level grades at SDS Kartini. The following are the explanations of the causes of each education quality problem in SDS Kartini elementary level grades:

a. Inadequate learning facilities

   The problem of inadequate learning facilities in elementary level grades at SDS Kartini can be caused

by various human resource factors, namely foundation school, and teacher.

In practice, there are still several learning facilities that have not been provided or have not been repaired by the foundation and school. This is because the foundation and the school do not carry out a direct independent evaluation of the school's condition. Then, the foundation and the school also reduce operational costs, so that the school uses several learning facilities that have existed since the past.

Also, there are still shortcomings in the provision of learning facilities by teachers. The learning facility is in the form of a learning implementation plan as a reference for learning activities at each class meeting. This is because the teacher's perception of the class that will be guided is the same as the class that the teacher has guided in the past. Then, the school also does not make regulations that require teachers to make a learning implementation plan.

Then, the foundation and school also lack coordination with teachers regarding evaluating the state of the learning facilities.

b. Poor health protocol implementation

The problem of poor health protocol implementation in elementary-level grades at SDS Kartini is caused by various human resource factors, namely the foundation and school, teachers, and parents or guardians of students.

Foundation and school do not play their role in making regulations that emphasize strict implementation of health protocols in the school environment. On the other hand, the foundation and school have provided hand-washing facilities in the school area.

Teacher are not carrying out their role to educate and guide students in implementing health protocols. This is because foundations and schools do not require strict implementation of health protocols in the school environment. Apart from that, teachers also still have a perception that they are less aware of the COVID-19 pandemic. Then, teachers also lack coordination with parents or guardians of students regarding the implementation of health protocols. In this case, teachers do not remind parents or guardians of students to equip students with masks through the class WhatsApp group.

Parents or guardians of students play a role in educating and facilitating students to implement health protocols. However, there are still some students who do not wear masks at school. This is because parents or guardians of students still have a perception that they are less aware of the COVID-19 pandemic.

c. Incomplete student learning materials

The problem of incomplete student learning materials at SDS Kartini can be caused by various human resources factors, namely, parents or guardians of students, and students.

Parents or guardians of students play a role in providing materials to support the learning process that students must bring. However, there are still some students who do not bring complete materials to support the learning process. This is because people or guardians lack sensitivity to the completeness of the learning materials required by students. The lack of sensitivity of parents or guardians of students is caused by the attention of parents or guardians being directed to several matters relating to students' needs outside of educational needs.

Students have a role in communicating with parents or guardians about learning material needs, as well as various problems they face. This is aimed at training students' attitudes of independence and responsibility. However, in practice, there are still some students who do not bring complete learning materials. This is caused by the nature of students forgetting to inform parents or guardians about the condition of learning materials. The condition of the learning materials includes learning materials that must be brought, those that must be maintained, or those that must be replaced with new ones. Basically, students' memory abilities are still in very good condition. However, when meeting with parents or guardians at home, sometimes students are paying attention to other things outside of school activities. In addition, because parents or guardians do not ask students about school activities, students forget to inform their parents or guardians about their learning material needs.

d. Less maximum student development

The problem of student development that is less than optimal in the elementary level grades of SDS Kartini is caused by various factors, namely human resource factors (teacher and parents or guardians of students), and methods.

Teachers have a role to educate and guide students during the learning process in class. The presence of a teacher in the classroom will make the learning process run well because the teacher understands the circumstances and abilities of each student. However, if the teacher is not present because the teacher's health is not good, then the teacher's role is temporarily replaced by a teacher who is also responsible for guiding other classes. Apart from that, teachers still lack creativity in teaching. This can be seen when the teacher always guides the class in the same way, and the teacher does not use props in teaching.

Then, teachers are still not used to implementing good character in students. Then, teachers also still have shortcomings in carrying out the learning evaluation process objectively. This can be seen from the assessment mechanisms that have been used by teachers. Teachers provide assessments that are even and/or teachers only provide initials on the results of students' work. Then, teachers also still have shortcomings in supervising students during the learning process.

Apart from that, teachers also still have shortcomings in terms of varying artistic activities. The only art activities carried out are drawing activities, although there are still many other art activities that are suitable for elementary-level students to carry out.

Parents or guardians of students also play an important role in guiding students while at home. However, some students still lack the attitudes, knowledge, and skills appropriate to the student's age. This is because

parents or guardians of students still do not guide students while at home.

Methods or procedures in the teaching and learning process in elementary-level grades at SDS Kartini still need to be improved. This is intended so that students can understand and apply the lesson material so that students' abilities can develop. Character education methods for students are still not optimal. Even though character education has been taught by teachers, there are still gaps for students not to apply character education. In this case, teachers do not maximize the use of existing infrastructures to develop students' character optimally.

Then, the learning method used also still has shortcomings in terms of making the learning process focused. The learning methods used by teachers also still have shortcomings in terms of supervising students. This supervision is carried out especially when teachers provide training to students. The lack of supervision from teachers is caused by the inequality of abilities between students. In this case, some students have and have not mastered basic literacy and/or numeracy skills. So, during class hours, the teacher must guide students who have not yet mastered basic literacy and/or numeracy skills. The lack of supervision from teachers is also caused by teachers giving leeway to students on Thursdays. This is because the subjects studied that day prioritize physical skills (not too burdensome on the mind).

4.3. Brainstorming for idea

Every problem that occurs must be overcome. However, problems regarding learning facilities, the application of health protocols, and also the student learning materials, will ultimately lead to the development of students. Where this is the result of the learning process that takes place in the classroom. In addition, the development of students is also one of the goals of the Indonesian state. This is contained in the fourth paragraph of the opening of the 1945 Constitution. In addition, the development of students is also a national goal of education. This is contained in Article 3 of Law No. 20 of 2003.

So, the priority of education quality problems that must be overcome are problems regarding the development of students who are less than optimal. Then, to be able to solve these problems objectively, opinions from several practitioners in the field of education (class teacher, Chairman of Foundation, and school accreditation assessors) are needed. The opinion-gathering process was carried out through a written questionnaire. The following are the opinions of solutions that have been given by several practitioners in the field of education:

a. Teachers must carry out preparation of lesson plans (RPP).
b. Teachers must attend training. This alternative solution also includes a visit to another school solution which is one of the solutions provided by the teachers.
c. Teachers have to read a lot.
d. Teacher must establish good relationships with parents or guardians of students.
e. It is necessary to have complete facilities and infrastructures.

4.4. Select the best idea

Due to limited resources in implementing each proposed improvement solution simultaneously, it is necessary to select the best solution. The selection of the best solution logically and systematically is carried out using the analytical hierarchy process (AHP) method which is sourced from the opinions of several practitioners in the field of education (class teacher, Chairman of Foundation, and school accreditation assessors). Figure 3 shows the hierarchical structure for selecting the best solution to maximize the development of students in elementary-level grades at SDS Kartini.

The consistency test was carried out based on assessments carried out by several practitioner respondents in the education sector through questionnaires. The table of calculation results for the consistency test of criteria values sourced from the opinion of class teacher respondents is shown in Table 4.

Next, the results of the alternative value consistency test based on creativity criteria sourced from the opinion of class teacher respondents produced a CR value of 0.0002. For the consistency test results, alternative values based on learning intensity criteria sourced from the opinion of class teacher respondents produced a CR value of 0.096. Then, the CR value obtained from the results of the alternative value consistency test based on cost criteria sourced from the opinion of class teacher respondents is 0.

Meanwhile, for the consistency test results, the criteria values sourced from the opinion of the school accreditation assessor respondent produced a CR value of 0.047. For consistency test results, alternative values based on creativity criteria sourced from the opinion of the school accreditation assessor produce a CR value of 0. Then, the CR value obtained from the alternative value consistency test based on learning intensity sourced from the opinion of the school accreditation assessor is 0.045. Next, the results of the alternative value consistency test based on cost criteria sourced from the opinion of the school accreditation assessor produced a CR value of 0.076.

Next, for the consistency test results, the criteria values sourced from the opinion of the Chairman of the Foundation obtained a CR value of 0.047. Then, the CR value obtained from the alternative value consistency test based on creativity criteria sourced from the opinion of the Chairman of the Foundation is 0.0002. Then, the results of the alternative value consistency test based on learning intensity criteria sourced from the opinion of the Chairman of the Foundation respondent produced a CR value of 0.0002. Next, the CR value obtained from the alternative value consistency test based on cost criteria sourced from the opinion of the Chairman of the Foundation is 0.

Because the results of the calculation of the consistency test on the criteria and alternative values

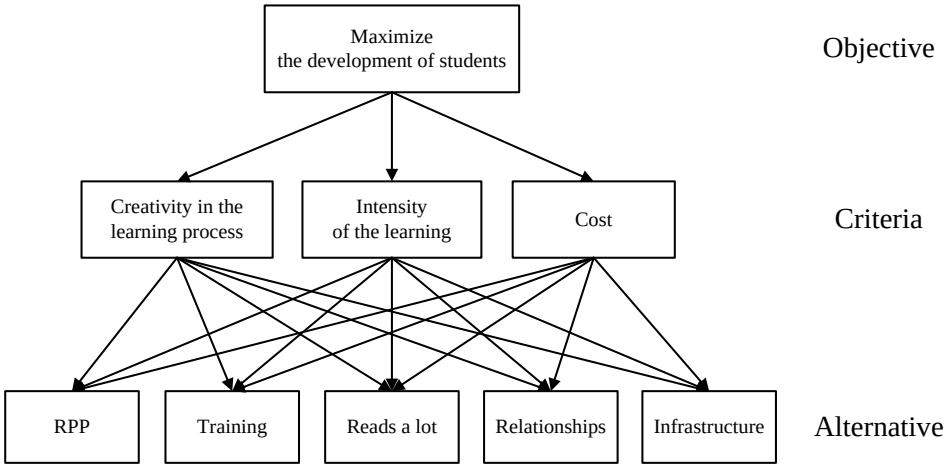


Figure 3. Hierarchy Structure of Select Best Idea

Table 4. Criteria Value Consistency Test (Class Teacher Respondent)

Criteria	Creativity	Intensity	Cost	Priority Weight	Eigen Value
Creativity	1	1	8	0.471	3.002
Intensity	1	1	8	0.471	3.002
Cost	0.125	0.125	1	0.059	3
Total	2.125	2.125	17		9.004
λ_{max}					3.001
CI (Consistency Index)					0.0005
RI (Random Index)					0.58
CR (Consistency Ratio)					0.001

provided by each practitioner respondents in the field of education produced a CR value ≤ 0.1, it can be concluded that the assessment carried out was consistent with one main criterion chosen by each practitioner respondents in the field of education.

After that, to obtain an average value from the consistent assessments given by each respondent, the geometric mean was calculated. Then, the results of the geometric mean value are used to obtain the overall priority weight in calculating the best solution results. Table 5 shows the results of calculating the best solution based on calculations carried out on the importance level assessment sourced from several practitioners in the field of education.

Because the best solution is chosen based on the order of the highest priority weights, so, the solution regarding teachers must establish a good relationship with parents or guardians of students is the best solution chosen.

4.5. Implementation plan and implementation

By using the poka yoke method, solutions designed to help teachers establish good relationships with parents or guardians of students must be able to maximize the existence of the basic factors that determine the teaching and learning process. The results of student work and attendance records are media that interact with the ongoing learning process. Therefore, the proposed improvement plan will be based on optimizing attendance records. The attendance record must be filled in based on the interactions made by the teacher with the parents or guardians of the students regarding the development of the students. The proposed format for student development evaluation that can be used as a medium for interaction between teachers and parents or guardians of students is shown in Figure 4.

Standard operating procedures (SOP) or the flow of proposed improvements based on the attendance record optimization named “HADIR”. “HADIR” stands for harmonization, assistance, declaration, inspection, and repetition. The following is the explanation of each "HADIR" line:

a. Harmonization

   Is the stage of increasing the ability of students to become more developed (achieve a good or harmonious state). At this stage, the teacher guides students in understanding the subject matter by explaining the subject matter or providing exercises. Then, the teacher makes and fills out the student development evaluation format on the final sheet of student work for each subject. The proposed format for student development evaluation is shown in Figure 4.

b. Assistance

   Is a stage of student guidance carried out by parents or guardians of students at home. Then, after the guidance carried out by the parents or guardians has been completed, the parents or guardians of the students can fill out the student development evaluation format as shown in Figure 4. After that, the parents or guardians of students can send photo evidence of the student development evaluation

Table 5. The Best Result of Solution

Alternative Criteria	Creativity (0.502)	Intensity (0.37)	Cost (0.127)	Priority Weight
RPP	0.233	0.296	0.372	0.274
Training	0.235	0.262	0.511	0.28
Reads a lot	0.474	0.248	0.331	0.372
Relationships	0.489	0.563	0.159	0.473
Infrastructures	0.235	0.298	0.295	0.265

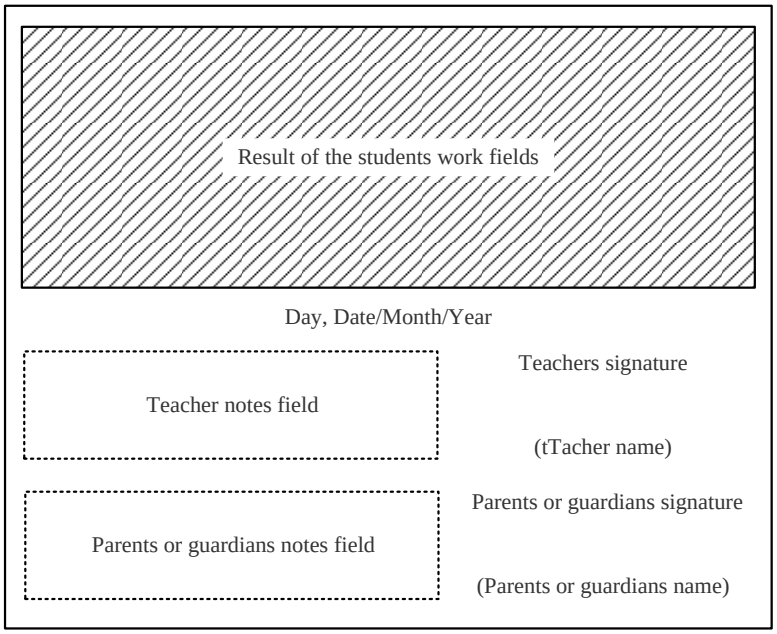


Figure 4. Proposed Student Development Evaluation Format

format which has been filled in by the teacher through the class WhatsApp group.

c. Declaration

This is the stage of determining student attendance information. Determination of attendance information is done to determine attendance information on the previous day. This stage is carried out before the class starts, where the teacher checks the photo evidence of the student development evaluation format that has been filled out and sent by the parents or guardians of the students in the class WhatsApp group. If photo evidence is available, students will receive attendance information present.

d. Inspection

Is an inspection stage carried out by the foundation and school related to the daily performances of teacher. One of these stages is done by checking the attendance record book that has been filled out by the teacher on the current day.

e. Repetition

Is the stage of repeating the process of evaluating student development every day. The repetition of each stage carried out is oriented to increasing the development of students as well as to the "HADIR" flow to become more effective and efficient. Therefore, if some obstacles or things must be corrected in the "HADIR" flow, the teacher also foundation, and the school can coordinate to fix that. Figure 5 shows the proposed format for the “HADIR” flow evaluation sheet. In the designed “HADIR” flow, there is the possibility of things outside of planning, namely:

1) Students cannot attend school due to illness or permission (by attaching supporting documents). If this happens, then the parents or guardians of the students are not required to fill out the student development evaluation form. Then, the student concerned will get a sick absence statement or permission.
2) Teacher cannot attend school due to illness or permission (by attaching supporting documents). If this happens, then the teaching and learning process and filling out the student development evaluation form are carried out by other teachers who are also responsible for guiding other grades.

After planning the implementation of the proposed improvement solution, the implementation phase of the proposed improvement solution should be carried out. However, due to limited available resources, the prepared improvement solution is only a proposal.

4.6. Monitoring and sign-off

By using the poka yoke method, solutions are designed by maximizing the existence of the basic determinants of the teaching and learning process. This is done to reduce or even eliminate the problems that occur. In terms of supervising the "HADIR" flow, the basic

SDS KARTINI	"HADIR" FLOW EVALUATION				
	Code:				
No.	Problem Date	Problem or Things to Improve	Cause	Improvement Solution	Improvement Date

Figure 5. Proposed "HADIR" Flow Evaluation Format

SDS KARTINI	INCOMPLETE RECORD OF STUDENT DEVELOPMENT EVALUATION FORMAT				
Grade:			Code:		
No.	Date	Students Name	Subjects	Action	
				Contact	Attendance

Figure 6. Proposed Incomplete Record of Student Development Evaluation Format

SDS KARTINI	TEACHER PERFORMANCES COMPLAINT SHEET			
Students Name:		Grade:	Student Parent or Guardian Name:	Code:
No.	Deviation Date	Record No.	Subjects	Subjects Description

Figure 7. Proposed Teacher Performances Complaint Sheet Format

determining factor that plays a role in funding for the ongoing learning process operations. The following are the roles of supervision carried out by each party involved in the learning process in elementary-level grades at SDS Kartini:

a. Foundation and school carry out supervision by:
   1) Reviewing and recording daily performance reports of teachers including checking attendance records made by teachers.
   2) Remind the teacher to make the student development evaluation format.
   3) Providing teacher salaries based on teacher performance.
b. Teacher carries out supervision by:
   1) Send reminder messages to parents or guardians of students to fill out the evaluation form for student progress through the class WhatsApp group.
   2) Record the name of the student on the incomplete record of student development evaluation format, if:
      - The student does not go to school without information (inattentive).
      - Parents or guardians of students have not filled out the student development evaluation form.
      - Parents or guardians of students only fill out the student development evaluation form for one subject on a day when there is more than one subject.

   Then, the teacher reminds the parents or guardians of the students concerned through the class WhatsApp group to guide students at home. The proposed format for the incomplete evaluation of student development evaluation format which was made and filled out by the teacher shown in Figure 6.
c. Parents or guardians carry out supervision by:
   1) Reviewing the performances of teachers through the student development evaluation format which is made and filled out by a teacher.
   2) Submit a complaint to the foundation and school if the teacher does not make the student development evaluation format at a certain time. Submission of complaints must be made by attaching evidence in the form of photos of student worksheets where there is no student development evaluation format. Each valid complaint will receive a tuition discount in accordance with the percentage of incompleteness of the student development evaluation format. The proposed format for the teacher performance complaint sheet is shown in Figure 7.

5. CONCLUSION

Based on the measurements, analysis, and design that have been carried out, it can be concluded several things, namely:

a. Based on the measurements made using national education standards, the final score of education quality at elementary level grades of SDS Kartini is 75. This score indicates that the quality of education in SDS is still not good. This is because a score of 75 is a score that is below the B accreditation score threshold (score between 81 to 90) as the level of accreditation that has been obtained by SDS Kartini.
b. Based on the calculations made, the best solution chosen is that the teacher must establish good relationships with the parents or guardians of students.
c. The proposed solution is oriented towards optimizing attendance records. The proposed solution is named "HADIR". "HADIR" stands for harmonization, assistance, declaration, inspection, and repetition.

ACKNOWLEDGEMENT

The authors would like to thank God Almighty (The Creator and Owner of everything) and also thank everyone who has provided support for the research carried out.

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