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Application of SMART Method and Dashboard Visualization for Student Code of Conduct Violations

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Abstract

In order to handle student discipline infractions at school, this project intends to design a decision support system (DSS) based on the Simple Multi-Attribute Rating Technique (SMART) technique integrated with a graphical dashboard. A variety of visual tools, such as scatter plots, heatmaps, pie charts, bar charts, and line charts, are used to evaluate and display violation data. This integration's primary goals are to make monitoring and analysis faster and more efficient and to support decision-making with regard to student infractions. The findings demonstrate how the SMART approach and visualization dashboard can be used to manage violation data more effectively, provide a better knowledge, and speed up reactions to infractions. This technique makes it easier for schools to spot trends in infractions, choose the best course of action for corrective measures, and enhance overall student discipline. It is anticipated that this system will enable discipline management in a learning environment in an efficient manner.

Keywords: *decision support system (DSS), smart, visualization dashboard, code of conduct violations, discipline management.*

1 Introduction

School is a place that greatly influences students' daily lives. The level of student discipline is set by the school. Discipline is one aspect of character that needs to be strengthened. Creating other character values is very important. Due to the deviant behavior that often occurs and contradicts the standards of discipline, strengthening the character value of discipline is very important . In an effort to strengthen the character value of discipline, the school sets rules that must be obeyed by all members of the school community. This aims to teach students to get used to being disciplined [1]. Enforcement of student discipline is important for schools to create a conducive learning environment. However, in practice, the implementation of student discipline in schools often faces challenges. One of the most common challenges is the difficulty in documenting violations. [2], categorizing violations and difficulties in dealing with such violations.

During the process of documenting violations, obstacles often arise from non-integrated systems, unclear documentation formats, and a shortage of skilled personnel for proper documentation. Meanwhile, categorizing violations also has its own obstacles, such as the lack of standardization of the categorization of violations and the lack of common perception of violations of the rules. Lack of clear SOPs presents obstacles in managing violations. Established guidelines for violations simplify the monitoring process [3]. In addition, other obstacles in managing violations are the lack of understanding of violations of the rules, and the lack of coordination between related parties such as teachers, students and parents. In dealing with this problem, there needs to be a useful strategy to handle and deal with student discipline violations

Simple multi attribute scoring method, also known as SMART, is based on the idea that every decision consists of a set of criteria, each of which is assigned a value that indicates how important each criterion is compared to the others [4]. The SMART method can be used in a decision support system to evaluate student rule violations. In addition, in accordance with applicable school regulations, they are expected to provide advice and input regarding sanctions for students who violate the rules [5].

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Advancements in technology have significantly enhanced methods that utilize dashboard visualization [6]. This includes Decision Support Systems (DSS) to improve the decision-making process, decision support systems (DSS) and visualization dashboards work well together because they have complementary functions, which include better understanding, the ability to make decisions faster, identification of problems and opportunities, monitoring and evaluation, and decision contextualization. Therefore, the SMART visualization dashboard is essential for managing student misconduct in schools.

The purpose of this research is to develop a Decision Support System (DSS) using the SMART method integrated with a visualization dashboard to effectively manage student discipline violations. This system will assist in categorizing violations, determining appropriate sanctions, and improving the monitoring process. Using a system development approach, data will be collected through observations and interviews with school staff, while the SMART method will be applied within the DSS framework. This research is expected to be an effective tool to manage discipline, increase transparency, and foster a conducive learning environment in the school environment.

2. Literature Review

Decision Support Systems (DSS) have grown rapidly in recent years, especially in data-driven decision making. DSS plays an important role in helping organizations make complex, multi-criteria decisions, including in education, as highlighted in previous studies [7]. Another study demonstrates that the application of web-based DSS in student evaluation can increase efficiency in achievement assessment [8]. This is relevant to this study which utilizes DSS to manage student disciplinary violations, but the main difference is the focus of this study which emphasizes more on the integration of DSS with a visualization dashboard for the management of disciplinary violations.

The SMART method allows for fairer assessments based on multiple criteria, such as those applied to supplier selection, as emphasized in previous research [9]. In the context of education, [10]howed that the SMART method is effective in evaluating student discipline by considering various factors. This research focuses on the application of SMART for student discipline sanction management, which has not been widely discussed in the previous literature.

Dashboard visualization plays an important role in facilitating real-time data analysis. Visualization dashboards enable quick decision-making based on continuously updated data throughput, as emphasized in previous research [11]. Dashboard visualization plays an important role in facilitating real-time data analysis. Visualization dashboards enable quick decision-making based on continuously updated data throughput, as emphasized in previous research [12]. Visualization dashboards not only provide immediate insights into data, but also allow schools to monitor student performance more efficiently. Additionally, an effective discipline policy can encourage positive student behavior and create a more conducive learning environment, as supported by previous research [13]

This research offers a new approach by combining DSS, SMART method, and visualization dashboard for student discipline violation management [14]. This approach utilizes real-time data to support faster and more accurate decision making, an approach that has not been widely applied in the context of discipline management in schools. Theemphasis on using technology for student discipline evaluation through visualization dashboards also makes a significant new contribution.

3. Research Method

This research focuses on implementing the Simple Multi-Attribute Rating Technique (SMART) to evaluate student discipline violations based on various criteria. The SMART method is used to assign weighted scores to each violation, allowing for a structured approach in managing disciplinary actions. To enhance the analysis and decision-making process, a dashboard visualization is employed, offering real-time insights into the data through visual tools such as pie charts, bar charts, and line graphs. This approach ensures that the monitoring of violations is more efficient and can assist in making informed decisions regarding student discipline.

3.1 SMART

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Multi Criteria Decision Making (MCDM) is divided into two categories: Multiple Objective Decision Making (MODM) and Multiple Attribute Decision Making (MADM). MCDM aims to determine the best choice from various options based on multiple criteria.

Simplified Multi-Attribute Assessment Technique (SMART) is one way to make multi-attribute decisions (MADM). The SMART methodology is based on an additive liner model, according to [15] this means that the total value of each criterion, or attribute, multiplied by the weight of the criterion, will result in the total value of the available alternatives. The model used in SMART is expressed through the Equation 1:

$$U(a_i) = \sum_{j=1}^{m} W_j u_i(a_i) \quad (1)$$

Where *U(ai)* is the total alternative value, Wj is the result of normalizing the criteria weights, and Ui(ai) is the result of determining the utility value.

Here is the flow of the smart method:

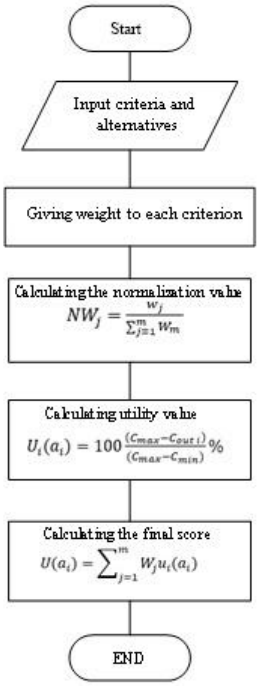

Figure 1. Smart method flow [17]

The SMART method flow (Figure 1) begins with a step-by-step approach to evaluate various alternatives based on several criteria. The main steps involved in the SMART method are as follows:

1. Identifying Criteria: First, the relevant criteria for decision-making are determined. For example, in this case, criteria could include attendance, behavior, uniform compliance, etc.
2. Assigning Weights: Each criterion is then assigned a weight, indicating its relative importance. The total of all weights should sum to 100%. For instance, attendance may have a weight of 5%, while behavior could be weighted higher due to its greater significance.
3. Normalization: Next, the weights are normalized by dividing each weight by the sum of all weights. This step ensures that each criterion's weight is proportionally represented.
4. Assigning Utility Scores: For each alternative (in this case, students with disciplinary violations), a utility score is assigned to each criterion. This score reflects how well the alternative performs concerning that criterion.
5. Final Calculation and Ranking: The final score for each alternative is calculated by multiplying the normalized weight of each criterion by the utility score and summing these values across all criteria. The alternatives are then ranked based on their final scores.

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Table 1 consists of violation categories, percentage weights and weight values. violation categories are summarized in 14 types of general violations, which are further broken down as shown in Table 2.

Table 1. Offense category (criteria) and offense weight [17]

No	Violation Category	Criteria	Weight percentage	Weight (Wj)
1.	Shoe Completeness	C1	5%	0,05
2.	Uniform clothing	C2	5%	0,05
3.	Flag ceremony	C3	10%	0,1
4.	Code of Conduct for Teaching and Learning Activities	C4	5%	0,05
5.	Permissions	C5	15%	0,15
6.	Lateness	C6	5%	0,05
7.	Clineliness	C7	5%	0,05
8.	Religious activities	C8	5%	0,05
9.	Social rules of conduct	C9	20%	0,2
10.	Self-appearance	C10	5%	0,05
11.	Information and communication	C11	5%	0,05
12.	Facilities and transportation	C12	5%	0,05
13.	School environment	C13	5%	0,05
14.	Social and community relations	C14	5%	0,05
	Total		100%	1

Table 2 shows the types of violations that are the details of the 14 violations

Table 2. Violation points [17]

No	Form of Violation	Violation Category	score
1.	All students who arrive late on Monday without the permission of the duty teacher must stand and participate in the ceremony on the front field of the school..	Flag ceremony	10
2.	At flag ceremonies, do not wear a hat or tie.	Uniform clothing	5
3.	Items such as the student council logo, location, belt, and school tie are incomplete.	Uniform clothing	5
4.	Dressing is not in accordance with the school schedule.	Uniform clothing	5
5.	White must be worn by Muslimah students-not instant hijab	Uniform clothing	5
6.	Unless you are sick, you cannot wear a jacket or sweater at school.	Uniform clothing	5

 ISSN:2302-8149
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7.	Only sportswear and Malay clothes are excluded.	Uniform clothing	5
8.	Students must wear shoes that are at least 90% black and no leather shoes. In addition, sandals are not allowed; students who do so are asked to take them off and put them in the picket room	Shoe Completeness	5
9.	Shoelaces are not white or black	Shoe Completeness	5
10.	Long socks that are not white above the ankles	Shoe Completeness	5
11.	If students are late for class after the bell rings for more than ten minutes without the permission of the subject teacher, they must report to the picket line.	Code of Conduct for Teaching and Learning Activities	5
12.	Learners who leave during the KBM do not have permission from the subject teacher.	Permissions	10
13.	If a student deliberately does not follow the learning procedure in a particular subject, the student is considered to have dropped the subject.	Permissions	20
14.	Students who do not enter the class without giving an explanation are considered absent.	Permissions	10
15.	The homeroom teacher and the head of student affairs will call students who are assigned to represent the school but do not take part in activities such as ceremonies, parades, or socialization..	Permissions	10
16.	If students are late without confirmation from the homeroom teacher, they will be allowed to join the KBM after completing the duty of the picket teacher by bringing a pass. If students are late more than three times, they will be called back.	Lateness	5
17.	Throwing or leaving garbage in the wrong place.	Clineliness	5
18.	Parents or guardians of students are notified, if they smoke while wearing school uniform.	Social rules of conduct	50
19.	Engaging in brawls or fights inside and outside the school.	Social rules of conduct	100
20.	Fighting both verbally and non-physically.	Social rules of conduct	50
21.	Defame the school, teachers, and employees of SMA Negeri 2 Mandau.	Social rules of conduct	100
22.	Sharp weapons that are not related to KBM will be confiscated and cannot be returned.	Social rules of conduct	50
23.	Penetrating school boundaries for purposes that violate ethics or morality	Social rules of conduct	50
24.	Giving false testimony or lying	Social rules of conduct	50

 ISSN:2302-8149
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25.	Parents will be called if the student concerned behaves ethically and behaves badly.	Social rules of conduct	10
26.	Students who engage in blackmail, extortion, or intimidation of other students	Social rules of conduct	25
27.	Students who steal at school	Social rules of conduct	100
28.	Male student's hair that is no longer than three centimeters, two centimeters, or one centimeter will get demerit points	Self-appearance	10
29.	Re-blackening hair dyed other than black is mandatory.	Self-appearance	5
30.	Long female student's hair must be tied up or trimmed.	Self-appearance	5
31.	Nails are not long and are not polished.	Self-appearance	5
32.	At school, students may not wear wigs, hair extensions or false eyelashes.	Self-appearance	5
33.	No makeup (lip balm, colored lip balm, eye liner, eye shadow, blush, etc.).	Self-appearance	5
34.	Must not have tattoos or paintings on their bodies, and must not have piercings meant for men.	Self-appearance	10
35.	Students must wear a black belt.	Self-appearance	5
36.	Wearing school uniforms that violate applicable regulations (too tight, pencil pants, etc.)	Self-appearance	10
37.	With the permission of the subject teacher, the use of smartphones is permitted. Violations will be processed and assigned points.	Information and communication	20
38.	Electronic items such as comics, DVDs, VCDs, or others that contain pornographic content are referred to parents or guardians.	Information and communication	150
39.	Damaging facilities and littering the classroom	School environment	5

The coaching steps according to the number of violation points will be shown in the following Table 3:

Table 3. Violation action [17]

Stages	Number of Points	Coaching	Decision
Process 1			

 ISSN:2302-8149
e-ISSN:2540-9719

Summoning I	0-50	Homeroom Teacher	The student concerned is called and given points and recorded in the control card / student progress book
Summoning II	51-75		
Summoning III	76-100		
		Process 2	
Summoning I	100-150	Guidance Counseling	Students are summoned with parents to get information about the offense and at point 250 make a stamped statement.
Summoning II	151-200		
Summoning III	201-250		
		Process 3	
Summoning I	251-300	Vice principal of student affairs	Students are summoned with parents, guardians, counseling teachers and related parties for case conferences and at point 350 are given WARNING I.
Summoning II	351-350		
		Process 4	
Summoning I	351–400	School Principal	Student is called with parents to be given WARNING II
		Process 5	
Summoning I	401-425	Teacher council meeting I	Students are called together with parents to be given a warning III
		Teacher council meeting II	Resign / Return to Parents by signing a stamped statement letter.

3.2 Dashboard Visualization

A visualization dashboard is a graphical interface that presents data or information in a concise and visual manner, making it easier for users to understand and analyze data quickly and effectively. This dashboard usually consists of various data visualization elements such as graphs, tables, maps and so on designed to provide in-depth insight into an aspect of a business, project, or process [6]

 ISSN:2302-8149
e-ISSN:2540-9719

The following will show the flow of the visualization dashboard:

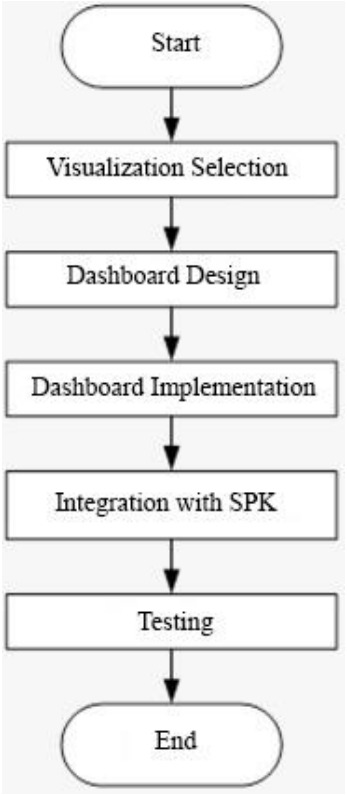

Figure 2. Dashboard visualization flow [6]

Figure 2 shows the flow of the dashboard visualization in the decision support system (DSS) for managing student violations. The dashboard provides a visual representation of real-time data, using tools like pie charts, bar charts, line charts, histograms, and scatter plots. These visualizations help school administrators quickly analyze violation trends, identify high-risk groups, and make informed decisions. The system enhances efficiency in monitoring student behavior and supports faster decision-making in disciplinary actions

4. Results and Analysis

This section presents the findings and analysis of the application of the Simple Multi-Attribute Rating Technique (SMART) and dashboard visualization in managing student code of conduct violations. The analysis is conducted on the collected violation data, which has been processed and visualized using various graphical elements. These results provide an in-depth understanding of violation trends and demonstrate the effectiveness of the system in supporting decision-making related to discipline enforcement in schools.

a. Smart Method Testing

The following will give an example case of a student who committed an offense using the smart method:

1. Name: Reyhan Indra Wijaya
   NISN: 0074887492
   Offense Type:
   a. Smoking in school uniform both inside and outside school (3x)
   b. Untidy hair (3x)
   c. Long nails (2x)
   d. Late entry
   e. Absent without explanation
   Steps of the smart method:
   1. Finding the Normalization Value:

 ISSN:2302-8149
e-ISSN:2540-9719

$$NW = j\ \frac{Wj}{\sum_{j=1}^{m} Wm} \quad (2)$$

Description:
Wj= Weight of a criterion
N= Normalization

- Social Order Criteria, N= 0.2/1 = 0.2
- Self-Appearance Criteria, N= 0.05/1 = 0.05
- Self-Appearance Criteria, N = 0.05/1 = 0.05
- Code of Conduct, N= 0.05/1 = 0.05
- Licensing, N = 0.15/1 = 0.15.

2. Find the final result of the smart calculation:
$U(a_i) = \sum_{j=1}^{m} WjUi \quad (a_i)$ (3)
Description:
U= utility (max score-min score)
$U(a_i)$ = (0.2 x 50x3) + (0.05 x 10x3) + (0.05 x 5x2) + (0.05 x 5) + (0.15 x 10)
= 30 + 1,5 + 1,5 + 0,25 +1,5
= 34,75.

2. Name: Abdul Fikri Harahap
NISN: 84283200
Offense Type:
a. Climbing the school fence for improper/unethical purposes.
b. Absent without explanation (11x).
c. Late entry (6x).
d. Did not attend the ceremony.

Steps of the smart method:

1. Finding the Normalization Value:
$$NW = j\ \frac{Wj}{\sum_{j=1}^{m} Wm}$$
Description:
Wj= Weight of a criterion
N= Normalization
   - Social Code Criteria, $N = \frac{0,2}{1} = 0,2$
   - Licensing, $N = \frac{0,15}{1} = 0,15$
   - Licensing, $N = \frac{0,15}{1} = 0,15$
   - Ceremony, $N = \frac{0,1}{1} = 0,1$
2. Find the final result of the smart calculation:
$U(a_i) = \sum_{j=1}^{m} WjUi \quad (a_i)$
Description: U= utility (max score-min score)
U(a_i) = (0.2 x 50) + (0.15 x 10 x 11) + (0.15 x 5 x 6) + (0.1 x 10)
= 10+16,5+4.5+0,1
= 31,1

Table 4 below summarizes the results of the SMART calculations for specific student cases, showing their utility values, total points, and the recommended coaching steps based on the accumulated violation scores. This structured approach ensures transparency and fairness in managing student discipline.

Table 4. SMART calculation results [17]

No.	Student Name	Utility Value	Point	Normalization	Final result	Coaching steps	sanction

 ISSN:2302-8149
e-ISSN:2540-9719

1.	Reyhan Indra Wijaya	C9.a	50	0,2	10	34,75	Process I, Call I
		C10.a	10	0,05	0,5		
		C10.d	5	0,05	0,25		
		C4.a	5	0,05	0,25		
		C5.c	10	0,15	1,5		
2.	Abdul Fikri Harahap	C9.f	50	0,15	1,5	31,1	Process I, Call I
		C5.c	10	0,15	1,5		
		C4.a	5	0,15	0,25		
		C3.a	10	0,1	1		

The results of violation points are accumulated during the 3-years study period. Classification of violation points and actions can be seen in Table 4.

4.2 Dashboard Visualization

Student violation data will be displayed in the visualization dashboard in the form of pie charts, bar charts, line charts, histograms, and scatter plots.

1. Percentage of student Violations in each class

   Pie charts below show how violations are distributed among the various classes. Each segment represents the percentage of offenses that occur in each class. Here is the pie chart of student offenses.

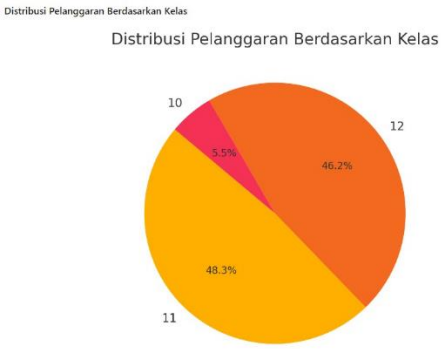

Figure 3. Percentage of student violations in each class [6]

From the Figure 3, it can be seen that the majority of violations occur in Class 11, which can be seen from the largest percentage on the pie chart. This shows that Class 11 has a higher rate of violations compared to Class 12 and Class 10.

2. Total Violation Scores by Class: Identifying High-Risk Groups

   The bar chart (Figure 4) shows the total violation score accumulated by each rombel. This gives an idea of which house has the highest offense rate. For example, if Class XII-9 has the highest score, this class may need special attention regarding student behavior

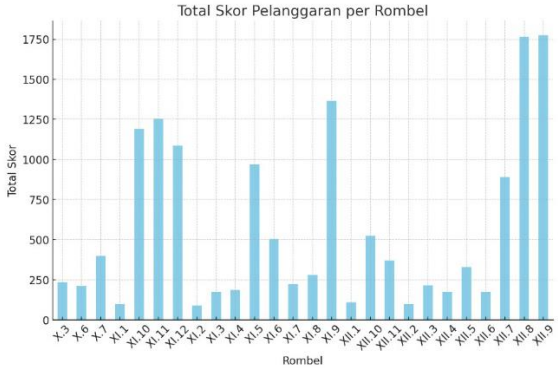

Figure 4. Total violation scores by class [6]

 ISSN:2302-8149
e-ISSN:2540-9719

Figure 4 shows that Group XII.8 has the highest total offense score among all the groups. This indicates that this group has a more significant violation problem and may require more attention from the school.

3. Violation Trends by Date: Monitoring Behavioral Patterns
   This line chart below shows the trend of violations over time based on the input date. From this visualization, we can see if there are certain periods where breaches occur more frequently. Here is the line chart:

Figure 5. Violation trends by date [6]

The violation trend in Figure 5 above shows that most of them, especially on January 17, 2024. This happens because the input of accumulated violations committed by students was made on January 17, 2024. Therefore, the line chart cannot show violations over time; however, over time, the line chart will change and no longer focus on one date.

4. Frequency Distribution of Violation Scores: Identifying Common Offense Levels
   A histogram in figure 6 depicts the frequency of violations by score. This helps to understand the distribution of how often a particular score is assigned. For example, if most of the scores are 5, it shows that minor offenses occur more often than major offenses.

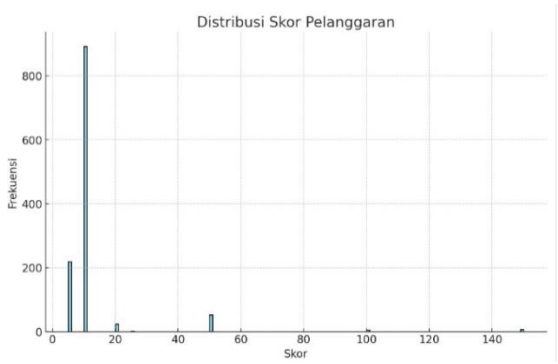

Figure 6. Frequency distribution of violation scores [6]

Most violation scores ranged from 5 to 10, indicating that many violations were minor. However, there are some violations with very high scores (up to 150), indicating serious violations that require decisive action.

5. Intensity of Violations Across Classes: Heatmap of Student Offenses
   This heatmap in Figure 7 provides an overview of the intensity of violations based on the combination of classes and rombel. Darker colors (red) indicate higher violation intensity. From this heatmap, we can identify which rombel in a particular class has the highest violation rate and may require further intervention.

 ISSN:2302-8149
e-ISSN:2540-9719

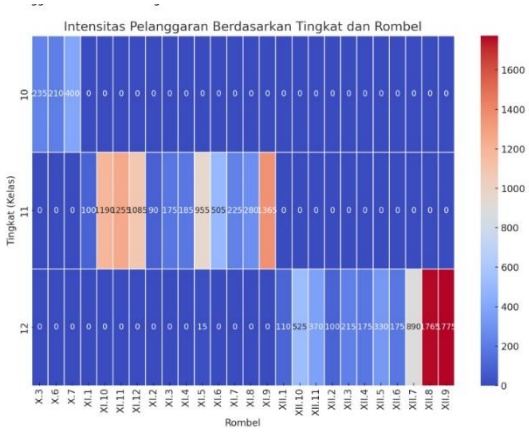

Figure 7. Heatmap of student offenses [6]

6. Correlation Between Violation Scores and Dates

Correlation Between Violation Scores and Dates will be shown through a scatter plot in Figure 8. Scatter plot shows the relationship between offense score and input date. From this visualization, we can see if there is a certain pattern of higher violation scores at certain times. If there are clusters in certain areas of this plot, it could indicate that there are certain periods or times where serious offenses are more common.

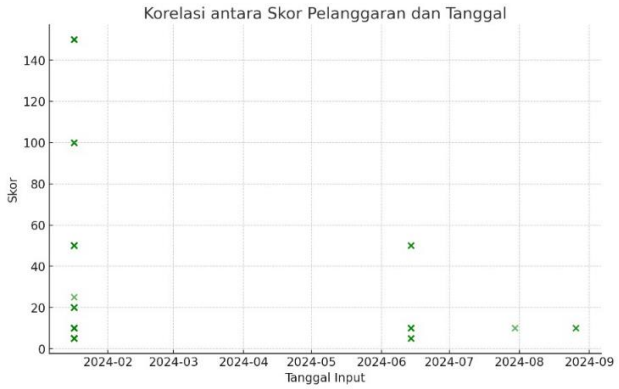

Figure 8. Correlation between violation scores and dates [6]

The scatter plot shows a concentration of high-scoring violations on certain dates. This could be an indication of certain patterns that need to be further analyzed to understand the causes of violations at these times.

1.3 Interface

The student discipline violation e-score application page can be accessed via the following URL: *https://escore.smandamandau.sch.id/index.php/app*.
Here is a look at the login page can be seen in Figure 9:

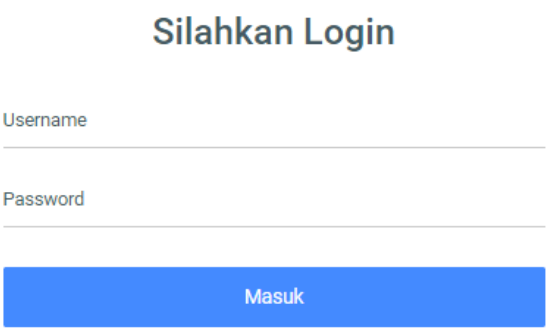

Figure 9. Login form [16]

 ISSN:2302-8149
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After typing the user and password correctly, it will enter the homepage as shown in Figure 10 below:

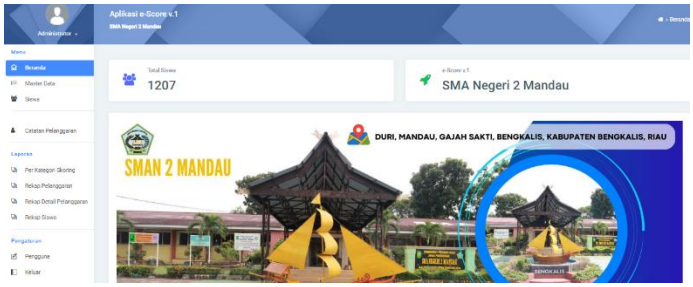

Figure 10. Homepage [16]

Several menus can be found in the main page menu. These include master data, students, offense records, reports, and settings...
The master data menu consists of: Year of Study, scoring category, and scoring as shown in Figure 11 below:

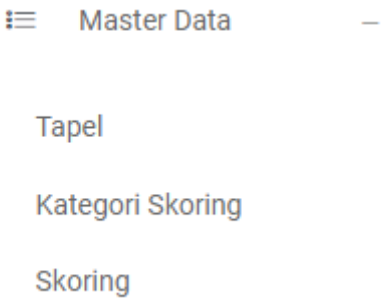

Figure 1.1 Master data menu breakdown [16]

Lesson Year (Tapel) contains recored data from 2021/2022 odd period until now. In this menu there are four columns that must be filled in by the admin, namely: subject year, semester, year, and status. For the learning year, semester and year it corresponds to the order of the previous year along with odd or even periods. Furthermore, the status column is related to the current period, for example, for periods that have passed or have not been entered, the status is inactive, while for the odd or even period that is running the status is active. The following Figure 12 is a *screenshot of* the table image:

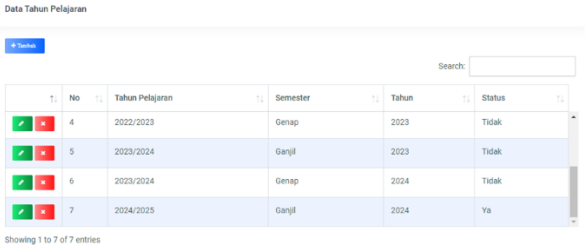

Figure 12. Lesson year data [16]

After the year of study, the master data menu also contains scoring categories. This scoring category refers to the criteria or types of offenses that may occur to students . The details of the types of violations will be displayed in Figure 13 below:

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	No	Kategori Skoring
	1	Kelengkapan Sepatu
	2	Pakaian
	3	Upacara
	4	Tata Tertib Kegiatan Belajar Mengajar (TATIB KBM)
	5	Perizinan
	6	Keterlambatan
	7	Kebersihan
	8	Kegiatan Keagamaan
	9	Tata Tertib Pergaulan
	10	Penampilan Diri
	11	Informasi dan Komunikasi
	12	Sarana Transportasi
	13	Lingkungan Sekolah
	14	Hubungan Sosial dan Kemasyarakatan

Figure 13. Type of Violations in school [16]

Finally, on the master data menu, there is a scoring menu on Figure 14. This scoring menu consists of the form of violation, the category of violation, and the score value of the violation obtained.:

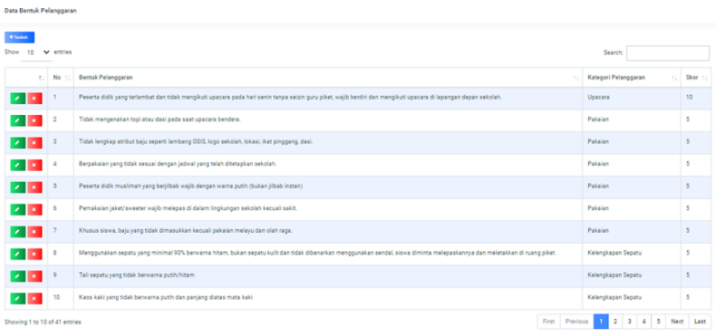

Figure 14. Scoring [16]

After seeing the contents of the master data, then we enter the next menu, namely the student menu. This student menu contains detailed student data needed, such as NISN, NIS, Name, gender, address, rombel and so on. Figure 15 is a display of student data:

Figure 15. Student data [16]

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The next menu is, violation notes, counseling notes and achievement notes. Counseling notes are intended for students with a range of violation scores of 100-250, while achievement notes contain student achievements such as competitions that students participate in. Meanwhile, the violation record contains the name of the student who committed the violation, the rombel, and the form of violation committed by the student (Figure 16).

Figure 16. violation record [16]

Next, proceed to the report menu. The report menu consists of reports per scoring category, violation recap, violation detail recap, and student recap (Figure 17). To download the report, the user is required to select the category first and filter as needed. After the data appears, then the report can be downloaded in excel format (Figure 18).

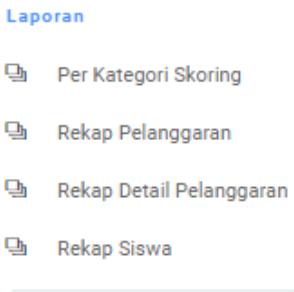

Figure 17. Report menu[16]

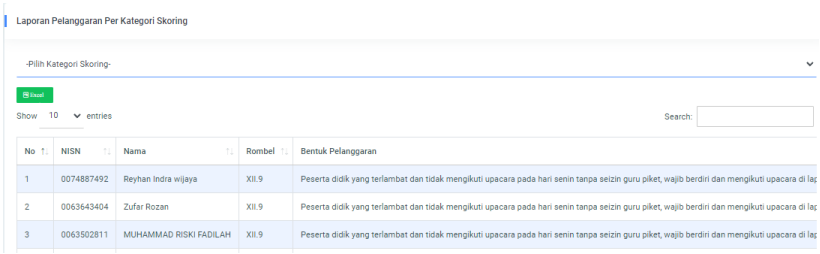

Figure 18. violation reports by category[16]

5. Conclusion

This research applies a Decision Support System (DSS) that uses the Simple Multi-Attribute Rating Technique (SMART) method integrated with a visualization dashboard to manage student discipline violations. The developed SPK is able to categorize and rate violations objectively, while the visualization dashboard provides an intuitive and informative data display, allowing real-time monitoring and analysis of violations. As a result, this system is expected to be an effective step in supporting proper decision-making in handling violations in the school environment.

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e-ISSN:2540-9719

Reference:

[1] I. Nuban, R. Triposa, and Y. A. Arifianto, "Deskripsi Pemahaman Siswa Terhadap Kedisiplinan sebagai Penanaman Nilai-nilai Kristen," *Desember*, vol. 2, no. 2, pp. 221–241, 2021.

[2] F. Xaverius, A. Perkasa Jampur, V. Christmantara, and A. History, "Sistem Informasi Bimbingan Konseling Menggunakan Framework PHP Codeigniter 4.0 (Studi pada SMAK Frateran Malang)," vol. 8, no. 2, pp. 94–107, 2022, [Online]. Available: http://jurnal.unmer.ac.id/index.php/jtmi

[3] A. P. Olesen, L. Amin, and Z. Mahadi, "In Their Own Words: Research Misconduct from the Perspective of Researchers in Malaysian Universities," *Sci Eng Ethics*, vol. 24, no. 6, pp. 1755–1776, Dec. 2018, doi: 10.1007/s11948-017-9997-9.

[4] S. Galuh Andika and P. Sokibi, "Sistem Pendukung Keputusan Pemilihan Kegiatan Ekstrakulikuler Untuk Siswa SMA Menggunakan Metode Simple Multi Attribute Rating Technique (Studi Kasus : SMA Santa Maria Cirebon)," 2019.

[5] R. A. W. Putra, S. Suyahman, and T. Sutrisno, "Penerapan Metode SMART Dalam Sistem Pendukung Keputusan Pemberian Sanksi Pelanggaran Tata Tertib Siswa(Studi Kasus SMK Negeri 1 Pujut)," 2020.

[6] G. Sedrakyan, E. Mannens, and K. Verbert, "Guiding the choice of learning dashboard visualizations: Linking dashboard design and data visualization concepts," *J Vis Lang Comput*, vol. 50, pp. 19–38, Feb. 2019, doi: 10.1016/j.jvlc.2018.11.002.

[7] J. M. Merigó and J. B. Yang, "A bibliometric analysis of operations research and management science," *Omega (United Kingdom)*, vol. 73, pp. 37–48, Dec. 2017, doi: 10.1016/j.omega.2016.12.004.

[8] A. Ikhwan and N. Aslami, "Decision Support System Using Simple Multi-Attribute Rating Technique Method in Determining Eligibility of Assistance," *Building of Informatics, Technology and Science (BITS)*, vol. 3, no. 4, pp. 604–609, Mar. 2022, doi: 10.47065/bits.v3i4.1370.

[9] W. Ho, X. Xu, and P. K. Dey, "Multi-criteria decision making approaches for supplier evaluation and selection: A literature review," *Eur J Oper Res*, vol. 202, no. 1, pp. 16–24, Apr. 2010, doi: 10.1016/j.ejor.2009.05.009.

[10] G. Setiaji and L. Yulianti, "Implementasi Metode Smart Dalam Sistem Pendukung Keputusan Pelanggaran Tata Tertib Siswa," 2695.

[11] A. Franklin *et al.*, "Dashboard visualizations: Supporting real-time throughput decision-making," *J Biomed Inform*, vol. 71, pp. 211–221, Jul. 2017, doi: 10.1016/j.jbi.2017.05.024.

[12] R. A. S. Al-Maroof and M. Al-Emran, "Students acceptance of google classroom: An exploratory study using PLS-SEM approach," *International Journal of Emerging Technologies in Learning*, vol. 13, no. 6, pp. 112–123, 2018, doi: 10.3991/ijet.v13i06.8275.

[13] G. D. Breetzke, I. Fabris-Rotelli, J. Modiba, and I. S. Edelstein, "The proximity of sexual violence to schools: evidence from a township in South Africa," *GeoJournal*, vol. 86, no. 2, pp. 765–776, Apr. 2021, doi: 10.1007/s10708-019-10093-3.

 ISSN:2302-8149
e-ISSN:2540-9719

[14] R. A. Pratama and R. Hardianto, "Permanent Employee Assessment Decision Support System using the Simple Multi Attribute Rating Technique (SMART) Method," *Journal of Computer Scine and Information Technology*, pp. 50–54, Apr. 2024, doi: 10.35134/jcsitech.v10i2.100.

[15] R. Fahlepi, S. Hang, and T. Pekanbaru, "Decision Support Systems Employee Discipline Identification Using The Simple Multi Attribute Rating Technique (SMART) Method," 2020.

[16] F. H. Aminuddin, A. R. Riyanda, and T. Djauhari, "Sistem Pendukung Keputusan Penentuan Wali Kelas Berdasarkan Prestasi Guru Dengan Metode Analytical Hierarchy Process (AHP) Berbasis Web," *Jurnal Media Informatika Budidarma*, vol. 6, no. 1, p. 728, Jan. 2022, doi: 10.30865/mib.v6i1.3461.

[17] Zain, M. T., Janiah, B. J., & Fadli, S. (2021). Penerapan Metode Smart Dalam Sistem Pendukung Keputusan Pemberian Sanksi Pelanggaran Tata Tertib Siswa (Studi Kasus SMK Negeri 1 Pujut). *MISI (Jurnal Manajemen Informatika & Sistem Informasi)*.