

The Representation of Moral Values in Grade 10 High School Mathematics Textbooks

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Abstrak

Studi terkini menggali representasi nilai-nilai moral dalam buku teks Matematika untuk Kelas 10 SMA, dengan menggunakan teknik analisis deskriptif kualitatif. Fokus utamanya adalah pada empat jenis gambar dalam konteks pembelajaran, yang bertujuan untuk melihat dampaknya terhadap pemahaman moral dan etis siswa. Gambar-gambar ini termasuk permainan *Angry Birds* yang berkaitan dengan vektor dan operasinya, balap karung dalam konteks persamaan dan pertidaksamaan linear, ilustrasi tentang Covid-19 dalam pembahasan peluang, serta gambar permainan dadu dalam konteks yang serupa. Survei mengindikasikan dampak yang beragam dari gambar-gambar tersebut, mulai dari peningkatan kesadaran tentang strategi dan pemecahan masalah hingga kemungkinan mengalihkan fokus siswa dari materi pokok. Hasil studi ini memberikan perspektif segar mengenai bagaimana materi visual dalam buku teks berkontribusi pada pemahaman moral siswa, sekaligus menyajikan rekomendasi tentang penyajian konten edukatif yang optimal dalam lingkup pendidikan matematika.

Kata Kunci: Representasi Nilai Moral; Buku Teks Matematika; Dampak Gambar Pembelajaran; Pemahaman Moral Siswa; Metode Kualitatif dan Kuantitatif.

Abstract

The current study explores the representation of moral values in Mathematics textbooks for Grade 10, using qualitative descriptive analysis techniques. The main focus was on four types of images in the learning context, aiming to see their impact on students' moral and ethical understanding. These images included an Angry Birds game related to vectors and their operations, a sack race in the context of linear equations and inequalities, an illustration of Covid-19 in the discussion of chance, as well as an image of a dice game in a similar context. Surveys indicated mixed impacts of the images, ranging from increased awareness of strategies and problem solving to the possibility of diverting students' focus from the subject matter. The results of this study provide a fresh perspective on how visual materials in textbooks contribute to students' moral understanding, while presenting recommendations on the optimal presentation of educational content within the scope of mathematics education.

Keywords: Representation of Moral Values; Mathematics Textbooks; Impact of Learning Images; Students' Moral Understanding; Qualitative and Quantitative Methods.

I. INTRODUCTION

Mathematics is a fundamental discipline that delves into numbers, formulas, and related concepts (Puspasari, Rinawati, & Pujisaputra, 2021; Abramovich, 2022). Its significance extends beyond academic pursuits, serving as an essential tool for daily life, from small-scale activities to technological advancements (Apriani & Widhiasi, 2020; Hanik et al., 2018; Afriansyah et al., 2023; Suherman & Sinarga, 2023). However, mathematics is not merely about numbers and formulas (Sowder, 2020; Tamba & Bermuli, 2023). In Grade 10 high school mathematics textbooks, elements related to moral values can also be identified and analyzed.

The integration of moral values into mathematics education has become a critical consideration in the development of textbooks (Prahmana & D'Ambrosio, 2020), particularly at the high school level. This study aims to examine the representation of moral values in Grade 10 high school mathematics textbooks, focusing specifically on illustrations and visuals. Selected images, drawn from topics such as "Vectors and Their Operations," "Linear Equations and Inequalities," and "Probability," are analyzed to uncover their potential to shape students' perceptions, attitudes, and moral values.

The research employed a survey involving 36 respondents, including one mathematics teacher and 35 students from SMA Negeri 3 Garut, to explore their perspectives on the moral implications of the images presented in the mathematics textbooks. The findings aim to provide insights into how visual representations in mathematics education can influence

students' moral understanding at the high school level.

Morality, as defined by philosophers and psychologists, refers to individuals' or societies' perceptions of the highest good (Kaur, 2019; Wagner, Pölzler, & Wright, 2021). In the current era, particularly among high school students, the urgency of moral values has become increasingly critical. The rapid growth of technology and information access exposes students to a wide array of societal norms and viewpoints. Hence, establishing a robust moral foundation at the high school level is essential.

Moral values shape students' character and personality, fostering individuals with integrity, empathy, and social responsibility (Warren, 2020; Idris, 2023). Amid the complexities and contradictions of modern information flows, moral education provides the ethical framework needed for students to make sound decisions and contribute to collective well-being. Moreover, moral education equips students to navigate the increasing complexities and dynamics of contemporary life, enabling them to develop value-based decision-making skills (Lowery, 2020; Abulibdeh, Zaidan, & Abulibdeh, 2024). It helps cultivate a generation capable of making positive contributions to society and the environment.

Through moral values, high school students can emerge as wise leaders, effective team players, and responsible global citizens. Therefore, integrating moral education into high school curricula is not merely a necessity but an investment in shaping a generation grounded in ethical principles amid modern complexities.

II. METHOD

This study employs a qualitative descriptive approach, focusing on an in-depth understanding of how moral values are represented in tenth-grade high school mathematics textbooks and how students respond to and internalize these values within the learning context. A qualitative descriptive approach aims to portray phenomena in detail without altering or manipulating variables, allowing the researcher to capture a holistic depiction of actual conditions (Ramadhan, 2021).

The primary data collection method utilized is in-depth interviews, enabling both students and teachers to freely express their thoughts and feelings. In-depth interviews are particularly effective in qualitative research because they allow respondents to share their perspectives without constraints, uncovering emotional and cognitive aspects that might not emerge through other techniques (Roosinda et al., 2021).

In addition to interviews, the study incorporates participant observation in the classroom setting. This method provides direct insights into students' reactions to visual content or illustrations in textbooks that convey moral values. Participant observation enables the researcher to grasp the context and dynamics during the learning process, aligning with Sulistiyo's theory, which emphasizes that observations can capture real classroom interactions that interviews might overlook (Sulistiyo, 2023).

Data collection was conducted in stages, with thematic analysis used for data interpretation. This technique helps identify themes or patterns emerging from the

qualitative data, such as how students perceive moral values through specific visuals in textbooks. Thematic analysis is highly valuable in qualitative research as it allows researchers to extract deep meanings from complex data and provide a detailed explanation of the findings (Fadli, 2021).

To enhance the analysis, the study incorporates a literature review, enabling the researcher to situate findings within the context of existing research. A literature review is crucial in identifying research gaps and ensuring alignment of findings with relevant theories. It also facilitates comparisons between the study's results and prior research in the same field (Ridwan et al., 2021).

The use of thematic analysis allows the researcher to not only explore students' perspectives but also map how visual representations in textbooks influence their understanding of morality. In thematic analysis, it is essential to understand how identified categories or themes interconnect, ultimately forming a comprehensive understanding of students' perceptions of moral values (Fadli, 2021).

The qualitative descriptive approach in this study also accounts for contextual factors that may influence students' perceptions, such as cultural backgrounds and prevailing social values. Qualitative research is particularly adept at capturing nuances and contextual elements that shape individual understanding, which are often beyond the scope of quantitative measurements. This approach allows the researcher to explore non-academic factors

contributing to the internalization of moral values (Fadli, 2021).

By employing a qualitative descriptive approach, this study offers a holistic perspective on the impact of visual materials on students' moral comprehension. The approach provides a rich and detailed depiction of the phenomenon under study, enabling the researcher to uncover the potential of visual materials for moral education on a broader scale (Ramadhan, 2021).

III. RESULT AND DISCUSSION

The theoretical framework in the research aimed at exploring students' representation of moral values is outlined as follows:

1. Visual Learning Theory

Visual Learning Theory emphasizes that students often learn more effectively through the use of visual materials. Teaching approaches that incorporate visual media, such as images, posters, models, photographs, and other visual aids, can enhance the effectiveness of learning processes (Supardi, 2017). According to this theory, visuals facilitate the comprehension of abstract concepts, especially in subjects like mathematics where theoretical ideas dominate. Furthermore, visual learning theory underscores the influence of visual information on students' critical and analytical thinking skills, as well as their ability to process and interpret information. Images rich in ethical values can stimulate students to reflect on moral and ethical aspects of various scenarios, thereby enabling a deeper understanding of these values in everyday life contexts.

2. Educational Psychology

Education is fundamentally a systematic effort designed to nurture students' talents and potentials through humanistic learning processes, fostering independent and strong character traits essential for personal and societal life (J.E., 2008). The goal of Educational Psychology is to assist students in sustaining their learning processes by identifying their interests, talents, abilities, and unique potentials. Educational Psychology, which merges psychological principles with educational practices, seeks to create harmony between these disciplines to achieve common educational objectives (Nurjanah et al., 2023).

3. Representation Theory in Educational Media

According to Wahyudin (2008), the ability to represent mathematical ideas is crucial for helping students organize their thoughts. When students can represent their ideas effectively, they expand their capacity for mathematical reasoning and understanding (Mulyati, 2018).

4. Social Cognitive Theory

As Gagne (1965) defines, the term "cognitive" stems from cognition, which refers to understanding or comprehension. Cognitive processes involve internal activities within the central nervous system during thinking. Piaget's concept of cognitive structure refers to the mental framework individuals develop by interpreting, organizing, and transforming information from their environment (Agustyaningrum et al., 2022).

5. Philosophy of Education

Ki Hajar Dewantara views education as a means of liberating individuals from external forces, particularly ignorance and

poverty (Zein, 2023). The Philosophy of Education encompasses diverse perspectives on the objectives, processes, and essence of education. A critical component of this philosophy involves addressing the purpose of education, which is often seen as shaping responsible and ethical citizens.

Here are the findings derived from the conducted research (See Figure 1 & 2).



Figure 1. Angry Bird Game

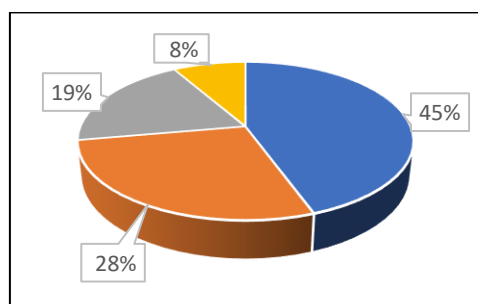


Figure 2. Analysis of Respondent Data

- Understanding Strategies and Problem-Solving: 44.44% of respondents indicated that the image enhances understanding of strategies and problem-solving, reinforcing values such as collaboration and perseverance.
- Distraction Potential: 27.78% of respondents believed the image might distract students from the lesson content, shifting their focus to

mere entertainment and reducing the seriousness of learning.

- Visual Aid: 19.44% perceived the image solely as a visual aid with no significant moral influence.
- Non-Response: 8.33% chose not to respond.

The conclusion drawn from the image is that the majority of respondents (44.44%) viewed it as a tool that strengthens the understanding of strategies and problem-solving while supporting values like collaboration and perseverance. However, a significant concern (27.78%) was raised regarding the image's potential to divert students' focus from the lesson to entertainment, thereby undermining the seriousness of the material. Additionally, a portion of respondents (19.44%) considered it merely a visual aid without moral impact.

From a moral perspective, the image has a positive influence by enhancing the understanding of strategies and problem-solving and reinforcing collaboration and perseverance among most respondents. However, its negative aspect lies in the potential to divert students' attention from the lesson content to entertainment, which could diminish the seriousness of learning (See Figure 3 & 4).



Figure 3. Sack Race Competition

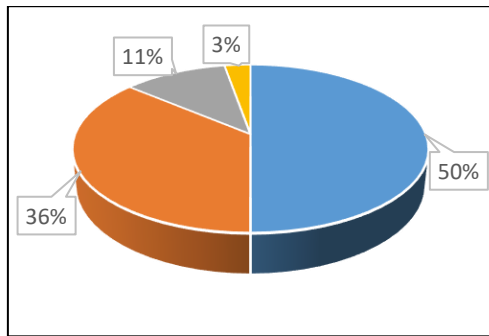


Figure 4. Analysis of Respondent Data

- Healthy Competition and Collaboration: 50% of respondents stated that the image conveys the importance of healthy competition and collaboration.
- Equality and Inclusion: 36.11% interpreted the image as promoting equality and inclusion, though not directly tied to moral teachings.
- Illustration Without Moral Implications: 11.11% viewed the image merely as an illustration without any moral implications.
- No Response: 2.78% chose not to provide an answer.

The image of the sack race was predominantly (50%) interpreted as a lesson on healthy competition and collaboration. A significant portion of respondents (36.11%) viewed it as a representation of equality and inclusion, albeit not directly connected to moral themes. A minority (11.11%) regarded it as merely a neutral illustration with no moral implications.

From a moral perspective, the sack race image was largely perceived as a positive tool for teaching the importance of healthy competition and teamwork. While not explicitly tied to morality, the image also promotes values of equality and inclusion.

However, a small minority viewed it neutrally, considering it simply as an illustration without moral significance (See Figure 5 & 6).

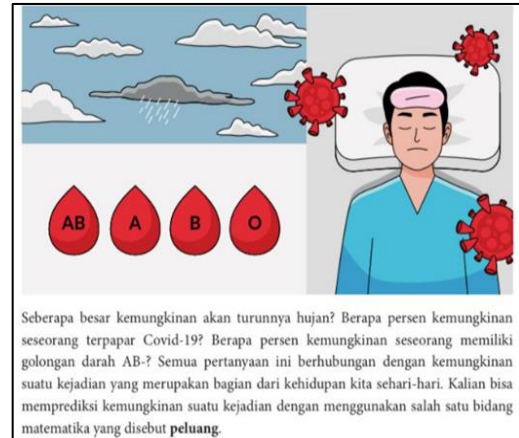


Figure 5. Covid-19 Probability

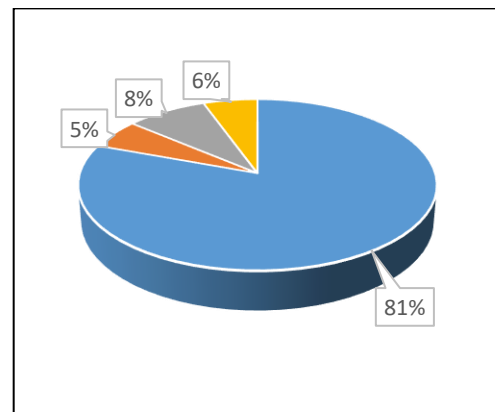


Figure 6. Analysis of Respondent Data

- Awareness and Empathy: 80.65% of respondents reported that images of individuals affected by COVID-19 heightened their awareness and empathy toward health and humanitarian issues.
- Reality Without Moral Influence: 8.33% perceived the images as depicting reality but without conveying a clear moral message.
- Anxiety or Fear: 5.56% believed the images could provoke unnecessary anxiety or fear.

- No Response: 2.78% chose not to provide an opinion.

Images related to COVID-19 were predominantly (80.65%) seen as tools to raise awareness and empathy regarding health and humanitarian concerns. A smaller proportion of respondents (8.33%) viewed them as a mere representation of reality devoid of moral implications, while a minor segment (5.56%) expressed concern over the potential for these images to generate unnecessary anxiety or fear.

These images have a significant positive moral impact, fostering awareness and empathy for health and humanitarian issues. However, they also carry the negative potential to instill unwarranted anxiety or fear in a small subset of respondents (See Figure 7 & 8).



Figure 7. Board Game

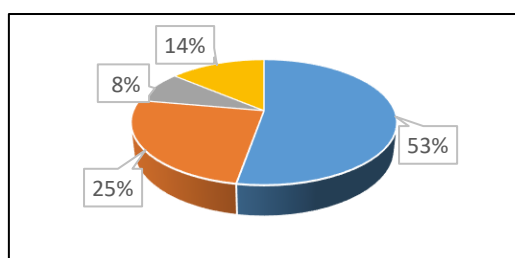


Figure 8. Analysis of Respondent Data

- Luck and Decision-Making: 52.78% of respondents believe this image

conveys lessons about luck, risk, and prudent decision-making.

- Simplifying the Concept of Probability: 25% suggest the image potentially simplifies the concept of probability, reducing the seriousness of the topic.
- Concept Understanding, Not Morality: 8.33% see the image's effect as more focused on understanding the concept rather than imparting moral values.
- Positive or Negative Effects (Depends on Perspective): 13.89% state that the image could have either a positive or negative impact depending on individual perspectives.

The game image is primarily perceived (52.78%) as teaching about luck, risk, and wise decision-making. However, some (25%) view it as potentially trivializing the concept of probability and diminishing the topic's seriousness. A portion of respondents (8.33%) emphasize the image's role in promoting conceptual understanding rather than moral values, while others (13.89%) believe its impact hinges on individual interpretation, varying between positive and negative.

The image is morally regarded as positive by some respondents due to its lessons on luck, risk, and prudent decision-making. However, it also carries a negative aspect, such as the potential oversimplification of probability concepts and reduced seriousness of the topic. The moral effect of this image depends on individual interpretations, leading to either positive or negative outcomes.

The findings indicate that the use of images in Grade 10 high school

mathematics textbooks can contribute to students' understanding of moral values, though the impact varies based on the content and context of the image. For instance, the Angry Birds image, linked to vector material, supports the enhancement of students' strategic and problem-solving skills, fostering values like perseverance and cooperation. Within the context of Visual Learning Theory (Supardi, 2017), such visualization shows that engaging visual material can enhance student engagement and help them associate mathematical concepts with valuable moral lessons.

Additionally, the image of a sack race in the chapter on linear equations illustrates healthy competition and collaboration, which are relevant to Educational Psychology. Educational Psychology aids students in understanding essential social skills, such as group cooperation, derived from visual interactions with images (Nurjanah et al., 2023). Visuals like these help students internalize social values, aligning with moral education theories in learning contexts (Sari, 2013).

Some images also have the potential to distract students, as noted by 27.78% of respondents. This suggests that images might act as distractors, reducing students' focus on the learning material. This impact should be addressed, especially by educators designing teaching materials that stimulate moral understanding without detracting from core subject matter.

These findings suggest that images in mathematics textbooks not only serve as tools for conceptual understanding but also play a role in shaping students' moral values. Educators can leverage these insights to design visual content that is both engaging

and imbued with significant moral value. These recommendations advocate for more careful and strategic use of visual media to provide holistic positive impacts on students, encompassing both cognitive and moral dimensions.

IV. CONCLUSION

The evaluated images demonstrate variations in their moral impact. The Angry Birds image contributes positively to strategic skills and problem-solving, although it is essential to remain vigilant regarding potential distractions. Meanwhile, the sack race image supports values of healthy competition and teamwork, although some perceive it as neutral. Images related to COVID-19 significantly enhance awareness and empathy towards health issues, though a small number of respondents might experience unnecessary anxiety. Similarly, images of games can teach lessons about luck and wise decision-making, but their moral impact varies depending on individual interpretations. Therefore, it is crucial to consider diverse perspectives and acknowledge that each image has the potential to influence moral values differently for each individual.

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