Fostering Character and Attitudes in Mathematics: The Role of Independent Curriculum at Nurul Ilmi Islamic Elementary School in the Era of Educational Disruption

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

This study aims to determine the effect of implementing character education on the development of attitudes from the perspective of mathematics learning in the independent curriculum at Nurul Ilmi Integrated Islamic Elementary School Jambi. This study uses a quantitative approach with a quasi-experimental design. The population in this study were all second-grade students, totaling 236 people, who were divided into 10 study group classes. The sample used in this study was 29 class

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2D students, who were taken randomly. The data in this study were collected using test techniques (pretest and posttest) from the perspective of mathematics learning. The data analysis used was the N-gain test and the T-test. The results of the study showed that the application of character education in grade 2 of SD Islam Terpadu Nurul Ilmi had a positive and significant effect on the development of student attitudes, both spiritual and social attitudes. The average increase in students' spiritual and social attitudes was in the "medium" category but tended to be "high." Thus, it is recommended for teachers to be more professional in implementing character learning in schools in various learning contexts.

1. INTRODUCTION

Education is the best process and effort in preparing the best generation of the future. Through education, participants are trained, educated, guided, and directed to become quality individuals by the development of the times. Loughlin & Lindberg-Sand (2023), Amet (2023), and Darsyah (2023) explain that education can also be interpreted as a human effort to be able to help, train, and direct children through the transmission of knowledge, experience, intellectual, and religiousness of parents in the womb according to human nature so that they can develop to the desired goals. Thornhill-Miller et al. (2023) and Diana & Afendi (2023) also stated that education is one of the human capital that follows the development of the times. Thus, it can be understood that education is a critical process for humans to have a better life through improving personal quality. In the context of education, the individual quality in question includes the quality of thinking (cognitive), attitude (affective), and action (psychomotor).

From the education perspective in Indonesia, various efforts continue to be made to create a quality generation according to the development of the times. One genuine attempt to prepare this quality generation is by innovating curriculum development. This is to the opinions of Khoirurrijal (2022), Akbarjono (2024), and Hadisaputra et al. (2024) that the curriculum needs to be continuously developed and refined by the pace of development of science and technology, as well as the developing society. The curriculum is a roadmap or leading guide for various activities to educate, train, and guide students. Gil (2021), Maina (2023), and Aryanti and Saputra (2023) state that the curriculum as an educational design has a very central position in a learning activity. Therefore, the curriculum must continue to change with the development of the times. One form of innovation in the curriculum is applying the concept of character education in learning in schools.

Currently, the independent curriculum has been implemented in Indonesia. According to Aryanti & Saputra (2023), implementing the Independent Curriculum aims to prepare people for productive, creative, and innovative personalities. Technically, implementing the independent curriculum is one of the orientations, which is the development of attitudes. Amanulloh and Wasila (2024) explain that a specialty found in the curriculum implemented in the education system in Indonesia is the focus on character development and national identity. In addition, Ningsih et al. (2024) also stated that the Independent Curriculum is a curriculum with diverse learning. This curriculum is predicted to provide more free space (independent) for students' character development and competence. The development of attitudes referred to in the independent curriculum includes spiritual attitudes, namely faith and devotion to God Almighty, and social attitudes, namely noble, independent, democratic, and responsible. This is as stated by Nuryanti Siregar (2024) that the curriculum in Indonesia is to realize a sovereign, independent, and individual Advanced Indonesia through the creation of Pancasila Students who are critical, creative, independent, faithful, devoted to God Almighty, and have noble morals, work together and are globally diverse. In addition to curriculum development, education in Indonesia is also directed at implementing character education.

According to Winata et al. (2020), Character education is a moral or character education system that instills and develops good character values in a person to have good knowledge and actions. Character education is intended to prepare a generation that is more sensitive to the development of the times while still adhering to the nation's values, norms, and cultureCharacter education is implemented with an integration

strategy in subjects (Rahman et al., 2020). Therefore, character education is a basic need for the Indonesian nation, and each subject has the same opportunity to implement this character education. The implementation of character education in schools must be in line and integrated with the subjects or subjects of each teacher. Thus, each subject must involve character attitude values per the curriculum's policies.

At the Nurul Ilmi Jambi Integrated Islamic Elementary School (SD), all teachers implement character education without exception. Character education must be integrated with each subject, so each teacher has methods and ways to apply the concept of character education according to the subject's characteristics. Unfortunately, no research has stated that implementing character education through learning fields of study, especially mathematics can effectively improve students' spiritual and social attitudes.

In general, mathematics education has different characteristics from other subjects. This subject is often considered relatively tricky for teachers and students, so many teachers have obstacles (increasing the difficulty of learning mathematics) if it has to be integrated with character education. Thus, various studies related to mathematics education are more dominantly related to problem-solving (Hidayat & Sariningsih, 2018; Wulandari et al., 2018; Zulfikar, 2019; Noviantii et al., 2020), mathematical literacy (Fathani, 2016), implementation of specific learning models (Nainggolan, 2019; Ariasih et al., 2019; Novianti et al., 2020), increasing motivation to learn mathematics (Ai Muflihah, 2021), creative thinking (Nurhayati & Rahardi, 2021), blended learning (Kurniawati et al., 2019). Meanwhile, research on spiritual attitudes and social attitudes in mathematics learning still needs to be more extensive and extensive. Based on the perceptions and situations above, more systematic research is needed to see the extent of the impact of character education on the development of students' attitudes. This research is intended to provide an overview of the impact of integrating character education from the perspective of mathematics education. Thus, the results of this study can be used as inspiration for mathematics and other subject teachers to implement character education in their respective schools according to the characteristics of their subjects.

2. METHODOLOGY

This study uses a quantitative approach with a quasi-experimental design (Hastjarjo, 2019). The population in this study were all second-grade students, totaling 236 people, who were divided into 10 study group classes. The sample used in this study was 29 class 2D students, who were taken randomly. The data in this study were collected using test techniques (pretest and posttest) from the perspective of mathematics learning.

The instrument used in the study was a questionnaire, namely a set of questions given to students after and before learning integrated mathematics oriented toward character education. Each question was scored using a Likert scale (1-5), as done by Mawardi (2019). The total number of questions used in the instrument was 40, consisting of 20 questions for spiritual attitudes and 20 for social attitudes. The spiritual attitudes measured in this study include obedience in worship, grateful behavior, praying before and after studying, and tolerance. The social attitudes measured include the elements of discipline, self-confidence, politeness, and responsibility. Thus, each element is measured with five different questions. Thus, the maximum score for each variable is 100, and the minimum score is 20.

Data analysis was carried out in several stages of the study. The first stage is the classification of scores into "high," "medium," and "low" groups. The classification is decided based on the scores obtained with the criteria in Table 1.

Table 1. Classification of attitude categories

Classification	Range of score	Category
1	81-100	High
2	61-80	Moderate
3	20-60	Low

After the data is classified in Table 1, it is analyzed using the N-gain and T-tests. The N-gain test is used to determine the increase in attitudes before and after the implementation of learning. The T-test determines the significance of changes in students' spiritual and social attitudes. The T-test in this study was carried out with the help of SPSS 25 software. The N-gain decision-making is based on the following Table 2.

Table 2. N-gain classification

N-Gain	Improvement Classification
g > 0,70	High
0,30 < g ≤ 0,70	Moderate
g ≤ 0,30	Low

3. RESULTS AND DISCUSSION

Based on the data obtained and the analysis conducted, the data can generally be displayed as in Table 3.

Based on Table 3, it can be seen that, in general, the attitude scores obtained by students are relatively good. For spiritual attitudes, students with a score range between 81-100 in the "high" category are 14 people or around 48.3%. Students who get a score between 61-80 in the "medium" category are 11 people or around 37.9%, while students who get a score between 20-60 in the "low" category are four people or around 13.8%. Thus, it can be said that students' average spiritual attitude score is in the "medium" category. However, in terms of composition, it is dominated by the group with the 'high' category. Table 3 shows that the social attitude scores obtained by students in class 2D of the integrated Islamic Elementary School Nurul Ilmi Jambi are also relatively good. For social attitudes, students with a score range between 81-100 with the "high" category and the

"medium" category are the same, namely 13 people or around 44.83%. As for students who scored between 20-60 in the "low" category, there were three people or around 10%. Thus, it can be said that the average score of students' social attitudes is in the "medium" category. However, in terms of composition, it is dominated by groups with the "high" and "medium" categories simultaneously.

Furthermore, an N-gain test was conducted to determine how the student's spiritual and social attitudes increased after participating in mathematics learning. The N-gain test on the data from the spiritual and social attitude tests of students in mathematics learning in class 2D as a sample can be shown in Table 4.

Based on Table 4, it can be seen that students who received an increase in the "High" category were 11 people or around 37.9%. Furthermore, students who received an increase in spiritual attitudes in the "medium" category were 16 people or around 55.2%. Meanwhile, students who received an increase in spiritual attitudes

Table 3. Score range and categories of student attitudes

Variable	Range of Score	Category	Number of respondents	Percentage
Spiritual Attitude	81-100	High	14	48,3
	61-80	Medium	11	37,9
	20-60	Low	4	13,8
Total			29	100
Social Attitude	81-100	High	13	44,83
	61-80	Medium	13	44,83
	20-60	Low	3	10
Total			29	100

Table 4. Improvement in students' attitudes based on the N-gain test

Variable	Range of Score	Category	Number of respondents	Percentage
Spiritual Attitude	g > 0,70	High	11	37,9
	0,30 < g ≤ 0,70	Medium	16	55,2
	g ≤ 0,30	Low	2	6,9
Total			29	100
Social Attitude	g > 0,70	High	12	42,4
	0,30 < g ≤ 0,70	Medium	16	55,2
	g ≤ 0,30	Low	1	3,4
Total			29	100

in the "low" category were two people or around 6.9%. Based on these data, the increase in spiritual attitudes of class 2D students after participating in mathematics learning that applies the concept of character education grew well.

Furthermore, in social attitudes, based on Table 4, it can be seen that students who received an increase in the "High" category were 12 people or around 42.4%. Meanwhile, students who received an increase in social attitudes in the "medium" category were 16 people or around 55.2%. Meanwhile, students who received an increase in social attitudes in the "low" category were one person or around 3.4%. Based on these data, the increase in social attitudes of class 2D students after participating in mathematics learning that applies the concept of character education grew well.

A T-test was conducted to determine whether the increase in spiritual attitude and social attitude scores is as in the data above (Table 4). The test results on the data can be seen in Table 5.

Based on Table 5, the variables of spiritual attitude and social attitude obtained a sig. (2-tailed) value of 0.000 <0.05. This means that there is an average difference between the pretest and posttest values for each variable. In other words, it can be said that the increase in students' spiritual and social attitudes after participating in mathematics learning with a character learning orientation is significant.

Referring to the data and results of the analysis that have been carried out as described above, the results of the study show that the application of the concept of character education in class 2 of Nurul Ilmi Integrated Islamic Elementary School has a positive and significant effect on the development of student's attitudes, both in spiritual attitudes and social attitudes. The average increase in students' spiritual and social attitudes is in the "medium" category but tends to be "high." Thus, it is recommended that teachers be more professional in implementing character learning in schools in various learning contexts.

The results of this study are in line with the results of previous studies, which stated that the implementation of the concept of character education has a positive impact on student learning outcomes. Utomo et al. (2023) found differences in student personality before and after science learning with a character education approach. Meanwhile, research by Djaja et al. (2023) states that character education can increase students' self-confidence. Other research conducted by (Yuningsih and Yusuf, 2024) also states that education has a positive effect on increasing politeness and aspects of openness and honesty, self-discipline, and responsibility. Other related research conducted by (Dinah, 2024) states that character education affects attitudes toward tolerance and peace. Thus, this study supports previous research by bringing new evidence from the mathematics education perspective.

The study's results inspire every teacher, especially elementary school mathematics teachers, to develop spiritual and social attitudes that can be improved by implementing mathematics learning oriented toward character education. Therefore, non-mathematics teachers can contribute significantly to developing spiritual and social attitudes through their subjects. This is intended so that character education is a moral or character education system that instills and develops good character values in a person so that they have good knowledge and actions in their lives (Winata et al., 2020) can be achieved better. In addition, the results of this study also provide a new perspective that the concept of character education applied together with the independent curriculum has the potential to produce an intelligent, characterful generation. An intelligent generation with character, namely having good spiritual attitudes and social attitudes, has the potential to become good citizens of the world. Students with character

Table 5. One-sample test

	T	Df	Sig. (2-tailed)	Mean difference	95% confidence interval of the difference	
					Lower	Upper
Spiritual Pretest	11.062	28	.000	41.452	33.80	49.10
Spiritual Posttest	16.981	28	.000	57.581	50.66	64.51
Social Pretest	11.311	28	.000	41.935	34.36	49.51
Social Posttest	17.341	28	.000	63.903	56.38	71.43

Note: Test Value = 0

enable them to collaborate harmoniously with other world citizens. This is in line with the opinion of Hartinah et al. (2024) that this innovation (character education) has a positive impact on the formation of student character, with an emphasis on values such as honesty, responsibility, creativity, and leadership. (Siti Khopipatu, 2024) also stated that character education is one of the ways to create an intelligent generation with character. In addition, an intelligent and characterful generation also enables them to manage natural resources wisely and wisely for the sustainable development of the nation and state.

This study implies that mathematics and non-mathematics teachers have the potential to participate in creating an intelligent and characterful generation through their respective subjects. Through their respective subjects, every teacher in Indonesia needs to apply character education systematically. This is in line with the explanation of Rahman et al. (2020), which is that the implementation of character education is integrated with subjects. In addition, to oversee the implementation of character education by teachers through their respective subjects, the government needs to issue relevant policies. School supervisors and subject supervisors also need to be involved more actively and professionally to ensure that the implementation of character education in schools runs effectively and creates an intelligent and characterful generation.

At the end of the study, several weaknesses need to be understood by the public in general. Some of these weaknesses include that this study only involved a relatively small number of samples of 2D-grade students. In contrast, the total number of elementary school students in the school is very large. This situation has the potential for bias in the existing data. In addition, in this study, character education in the school has been carried out from grade one to grade two; therefore, of course, there is a difference between the length of school and the increase in students' character abilities. Thus, other similar studies are needed to further the process of character education in the school.

4. CONCLUSION

Based on the data and analysis that has been done, it can be concluded that the application of the concept of character education in grade 2 of SD Islam Terpadu Nurul Ilmi has a positive and significant effect on the development of student's attitudes, both in spiritual attitudes and social attitudes. The average increase in students' spiritual and social attitudes is in the "medium" category but tends to be "high." Thus, it is recommended for teachers to be more professional in implementing character learning in schools in various learning contexts.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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