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ANALYSIS OF STUDENTS' ATTITUDES TOWARDS STEM AND 21ST CENTURY SKILLS IN ELEMENTARY SCHOOL FROM A GENDER PERSPECTIVE

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Abstract

Science, Technology/Engineering, Mathematics (STEM) and 21st Century Skills are crucial to be implemented for all students starting from an early age, specifically at the elementary school level. This study aims to describe students' attitudes towards STEM and 21st Century Skills in terms of gender at the elementary school level. This research is a quantitative survey using a Cross-Sectional approach, which can explain and compare the results of questionnaires given to students. Student attitudes are explained based on STEM domains and 21st Century Skills, considering gender. The research respondents were 37 elementary school students at SD Muhammadiyah 2 Sidoarjo. The results of this study show that in the Science domain, the average score of students is 3.45 (medium), in the mathematics domain, the average score is 2.97 (low), in the Technology/Engineering domain, the average score is 3.76 (medium), and in the 21st Century Skills domain, the average score is 3.91 (medium). Additionally, there is a significant difference between the attitudes of male and female students towards STEM and 21st Century Skills.

Keywords: 4-7 keywords, separate with the semicolon and alphabetical order

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INTRODUCTION | مقدمة

In the 21st century, every individual is required to develop various potentials to be able to compete competitively in various fields of life, including social, economic, political, and educational spheres. Education is the initial process that every individual must go through to enter real life. The issue of gender equality is an important topic that is part of the development of the times, supported by advancements in science and technology that drive economic development and information globalization, allowing women to have the same roles as men. In the family environment, women need to play a primary role in education. Gender equality is crucially supported by adequate education. Therefore, education must ensure equality between men and women so that they can have human rights and participate in education. Access to education for women should not lag behind that for men. Based on this, students need a learning system that can support the learning needs of each student. The learning needs for 21st-century skills in all subjects, including science education in elementary schools, must be provided by all educators. 21st-century skills are characterized by learning skills, abilities, and literacy. Learning skills involve activities that include collaboration, communication, critical thinking, and creativity. The development of these skills cannot be achieved without planned and systematic efforts; instead, it must be done deliberately with a targeted design. These skills are acquired from students' experiences (Redhana, 2019).

The learning needs in the 21st century include 4C skills (critical thinking, creativity, communication, and collaboration) and IT literacy (Marsa & Desnita, 2020). These 21st-century skills prioritize students' abilities in critical thinking, problem-solving, collaboration, communication, and creativity. These skills can strengthen social capital and intellectual capital, summarized as the 4Cs: communication, collaboration, critical thinking and problem solving, and creativity and innovation. Operationally, the 4Cs have four categories of steps: First, ways of thinking, including creativity, innovation, critical thinking, problem-solving, decision-making, and proactive learning. Second, ways of working, including communication, collaboration, and teamwork. Third, ways of living as both global and local citizens; and fourth, tools for developing 21st-century skills, namely information technology, digital networks, and literacy (Halimatul Mu et al., n.d.). The development of 21st-century learning can support these learning needs, marked by rapid changes, development, and advancements in information and communication technology.

The Ministry of Education and Culture explains that 21st-century learning represents a transition where the developed curriculum guides schools from being teacher-centered to student-centered (Daryanto, 2017). This aligns with the demands of the future where students must have thinking and learning skills. 21st-century learning also plays a meaningful role in the era of globalization in the 21st century, requiring every citizen to have the abilities to meet the demands of the times, both women and men. Women and men have the right to receive education, understanding, and equal treatment as a form of equality, making the 21st century an era open to change. Every student has the right to equal learning opportunities, necessitating an effective learning approach for all students.

The goal of 21st-century education is to encourage students to master essential and useful skills to be more responsive to current changes and developments (Pratiwi et al., n.d.). The primary aim of 21st-century education is to build individual learning capabilities and support their development into lifelong learners who are active, independent, and creative. Therefore, educators must also become role models in learning. Educators, as learning role models, will provide guidance to help students develop their skills and offer various supports to help them achieve good learning outcomes. Education will encourage students to interact and build new knowledge with others (Almarzooq et al., 2020). To strengthen 21st-century learning, STEM education is used.

Currently, many elementary schools have implemented STEM learning. This can be seen from the high percentage of teachers conducting student-centered learning. Teachers also apply learning models such as inquiry, project-based learning, and problem-based learning. The 2013 Curriculum, implemented in elementary schools, has accustomed teachers to integrated learning in both content and skills. This indicates that STEM learning can be implemented in elementary education in Indonesia. In the implementation of STEM learning, there are several challenges faced, such as lack of support and pedagogical knowledge, technical challenges, time constraints, access to STEM content, and facilities, especially technology-based facilities. Technical challenges and time constraints are the most commonly reported challenges by teachers in the implementation of STEM (Nuragnia et al., 2021).

STEM education is an approach in the development of education, particularly in the field of science in elementary schools. The STEM approach integrates science, technology, engineering, and mathematics into a comprehensive curriculum (Ismail et al., 2016). STEM is an approach to learning science, technology, engineering, and mathematics that integrates problem-based learning with real-world issues. The STEM approach combines various disciplines

into teaching methods. This approach establishes that students must have both knowledge and skills simultaneously to solve problems using the knowledge and skills available in the learning areas. STEM learning approaches build students' characters towards STEM, demanding them to become problems solvers, creators, innovators, technologically literate, independent, logical and critical thinkers, as well as integrative thinkers. Additionally, the STEM approach encourages students to enhance their cognitive, emotional, and psychomotor characteristics and be able to design, develop, use, and apply technology in real life. Therefore, STEM skills learning approaches play an important role in education today.

The STEM learning approach is one alternative that can develop science literacy skills among elementary school students. This STEM approach is very appealing because it can provide individual skills and competencies for students to enhance their interest and talent in STEM fields, and improve students' literacy in those learning areas (Karalar et al., 2021). The STEM approach can make the learning process more varied and innovative, enabling students to analyze various academic concepts that are contextualized in daily life. STEM learning can help students to explore all relevant knowledge, gain more experience in facing everyday life problems, and develop critical thinking skills. The STEM learning approach can enhance students' thinking abilities in science literacy in elementary schools. This STEM approach can be combined with problem-based learning methods by integrating the four disciplines. The STEM approach requires students to have problem-solving skills and knowledge as well as skills and knowledge in their field of study. In natural sciences, students must use the knowledge of nature acquired to solve everyday problems. Through STEM, the sciences, technology, engineering, and mathematics can be combined into one with a focus on the learning process for problem-solving in real life. Therefore, there is a need for development in the learning model.

The development of this STEM learning model can be properly implemented in schools, providing the possibility for schools to produce a skilled generation that can compete globally. In the era of the 4.0 revolution, generations need to have competitiveness from various aspects. The STEM education-based science learning experience can develop students' understanding of science content, innovation, problem-solving skills, and soft skills such as communication, collaboration, and leadership (Matondang, 2019). This can shape students' characters through improved STEM-based learning. Improving STEM-based student learning can build students' characters to understand a knowledge concept (science) and apply that knowledge with skills (technology) they have mastered to create or design a method (engineering) with analysis and based on mathematical data calculations (math) to obtain solutions to problem-solving, making human work easier. As a trend in the education world, STEM becomes an approach to address everyday life problems to guide students' mindset as problem solvers, inventors, innovators, fostering independence, logical thinking, technology literacy, and connecting STEM education with their job field (Mulyani, 2019).

STEM-based science learning, skills are not the only thing to consider. If they have a pleasant experience and positive feelings at the beginning of science learning, it will facilitate their learning process. Students will develop a positive attitude towards science learning, making them interested and happy to learn. Students' attitudes towards science are important because they can improve their learning outcomes and achievements, thus affecting their performance (Liaghatdar et al., 2011). The excellence of the STEM approach in science learning in this era of globalization needs to be supported by students' attitudes towards learning. At this time, they experience rapid changes in attitude, both male and female students. Both male and female students have an equal share of learning, and this difference becomes the responsibility of

educators. The STEM learning approach is an approach that can remove traditional learning by integrating four disciplines, integrating four scientific disciplines, and implementing them into the real world, making significant learning for students. Characteristics in STEM education involve the ability to apply mathematical, scientific, and engineering knowledge to design and conduct experiments accurately, such as: Analyzing and clarifying data (Kelas et al., 2021). Thus, in STEM learning, students can contribute effectively to their learning success. STEM learning in the learning process plays an important role in improving students' attitudes towards STEM, which can contribute to students' learning success. The improvement of students' attitudes towards STEM informs students to have a positive attitude towards STEM. With the development of students' attitudes towards STEM, it can shape students' characters who understand knowledge or concepts (science) and implement that knowledge through skills (technology) in a way (engineering) designed based on analysis and mathematical calculations (mathematics), thus creating real solutions to help humans solve everyday problems (Asmuni, 2020). STEM encourages students to become flexible, cooperative individuals who can collaborate with others.

METHOD | منهج

This research method is used as a scientific way to obtain data with specific purposes and utilities. This research utilizes the quantitative survey method with a Cross-Sectional approach. Quantitative Research Method is a research method based on positivist philosophy, used to study the population of 6th-grade students involving 37 specific students, data collection using research instruments, data analysis is quantitative or statistical, with the aim of testing established hypotheses (Gunasti et al., 2023). Quantitative research can be used by researchers to focus more on conducting field research on students' attitudes towards STEM and 21st-century skills viewed from gender perspectives. This research aims to identify students' attitudes towards STEM and 21st-century learning skills based on gender perspectives. Students' attitudes towards STEM and 21st-century skills are explained in several aspects, including STEM attitudes, 21st-century skills, gender, and student grades.

In this research, the data sources obtained are from male and female students in elementary schools to participate in this research. Data collection is obtained from questionnaires and observations. The data include written documents containing questionnaires about students' attitudes towards STEM and 21st-century skills viewed from gender perspectives. Questionnaire data are obtained from statements and questions about STEM learning and 21st-century skills. Each item consists of a scale of 1-5 to be filled in by all students. Data collection using questionnaires or surveys aims to determine students' attitudes towards STEM and 21st-century skills viewed from gender perspectives. Then, the questionnaire is tested using validity and reliability tests. This instrument is analyzed using SPSS. The results of the questionnaire indicate high reliability, where the Cronbach's alpha value is 0.851, and item validity is shown in Table 1. It can be seen in Table 1 that all items are declared valid with (r_calculated < r_table 0.344). Below are the results of the validity and reliability test of the questionnaire in Table 1.

Tabel 1. Uji Validitas

Item	Validitas skor	deskripsi	Item	Validitas skor	deskripsi	Item	Validitas skor	Deskripsi
1	0.548	Valid	15	0.352	Valid	29	0.673	Valid
2	0.507	Valid	16	0.345	Valid	30	0.522	Valid
3	0.353	Valid	17	0.374	Valid	31	0.425	Valid
4	0.369	Valid	18	0.655	Valid	32	0.650	Valid
5	0.638	Valid	19	0.473	Valid	33	0.405	Valid
6	0.411	Valid	20	0.360	Valid	34	0.593	Valid
7	0.375	Valid	21	0.415	Valid	35	0.599	Valid
8	0.349	Valid	22	0.355	Valid	36	0.584	Valid
9	0.702	Valid	23	0.553	Valid	37	0.361	Valid
10	0.362	Valid	24	0.393	Valid			
11	0.358	Valid	25	0.563	Valid			
12	0.526	Valid	26	0.416	Valid			
13	0.388	Valid	27	0.355	Valid			
14	0.488	Valid	28	0.662	Valid			

The table above shows that the questionnaire has been tested using SPSS to determine its validity in assessing students' attitudes towards Science, Technology/Engineering, Mathematics (STEM), and 21st Century Skills.

According to expert validation of the questionnaire on students' attitudes towards STEM (Science, Technology, Engineering, and Mathematics) and 21st-century skills in elementary schools, reviewed by gender, several steps are involved. First, experts will assess the content validity of the questionnaire, ensuring that the questions and statements presented cover relevant aspects of STEM and 21st-century skills, as well as being sensitive to gender differences. Second, they will evaluate the clarity of language and concepts used in the questionnaire, so that students can understand and respond appropriately regardless of their gender. Furthermore, expert validation will pay attention to the aspect of reliability, which is the extent to which the questionnaire can produce consistent results when given to students of different genders. Finally, experts will examine the construct validity of the questionnaire, ensuring that the instrument truly measures students' attitudes towards STEM and 21st-century skills without significant gender bias. With adequate validation, the questionnaire can be considered suitable for use in elementary education contexts oriented towards STEM and 21st-century skills development. Table 2 shows the indicators for each item in science, technology/engineering, and mathematics (STEM) on the questionnaire distributed to students

Tabel 2. Indicator Item

Domain	Indicator	Item
Science	I feel good about myself when I do science.	1
	I might choose a career in science.	2
	After I graduate from high school, I will often use science.	3
	When I am older, knowing science will help me make money.	4
	When I am older, I need to understand science for my job.	5
	I know I can do well in science.	6
	Science will be important for me in my future career.	7
	I can understand most subjects easily, but science is hard for me to understand.	8
	In the future, I can do harder science jobs.	9
Matematics	Mathematics is my worst subject	10
	When I'm older, I might choose a job that involves mathematics	11
	Mathematics is difficult for me	12
	I am the type of student who is good at mathematics	13
	I can understand most subjects easily, but mathematics is difficult for me	14
	In the future, I can solve more difficult math problems	15
	I can get good grades in mathematics	16

	I am good at mathematics	17
Engineering/ Technology	I enjoy imagining creating new products	18
	If I study Engineering, then I can improve things that people use every day	19
	I am good at building or fixing things	20
	I am interested in what makes machines work	21
	Designing products or structures will be important in my future job	22
	I want to know about how electronics work	23
	I want to be creative in my future job	24
	Knowing how to use mathematics and science together will help me find useful things	25
	I am confident that I can succeed in the field of Engineering.	26
21st – century skills	I can lead others to achieve a goal.	27
	I like helping others do many things well.	28
	At school and at home, I can do many things well.	29
	I respect all children my age even though they are different from me.	30
	I try to help other children my age	31
	When I make decisions, I think about what is good for others.	32
	When things don't go as I want, I can change my actions for the better.	33
	I can set my own learning goals.	34
	I can use my time wisely when working alone.	35
	When I have a lot of homework, I can choose what needs to be done first.	36
	I can work with all students, even if they are different from me.	37

This research aims to assess students' attitudes toward STEM by providing a questionnaire rubric that has been categorized. In this study, to test students' attitudes toward STEM and 21st-century skills, statistical analysis was conducted using Linear Regression test with SPSS software. Below is the interpretation of the linear regression test calculations.

Questionnaire rubric range X

Y	Tingkat
2.00	Very low
2.00 < x 3.00	Low
3.00 < x	Medium
y 4.00	High
< x 4.50 < x y 5.00	Very high

RESULT | نتائج

This research took place over 3 days on Friday, Monday, and Tuesday, on December 22nd, 25th, and 26th, 2023, involving all 6th-grade students at SD Muhammadiyah 2 Sidoarjo. The distribution of STEM and 21st-century skills questionnaires was carried out in class 6 Al-Farabi. The total number of students in class 6 is 16 boys and 17 girls. The distribution of these questionnaires aims to observe the students' attitudes towards Science, Technology/Engineering, Mathematics (STEM), and 21st-century skills. SD Muhammadiyah 2 Sidoarjo has already implemented STEM and 21st-century skills learning for its students.

As can be seen from Figure 1, the research has been conducted. The distribution of questionnaires to the students can be seen in the diagram concerning the students' attitudes towards STEM and 21st-century skills.

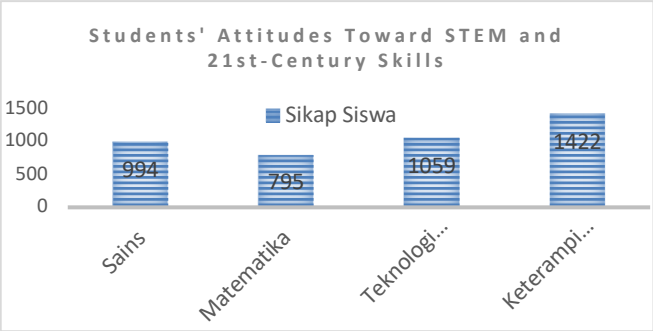

Figure 1. Results of student attitudes

In the diagram above, it is known that students' attitudes toward STEM and 21st-century skills in the understanding of science subjects for both male and female students total 994, in the domain of mathematics, the understanding held by male and female students totals 795, in the domain of technology/engineering, the understanding held by male and female students totals 1059, while in the domain of 21st-century skills, the understanding held by male and female students totals 1422. From the diagram, it can be seen that both male and female students have the highest interest in 21st-century skills, while the lowest interest from both male and female students is in the field of mathematics.

Students' attitudes toward STEM and 21st-century skills based on subjects

In this section, students' attitudes toward STEM and 21st-century skills according to subjects can be explained. Table 4 shows the analysis of students' responses to the questionnaire provided.

Tabel 3. Students' Attitudes towards STEM and 21st-century Skills

Science			Matematics			Engineering /technology			21st- century skills		
Item	Mean	description	item	Mean	decriotion	Item	Mean	Description	Item	Mean	Description
1	3.39	Medium	10	2.52	Medium	18	3.85	Medium	27	3.48	Medium
2	2.79	Low	11	3.27	Medium	19	3.61	Medium	28	4.12	Low
3	3.18	Medium	12	2.97	Low	20	3.18	Medium	29	3.88	Medium
4	3.45	Medium	13	2.67	Low	21	3.33	Medium	30	4.24	Low
5	3.55	Medium	14	3.03	Medium	22	3.21	Medium	31	3.97	Medium
6	3.36	Smedium	15	3.36	Medium	23	3.70	Medium	32	3.97	Medium
7	4.06	High	16	3.45	Medium	24	4.06	High	33	3.97	Medium
8	3.15	Medium	17	2.82	Low	25	4.73	Very high	34	3.73	Medium
9	3.18	Medium				26	3.42	Medium	35	3.61	Medium
									36	4.18	High
									37	3.94	Medium
Total : 3.45 (medium)			Total : 2.97 (low)			Total : 3.67 (medium)			Total : 3.91 (medium)		

In the domain of science subjects, the indicator with the highest average student score is "Science will be important for me in my future career" (item 7) with a score of 4.06 (high), while the lowest indicator is "I might choose a career in science" (item 2) with a score of 2.79 (low).

In the domain of mathematics subjects, the indicator with the highest average student score is "I can get good grades in mathematics" (item 16) with a score of 3.45 (moderate), while the lowest indicator is "Mathematics is my weakest subject" (item 10) with a score of 2.52 (low).

In the domain of technology/engineering, the indicator with the highest average student score is "Knowing how to use mathematics and science together will help me discover useful

things" (item 25) with a score of 4.73 (very high), while the lowest indicator is "I am good at building or fixing things" (item 20) with a score of 3.18 (moderate).

In the domain of 21st-century skills, the indicator with the highest average student score is "I respect all children my age even if they are different from me" (item 30) with a score of 4.24 (high), while the lowest indicator is "I can lead others to achieve a goal" (item 27) with a score of 3.48 (moderate).

Tabel 4. Uji Regresi Linier

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	21.642	10.057		2.152	.040
	Science	.257	.250	.194	1.030	.311
	Mathematics	.292	.309	.167	.945	.352
	Engineering / technology	.208	.238	.164	.872	.390

a. Dependent Variable: 21st-century skills

Students' attitudes toward STEM and 21st-century skills based on gender

In this section, it explains the students' attitudes toward STEM and 21st-century skills based on gender. There are a total of 16 male students and 17 female students. The results can be seen in Table 5.

Tabel 5. Students' attitudes towards STEM and 21st-century skills based on gender

Item	Male		Female		Item	Male		Female	
	Mean	Description	Mean	Description		Mean	Description	Mean	description
1	3.44	Medium	3.35	Medium	20	3.38	Medium	3.00	Low
2	3.06	Medium	2.53	Low	21	3.44	Medium	3.24	Medium
3	3.25	Medium	3.12	Medium	22	3.13	Medium	3.29	Medium
4	3.56	Medium	3.35	Medium	23	3.69	Medium	3.71	Medium
5	3.50	Medium	3.59	Medium	24	3.75	Medium	4.35	Low
6	3.25	Medium	3.47	Medium	25	3.44	Medium	4.00	Low
7	4.31	Low	3.82	Medium	26	3.50	Medium	3.35	Medium
8	3.06	Medium	3.24	Medium	27	3.63	Medium	3.35	Medium
9	2.81	Low	3.53	Medium	28	3.88	Medium	4.35	Low
10	2.56	Low	2.47	Low	29	3.56	Medium	4.18	Low
11	2.88	Low	3.65	Medium	30	3.94	Medium	4.53	Very high
12	3.25	Medium	2.71	Low	31	3.56	Medium	4.35	High
13	2.31	Low	3.00	Low	32	3.63	Medium	4.29	High
14	3.25	Medium	2.82	Low	33	3.63	Medium	2.29	Low
15	3.13	Medium	3.59	Medium	34	3.75	Medium	3.71	Medium
16	3.19	Medium	3.71	Medium	35	3.63	Medium	3.59	Medium
17	2.44	Low	3.18	Medium	36	3.88	Medium	4.47	High
18	3.69	Medium	4.00	High	37	4.06	Low	3.82	Medium
19	3.81	Medium	3.14	Medium					

In the domain of science, the average highest indicator for male students is "Science will be important for me in my future career" (item 7) with a score of 4.31 (high), while the lowest indicator is "In the future, I might do harder science jobs" (item 9) with a score of 2.81 (low). Meanwhile, the highest indicator for female students is "Science will be important for me in my

future career" (item 7) with a score of 3.82 (medium), while the lowest indicator is "I might choose a career in science" (item 2) with a score of 2.53 (low).

In the domain of mathematics, the average highest indicator for male students is "Math is difficult for me" (item 12) with a score of 3.25 (medium), while the lowest indicator for male students is "I am a type of student who is good in mathematics" (item 13) with a score of 2.31 (low). On the other hand, the highest indicator for female students is "I can get good grades in mathematics" (item 16) with a score of 3.71 (medium), while the lowest indicator for female students is "Mathematics is my worst subject" (item 10) with a score of 2.47 (low).

In the domain of technology and engineering, the average highest indicator for male students is "If I learn engineering, then I can improve things used by people every day" (item 19) with a score of 3.81 (medium), while the lowest indicator for male students is "Designing products or structures will be important in my future job" (item 22) with a score of 3.13 (medium). Meanwhile, the highest indicator for female students is "I want to be creative in my future job" (item 24) with a score of 4.35 (high), while the lowest indicator for female students is "I am good at building or fixing things" (item 20) with a score of 3.00 (low).

In the domain of 21st-century skills, the average highest indicator for male students is "I can work with all students, even if they are different from me" (item 37) with a score of 4.06 (high), while the lowest indicator for male students is "I try to help other children my age" (item 31) with a score of 3.56 (medium). On the other hand, the highest indicator for female students is "I respect all children my age even if they are different from me" (item 30) with a score of 4.53 (very high), while the lowest indicator for female students is "When things don't go as I want, I can change my actions for the better" (item 33) with a score of 2.29 (low)

Tabel 7. Between-Subjects Tests MANOVA Type III

Source	Dependent variable	Sum of squares	Df	Mean	f	sig
Gender	Science	18.031	2	9.016	636	537
	Mathematics	2.018	2	1.009	119	888
	Technology/engineering	23.340	2	14.170	927	407
	21st-century skills	17.889	2	8.944	351	707

In Table 7, it is shown that the dimension with very high interest is technology and engineering, where male students have a superior attitude towards technology compared to female students. Male students are more inclined to choose STEM fields compared to female students, who may indirectly be influenced by beliefs and benefits related to STEM. Male students participating in technical education programs have a higher attitude towards engineering compared to female students in the same program.

DISCUSSION | مناقشة

Based on the above research results, it can be seen that students' attitudes towards STEM and 21st-century skills vary based on subjects and gender. The influence of the questionnaire distribution results can be observed using linear regression analysis. Overall, the questionnaire results show a moderate level of influence, whereas the attitude towards STEM education has a significant relationship with the skills that students can develop in the 21st century. Therefore, to cultivate innovators and technology-savvy individuals in the 21st century, we must enhance students' attitudes and interests in STEM and 21st-century skills.

During the research activities in class 6 at Al-Farabi in SD Muhammadiyah Sidoarjo, there were 33 students, consisting of 16 male and 17 female students. This school has implemented STEM and 21st-century skills education, particularly in class 6, effectively.

The results of the questionnaire distributed to students using STEM-based approaches have been analyzed. The results from the questionnaire answered by both research subjects, male and female students, include four indicators: (1) Science, (2) Mathematics, (3) Technology/Engineering, and (4) 21st-Century Skills. The highest-rated indicator regarding students' attitudes towards subjects is technology/engineering, specifically the item "Knowing how to use mathematics and science together will help me discover useful things" (item 25) with a score of 4.73 (very high). Additionally, in the 21st-century skills indicator, "I respect all children my age even if they are different from me" (item 30) scored 4.24, and in the science indicator, "Science will be important to me in my future career" (item 7) scored 4.06 (high). On average, all indicators of students' attitudes towards subjects have high scores, except for mathematics, which does not have the highest score as it is perceived as more challenging than other subjects.

Regarding gender-specific results from the questionnaire, first, the male students' responses include "Science will be important to me in my future career" (item 7) with a score of 4.31 (high) and "I can work with all students, even if they are different from me" (item 37) with a score of 4.06 (high). Second, the female students' responses include "I respect all children my age, even if they are different from me" (item 30) with a score of 4.53 (very high), and "When I have a lot of homework, I can choose what to do first" (item 36) with a score of 4.47 (high). In conclusion, based on the questionnaire results analyzed by gender, both male and female students at SD Muhammadiyah 2 Sidoarjo have the ability to master STEM and 21st-century skills.

However, concerning gender, male students seem to have more aspirations for STEM-related careers than female students. It appears that females may not be interested or prefer to avoid STEM fields, possibly due to gender bias, resulting in their underrepresentation in STEM fields (Moss-Racusin et al., 2018). Female students tend to be more anxious when working on mathematics problems compared to male students. Boys tend to perform relatively better in science and mathematics, while girls are relatively better in reading than in other academic areas. Therefore, male and female students exhibit differences in gender-related abilities in STEM education (Stoet & Geary, 2018)

CONCLUSSION | خاتمة

Overall, students' attitudes towards Science, Technology/Engineering, and Mathematics (STEM) as well as 21st-century skills are at a moderate level. Looking at the STEM domain, there is a significant difference in students' attitudes towards STEM and 21st-century skills based on gender. From the perspective of student attitudes, the average scores from the questionnaire indicate that students' attitudes towards STEM are highest dominantly in the 21st-century skills dimension and lowest dominantly in the mathematics dimension.

STEM education across genders exhibits significantly different attitudes. Therefore, we as educators in elementary schools must be the most important factor in attracting interest in STEM. Consequently, students need to be trained in STEM and 21st-century skills approaches as these approaches entail concepts and skills crucial for future life.

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