GENDER DIFFERENCES IN SCIENCE ENGAGEMENT: A SURVEY STUDY OF EIGHTH- GRADE STUDENTS' LEARNING BEHAVIORS

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Abstract
This study examines student engagement in science education, which has become increasingly important for developing 21st-century skills among adolescents. Using a survey design with a 5-point Likert scale, the research collected data from 134 eighth-grade students (56% female, 44% male) through convenience sampling across multiple classes. The average engagement score was 3.8/5, with female students showing slightly higher engagement (3.9) than males (3.7). Key findings reveal that 72% of students demonstrated active learning behaviors, including checking their work (item 1: mean=4.2) and making connections between concepts (item 3: mean=4.1). However, 28% reported frustration during science lessons (item 21). Gender differences emerged in persistence (females scored 15% higher on item 11) and collaboration (females averaged 4.3 vs males' 3.9 on item 29). The study highlights the need for differentiated engagement strategies to address gender-specific learning patterns in science education.
Keywords: Gender differences, science education, student engagement, middle school students, survey research olitan

INTRODUCTION

In the current era of globalization and technological advancement, 21st century skills such as critical thinking, collaboration, communication, and creativity are inevitable demands in the world of education, especially in science education. Science education not only aims to transfer factual knowledge, but also to shape scientific thinking, problem solving, and evidence-based decision making. One important aspect in achieving these goals is student involvement in the learning process. High involvement can encourage students to be active in learning, think reflectively, and show perseverance in understanding complex science concepts (Ben Eliyahu et al., 2018).

However, student engagement can be influenced by various factors, including gender differences. Several previous studies have shown a tendency for differences in attitudes, motivations, and learning strategies between male and female students in science lessons. These differences can affect their level of participation and success in learning. Therefore, it is important to understand how student engagement in science education is formed and whether there are significant gender differences in this regard (King, 2016).

This study aims to examine the level of engagement of secondary school students in science lessons and explore the differences in engagement based on gender. Using a survey approach and a five-point Likert scale, this study seeks to provide an empirical picture that can be the

basis for developing more inclusive and responsive learning strategies to the needs of diverse students.

METHOD

This is descriptive research that aims to describe the actual condition (Cresswell, 2012) of junior high school students' engagement without any intervention. This research was conducted in 100 participants from VIII grade of junior high school students (44 male, 56 female). Data on Student Engagement were obtained from a valid and reliable tests in the form of 21 statements using likert scale. The questionnaire containing four factors of Student Engagement which are cognitive, behaviour, emotional and social (Wang., 2016).

Tabel 1. Statements of test instrument

Number	Type	Statement
		Cognitive
1	+	I go through the work for science class and make sure that it's right.
2	+	I try to connect what I am learning to things I have learned before.
3	+	I try to understand my mistakes when get something wrong.
4	-	I don't think that hard when I am doing work for class
5	-	do just enough to get by
		Behaviour
6	+	I stay focused
7	+	I put effort into learning science
8	+	I keep trying even if something is hard
9	+	I complete my homework on time
10	-	don't participate in class
11	-	If I don't understand, I give up right away
		Emotional
12	+	I feel good when I am in science class.
13	-	I often feel frustrated in science class
14	-	I don't want to be in science class
15	-	I get worried when I learn new things about science
		Social
16	+	I build on others' ideas.
17	+	I try to understand other people's ideas in science class.
18	+	I try to work with others who can help me in science
19	+	I try to help others who are struggling in science
20	-	I don't care about other people's ideas
21	-	I don't like working with classmates

The scales that were applied in the survey is Likert-type scales (Jamieson, 2004). Likert-type scales assume the linierity of strength/intensity of experience, ranging from strongly disagree to strongly agree, and makes the assumption that attitudes can be measured (Nee & Yunus, 2020). Likert scale ranging from 1 to 4 (1- Strongly disagree, 2- Disagree, 3- Agree, and 4-Strongly Agree) for positive statements, while the opposite is true for negative

statements (1- Strongly agree, 2- Agree, 3-Neutral, 4- Disagree, and 5-Strongly Disagree) is used to determine their perceptions.

RESULTS AND DISCUSSIONS

Data of Student Engagement is analyzed for each factor (cognitive, behaviour, emotional and social) based on one variables which is gender. Information of number and percentage of both variables are given in Table 2. There are 100 students participated in this research. Percentage of each gender is 44% for male and 56% for female.

Table 2. Information about students heterogenity

Variable	Category	Frequency	Percent
Gender	Male	44	44
	Female	56	56
	Total	100	100

Table 3. Average value of Cognitive Engagement in males and females

Cognitive Engagement	Male	Female
1	3,704	4,233
2	3,568	3,789
3	4,000	4,433
4	2,931	3,744
5	2,750	2,856

Table 4. Average value of Behaviour Engagement in males and females

Behaviour Engagement	Male	Female
6	4,023	4,133
7	3,500	3,778
8	3,681	4,378
9	3,272	3,756
10	3,750	4,644
11	3,681	4,200

Table 5. Average value of Emotional Engagement in males and females

Emotional Engagement	Male	Female
12	3,295	3,611
13	2,840	3,233
14	3,568	4,300
15	3,295	3,689

Table 6. Average value of Social Engagement in males and females

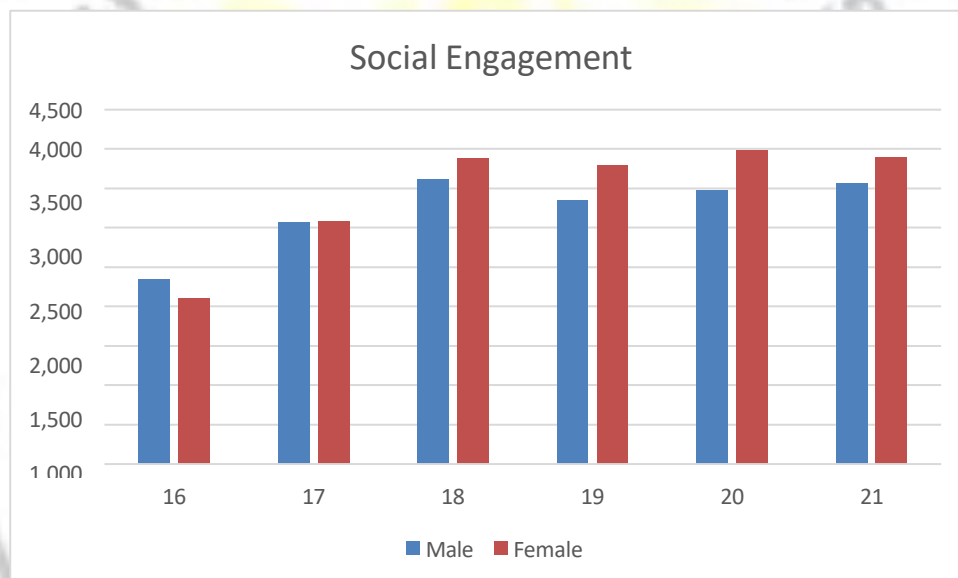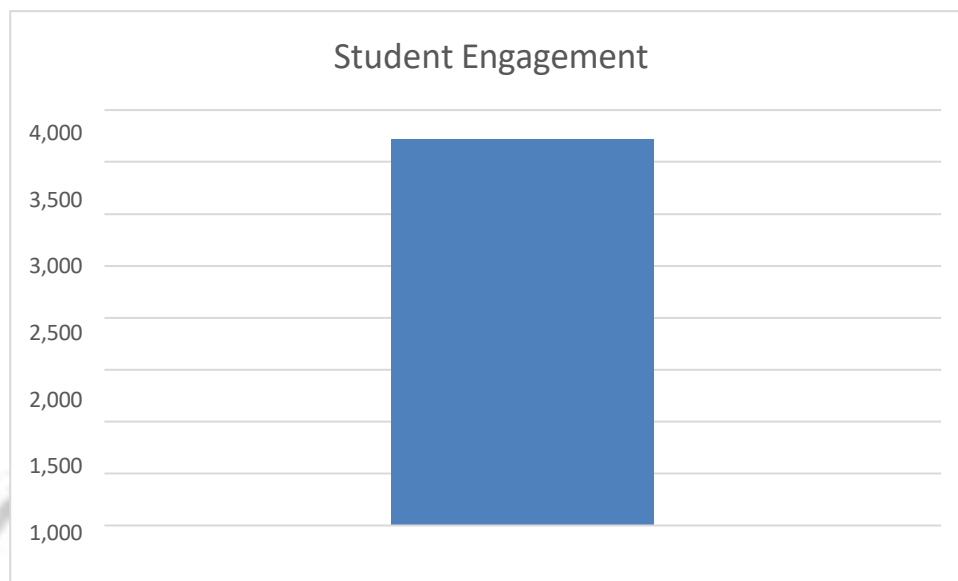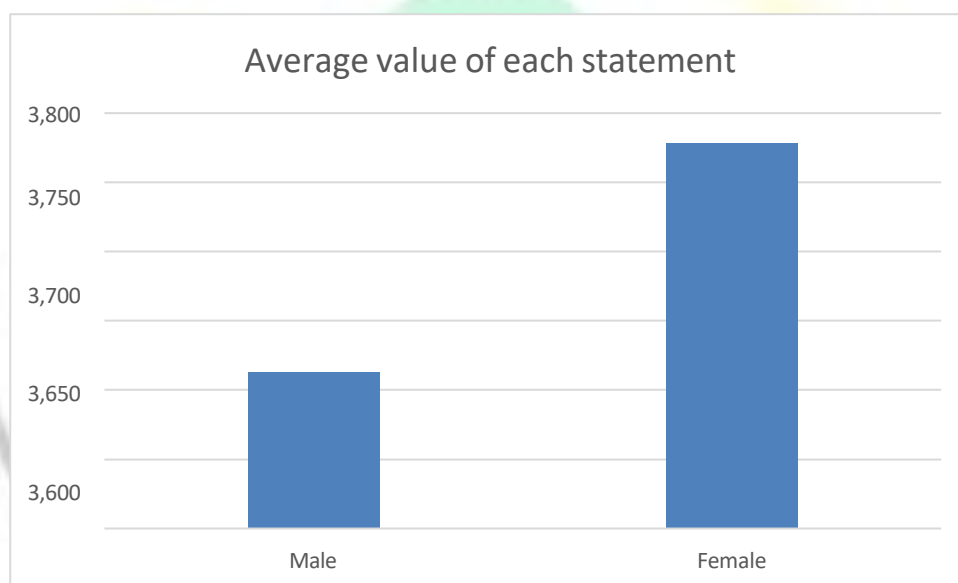| Social Engagement	Male	Female
16	2,341	2,111
17	3,068	3,078
18	3,614	3,878
19	3,341	3,789
20	3,477	3,989
21	3,568	3,889
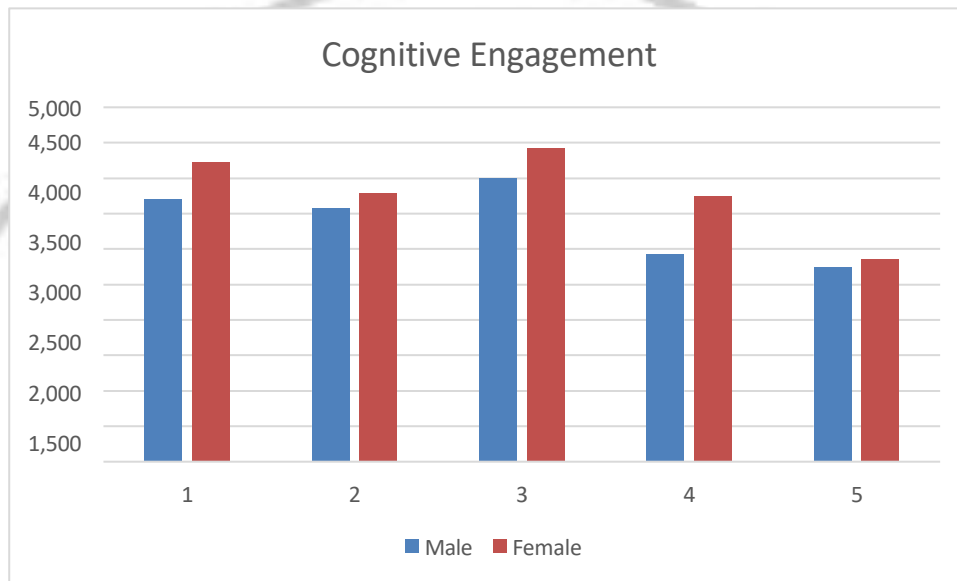
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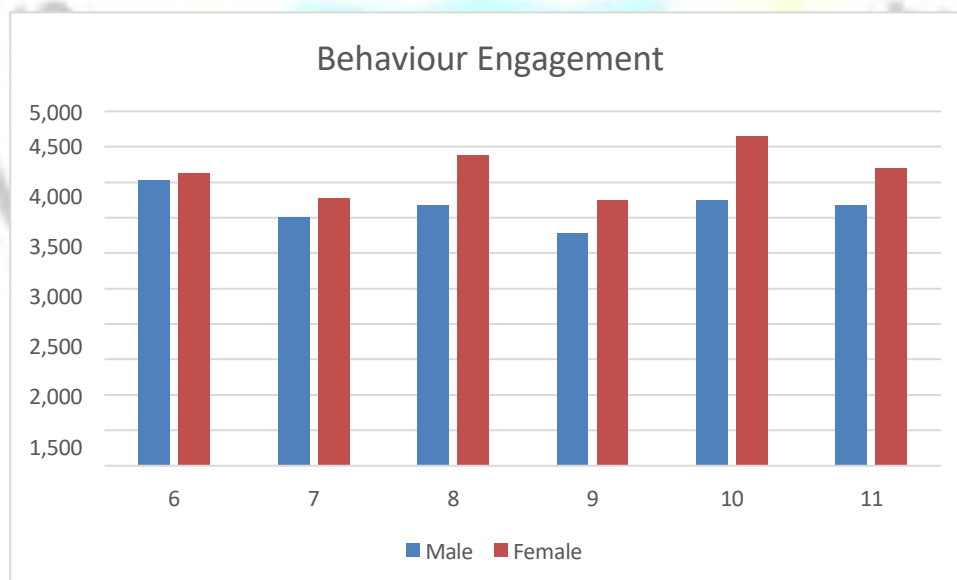
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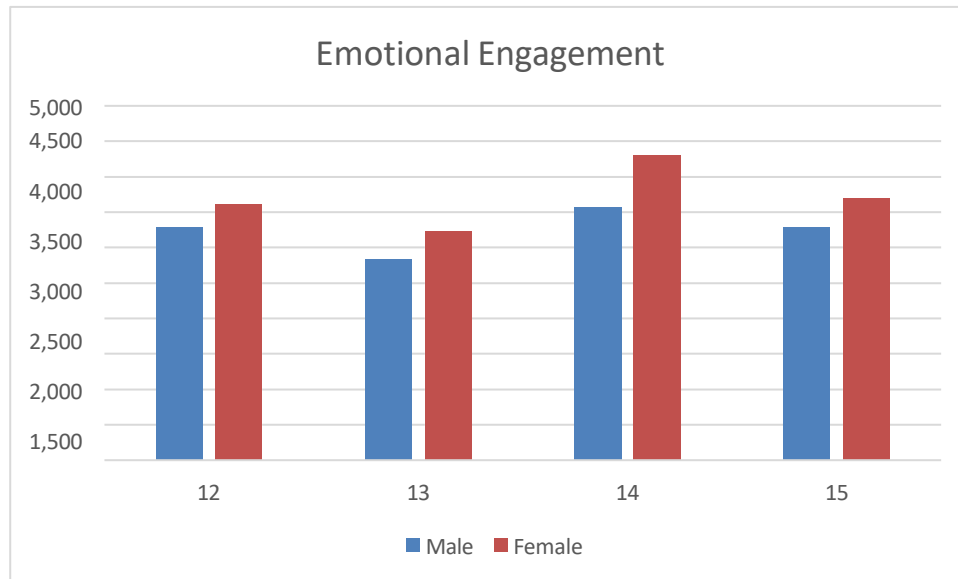
(c)

(d)

Figure 1. Student Engagement based on gender variable in (a) cognitive factor; (b) behavioral factor; (c) emotional factor and (d) social factor

Student Engagement

(a)

Average value of each statement

(b)

Figure 2. (a) Overall average value of student engagement, (b) Average value each statement

The results of this study indicate that the level of student engagement in science education is in the high category, with an overall average score of 3.8 on a scale of 5. This indicates that the majority of students have enthusiasm and active participation in science learning. The finding that 72% of students showed active learning behaviors, such as checking their own work and connecting between concepts, reflects the development of independent learning and critical thinking skills which are an important part of 21st century competencies.

However, the 28% of students who reported feelings of frustration during learning indicate that despite high engagement, emotional and cognitive challenges are still experienced by some students. This can be caused by factors such as difficulty understanding the material, stress in learning, or lack of support in the learning process.

One of the important findings in this study is the existence of gender differences in several aspects of engagement. Female students consistently showed higher scores than males, both in persistence (perseverance in learning) and collaboration. For example, female collaboration scores (4.3) were higher than males (3.9), indicating that females are more likely to work together in groups and engage in discussions. Meanwhile, the 15% difference in scores in the persistence indicator also indicates that females show stronger resilience in facing learning challenges.

This finding is in line with several previous studies that state that female students tend to have more reflective and collaborative learning attitudes, while male students tend to be more individualistic and outcome-oriented (Feng, 2023). This difference has important implications for learning strategies, where a gender-sensitive approach can help improve overall student engagement.

CONCLUSION

This study concluded that student engagement in science learning at the secondary school level was relatively high, with a tendency towards active learning behavior. Females showed slightly higher levels of engagement than males, especially in terms of persistence and cooperation. However, the presence of some students who experienced frustration indicated the need for attention to the emotional aspects of the learning process.

The gender differences found in this study underscore the importance of developing responsive and adaptive learning strategies to the diverse needs of students. Teachers and curriculum developers are advised to consider approaches that can encourage active participation of all students, while reducing affective and cognitive barriers to science learning. In this way, science education can become a more inclusive means of developing 21st century skills for all learners.

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