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RESEARCH ARTICLE

Do Positive Perceptions of Student-Centered Learning Translate to Achievement? Insights from Sixth-Grade Mathematics Students

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ABSTRACT

Student-centered learning (SCL) has gained emphasis in educational reforms to promote active student engagement, deeper understanding, and improved learning outcomes. Despite the growing interest in SCL, little is known about how elementary students perceive its application in mathematics education, particularly in the Philippines. This study aimed to explore the perceptions of sixth-grade students in central schools regarding SCL in mathematics. Specifically, it investigated students' overall perceptions of SCL, differences in perceptions based on gender, and the relationship between these perceptions and their mathematics achievement. Using correlational and comparative designs, data were collected from 132 sixth-grade students enrolled in two central schools in Tacloban City, Philippines, through a survey questionnaire based on the MISCL toolkit, covering six dimensions of SCL. Results indicated that students generally viewed their mathematics learning experiences as highly student-centered. There was no significant difference in perceptions between male and female students. This suggests that SCL can be equally inclusive and effective across genders, highlighting its potential to promote equitable learning environments. Furthermore, no significant relationship was found between students' SCL perceptions and mathematics achievement. This implies that while students may hold favorable views of SCL, these perceptions do not necessarily lead to higher mathematics achievement. This suggests that other factors, such as prior knowledge, cognitive ability, instructional quality, or assessment alignment, may play a more critical role in influencing academic outcomes. This study underscores the need for further refinement of SCL strategies and the incorporation of additional instructional supports to enhance its effectiveness. It also contributes to the ongoing discourse on student engagement and instructional practices in elementary mathematics education.

Keywords: Central schools, mathematics achievement, perceptions, student-centered learning (SCL).

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1. Introduction

The concept of student-centered learning (SCL) has gained significant traction in educational research and practice, emphasizing the active involvement of students in the learning process. Unlike traditional teacher-centered approaches, which focus on direct instruction, lectures, and passive learning, SCL prioritizes students' needs, interests, and abilities, promoting a more engaging and effective learning environment (Lee & Hannafin, 2016; Pastini & Lilasari, 2023). Previous studies reported that student-centered pedagogies enhance motivation, critical thinking, and overall academic achievement by allowing students to take ownership of their learning (Aytaç & Kula, 2020; Mat & Jamaludin, 2024; Mbonimana & Sikubwabo, 2024). In particular, mathematics education, often perceived as rigid and abstract, can benefit from SCL by making learning more contextual, interactive, and relevant to students' real-world experiences.

Despite the well-documented advantages of SCL, there remains a need for empirical studies that explore how students perceive this approach in a specific educational setting like the Philippines. The effectiveness of SCL in mathematics has been widely discussed in theoretical frameworks (Adiwijaya & Palupi, 2024; Emanet & Kezer, 2021; Hidayat, 2018), yet limited research has examined its practical application in elementary schools, particularly in the Philippine Central Schools. Furthermore, while existing literature explores the impact of SCL on student achievement (Sørensen *et al*., 2023; Wardhani & Kartowagiran, 2019; Wilson *et al*., 2019), there is a paucity of studies investigating gender-based differences in perception and the potential link between student perceptions and their actual academic achievement in mathematics. Addressing these gaps is essential in refining teaching strategies and ensuring that SCL effectively meets the diverse needs of elementary students.

In the context of the Tacloban City Division in the Philippines, implementing SCL in mathematics has gained attention among mathematics educators. However, the extent to which students perceive its effectiveness and impact on their learning experience remains underexplored. Arguably, central schools in the Tacloban City Division serve as key educational settings in shaping foundational knowledge, making them ideal settings for investigating student-centered pedagogies. Understanding students' perspectives on SCL in mathematics can provide valuable insights into how this approach is experienced at the elementary level and whether it contributes to improved learning outcomes. Moreover, since elementary education is the foundation for future academic pursuits, examining Grade 6 students' perceptions is crucial in assessing whether SCL promotes preparedness for higher-level mathematics.

Given the aforementioned discussion, the primary objective of this study is to examine the perceptions of Grade 6 students in central schools within Tacloban City regarding the implementation of SCL in mathematics. Specifically, this study aims to (1) examine how students perceive their learning experiences as student-centered, (2) explore gender-based differences in perception, and (3) investigate whether a significant relationship exists between student perceptions and their mathematics achievement. The study hypothesizes that there is no significant difference in perceptions between male and female students and no significant relationship between student perceptions of SCL and their mathematics achievement.

Furthermore, this study contributes to the growing literature on student-centered learning in elementary education. The findings have implications for curriculum development, instructional design, and teacher professional development, particularly in mathematics education. If student perceptions indicate a positive link between SCL and improved achievement in the subject, it could further justify adopting student-centered approaches in mathematics instruction. Additionally, insights from this study could inform policies that support the enhancement of mathematics pedagogy, ensuring that teaching methods align with students' learning preferences and needs.

2. Methodology

This section outlines the research methods employed in the study, including the research design, study respondents and setting, research instruments, data collection procedures, ethical considerations, and statistical data treatment.

2.1. Research Design

This study utilized a quantitative research approach, employing surveys as the primary tool for data collection to ensure consistency and reliability in capturing students' responses. Additionally, a comparative method was adopted to explore potential differences in perceptions of SCL between male and female respondents. This method was justified as it provided insights into possible gender-based variations in learning experiences. Concurrently, a correlational design was employed to investigate the relationship between the respondents' perceptions of SCL and their achievement in mathematics. This design was deemed suitable as it enabled the researchers to ascertain how much the respondents' perceptions influenced their mathematics academic achievement.

2.2. Research Respondents and Setting

The study was conducted in two central schools in Tacloban City, the provincial capital of Leyte in the Philippines. Central schools were chosen as the research locale due to their role as key educational institutions within the city, accommodating a diverse student population and implementing standardized curriculum delivery methods. These schools provide an optimal setting for investigating perceptions of SCL, as they also integrate modern teaching approaches into their instructional practices. A total of 132 sixth-grade student respondents were randomly sampled, comprising 50 males and 82 females. Respondents were selected using a simple random sampling technique to ensure representativeness and minimize selection bias. Sixth-grade students were selected because they are at a critical stage of elementary education, during which foundational mathematical concepts are reinforced, making their perceptions of SCL in mathematics particularly relevant to the study.

2.3. Research Instrument

The study utilized the *Measuring and Improving Student-Centered Learning* (MISCL) toolkit (Kaufman *et al*., 2020; RAND Corporation, 2020) to assess how respondents perceived their learning experiences as student-centered. The MISCL toolkit was selected for its comprehensive approach to evaluating SCL components, making it a suitable instrument for the study. The questionnaire consisted of six key dimensions: Personalization of Learning (PL), Learning Standards and Competencies (LSC), Anytime, Anywhere Learning (AAL), Student Agency and Ownership (SAO), Data Use (DU), and Contextual Conditions Supporting Student-Centered Learning (CCSSCL), collectively measuring various aspects of SCL to provide a holistic understanding of students' learning experiences.

To ensure content validity, expert validation was conducted with four mathematics educators with over five years of teaching experience. They reviewed the tool's

applicability within the study's context, providing feedback on terminology, phrasing, and contextual appropriateness. Their recommendations were incorporated to enhance the instrument's relevance and accuracy for the target respondents. Additionally, a pilot test was conducted with a group of non-sampled Grade 6 students from a central school in Tacloban to assess the instrument's reliability. The internal consistency of the questionnaire was evaluated using Cronbach's alpha, which demonstrated acceptable reliability across the six dimensions: PL ($\alpha = 0.79$), LSC ($\alpha = 0.83$), AAL ($\alpha = 0.80$), SAO ($\alpha = 0.83$), DU ($\alpha = 0.81$), and CCSSCL ($\alpha = 0.84$). These reliability coefficients indicate that the instrument consistently measures student-centered learning perceptions. The overall Cronbach's alpha for the entire questionnaire was 0.83, indicating good internal consistency. The pilot test results confirmed that the questionnaire was well-structured and comprehensible for the target respondents.

2.4. Data Collection Procedures and Ethical Considerations

The data collection process was carefully planned and implemented to maintain the integrity of the study while adhering to ethical standards, mainly since the respondents were minors. Before administering the survey, the researchers secured the necessary approvals from school authorities and obtained assent and informed consent from parents or guardians. After securing approval from the schools and on the day of data collection, the researchers briefed the students on the study's objectives, emphasizing confidentiality and anonymity following the Data Privacy Act of the Philippines. Students were assured that their participation was voluntary and that their responses would remain confidential. This measure was essential in promoting trust and encouraging candid responses from the respondents. The survey was administered in person at two central schools. One researcher explained the survey items to the students in one central school. In contrast, the other researchers assisted in monitoring and ensuring their comprehension in the presence of their teacher-adviser. The respondents were given ample time to complete the survey questionnaire.

A similar approach was used at another central school to facilitate the administration process of the survey questionnaire. The data collection procedure was completed within a day, taking approximately 30–40 minutes per school. Throughout the data collection, the researchers assisted the respondents who encountered unfamiliar terminology or had questions regarding the survey items. Once all responses were collected, the questionnaires were carefully reviewed, encoded, and prepared for analysis. Further, the respondents' mathematics grades were retrieved from the teacher-advisers following their permission. All data collected for this study were securely stored on a password-protected drive accessible only to the researchers. The data were handled with the utmost confidentiality to ensure the privacy and integrity of the respondents' information. In the preparation of this manuscript, digital writing assistance tools such as *Grammarly* and *Quillbot* were used solely to enhance the clarity, grammar, and coherence of the text.

2.5. Treatment of Data

The collected data were analyzed using descriptive and inferential statistical methods. Textual and tabular presentations effectively summarized the results. Descriptive statistics evaluated students' mathematics achievement and their perceptions of SCL, including frequency counts, percentages, standard deviations, mean scores, and medians. These measures provided an overview of the distribution and trends within the data. A two-sample t-test was conducted to determine if a statistically significant difference existed between male and female respondents' perceptions of SCL. Additionally, Spearman's rank correlation coefficient (Spearman rho) examined the relationship between the respondents' perceptions of SCL and their mathematics achievement. Data processing and statistical analyses were conducted using Microsoft Excel and JAMOVI statistical software to ensure the accuracy and reliability of the results. These tools allowed efficient data organization, computation, and interpretation, enhancing the credibility of the study's results.

3. Results

3.1. Distribution of Respondents' Mathematics Achievement

Table I presents the distribution of the respondents' mathematics achievement based on their final grades. The majority of the students (44.70%) attained a *Very Satisfactory* level (85–89), while 16.67% demonstrated *Outstanding* achievement (90–100). Additionally, 31.82% obtained a *Satisfactory* rating (80–84), and 8.61% were categorized as *Fairly Satisfactory* (75–79). The computed mean grade was 86 with a standard deviation of 3.96, indicating an overall *Very Satisfactory* achievement level among the respondents.

3.2. The Extent of Respondents' Perceptions of SCL in Mathematics

Table II summarizes the extent to which respondents perceived their mathematics learning experiences as student-centered across six dimensions: Personalization of Learning (PL), Learning Standards and Competencies (LSC), Anytime, Anywhere Learning (AAL), Student Agency and Ownership (SAO), Data Use (DU), and Contextual Conditions Supporting Student-Centered Learning (CCSSCL). The results indicate that most respondents rated their experiences as high or very high across all dimensions. Specifically, 74.24% of the students reported a high perception of Personalization of Learning,

TABLE I: Distribution of the Respondents' Mathematics Achievement

Interval	Frequency	Percent	Level
90–100	22	16.67	Outstanding
85–89	59	44.70	Very satisfactory
80–84	42	31.82	Satisfactory
75–79	9	6.81	Fairly satisfactory
<75	—	—	Did not meet expectations

Note: No. of cases = 132; Mean Grade = 86 (Very Satisfactory); Std. Dev. = 3.96.

TABLE II: The Extent of Respondents' Perceptions of SCL in Mathematics

Level	PL	LSC	AAL	SAO	DU	CCSSCL
	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)
Very High	30 (22.73)	45 (34.09)	52 (39.39)	55 (41.67)	71 (53.79)	60 (45.45)
High	98 (74.24)	77 (58.33)	68 (51.52)	72 (54.55)	49 (37.12)	53 (40.15)
Moderate	4 (3.03)	10 (7.58)	11 (8.33)	5 (3.79)	10 (7.58)	18 (13.64)
Low	—	—	1 (0.76)	—	2 (1.52)	1 (0.76)
Very Low	—	—	—	—	—	—

Note: N = 132; Mdn (PL) = 4 (High); Mdn (LSC) = 4 (High); Mdn (AAL) = 4 (High); Mdn (SAO) = 4 (High); DU = 4 (High); CCSSCL = 4 (High).

TABLE III: Difference in Respondents' Perceptions of SCL Based on Gender

Group	N	Mean	SD	Two-Sample T-test	
				t-value	p-value
Male	50	3.97	0.40	−1.663*	0.099
Female	82	4.07	0.33		

Note: *Not significant at the 0.05 level.

while 58.33% perceived Learning Standards and Competencies at a high level. Likewise, 51.52% rated Anytime, Anywhere Learning as high, and 54.55% reported a high perception of Student Agency and Ownership. Furthermore, 53.79% of the students rated Data Use as very high, and 45.45% perceived Contextual Conditions Supporting Student-Centered Learning at a very high level. The median ratings for all dimensions were four (High), indicating a generally favorable perception of student-centered learning.

3.3. Difference in Respondents' Perceptions of SCL Based on Gender

Table III presents the results of the two-sample t-test conducted to determine if there was a significant difference in the perceptions of SCL between male and female respondents. The analysis revealed that male students (M = 3.97, SD = 0.40) and female students (M = 4.07, SD = 0.33) had similar perceptions of SCL in mathematics. The computed t-value of −1.663 (p = 0.099) indicates that the difference between the two groups was not statistically significant at the 0.05 significance level.

3.4. Relationship between Respondents' Perceptions of SCL and Mathematics Achievement

Table IV presents the result of the Spearman's rank correlation coefficient analysis examining the relationship between students' perceptions of SCL and their mathematics achievement. The correlation coefficient was 0.029, with a p-value of 0.741, indicating no significant relationship between the two variables at the 0.05 significance level.

TABLE IV: Relationship between Respondents' Perceptions of SCL and Mathematics Achievement

Group	Spearman's rho	
	r_s-Value	p-Value
Student-Centered learning Mathematics achievement	0.029**	0.741

Note: *Not significant at the 0.05 level.

4. Discussion

Student-Centered Learning (SCL) has emerged as a transformative approach in mathematics education, emphasizing active student engagement, personalized learning experiences, and collaborative problem solving. Unlike traditional teacher-centered methods, SCL shifts the focus from passive knowledge reception to an interactive and inquiry-driven process, where students take ownership of their learning (Magdalinski & Branigan, 2020; Wang, 2023). Given the increasing recognition of its potential to enhance mathematical understanding and achievement, examining how elementary students perceive and experience SCL is crucial. In this study's context, we explored the perceptions of sixth-grade students in two central schools in the Department of Education's (DepEd) Tacloban City Division in the Philippines regarding SCL in mathematics, explored differences in perceptions between male and female respondents, and analyzed the relationship between their perceptions and mathematics achievement. The results can provide valuable insights into how SCL is perceived by the student-respondents, contributing to ongoing discussions about student engagement, instructional effectiveness, and academic achievement in mathematics education.

The results of this study indicated that the respondents generally perceive their mathematics learning experiences as highly student-centered, as reflected in the median

scores. It can suggest that SCL is firmly integrated into their learning environment, promoting active engagement and participation. Several studies (Amerstorfer & Freiin von Münster-Kistner, 2021; Lee & Hannafin, 2016; Wang, 2023) indicated that SCL strategies positively influence students' academic outcomes by fostering higher engagement and motivation levels during learning. Traditional teacher-centered approaches, which emphasize passive reception of knowledge, have been shown to yield inferior academic performances compared to more interactive, student-centered methodologies (Abiodun, 2015; Islam *et al*., 2024; Woods & Copur-Gencturk, 2024), which further aligns with findings that methods involving greater student participation result in better academic outcomes (Barry *et al*., 2024; Bayoumy & Alsayed, 2021). However, traditional teacher-centered practices cannot be entirely ruled out. Certain mathematical concepts may still require structured, teacher-led instruction to ensure clarity and accuracy, especially when dealing with abstract or procedural topics. Furthermore, systemic factors such as time constraints, curriculum demands, and large class sizes often compel mathematics educators to rely on conventional instructional methods to manage classroom efficiency and ensure coverage of required competencies.

Additionally, the study found no significant difference between male and female respondents in their perceptions of SCL, leading to the failure to reject the null hypothesis. This suggests that gender does not play a substantial role in shaping respondents' experiences with student-centered learning in mathematics. This result also implies that SCL can be equally inclusive and effective across genders, highlighting its potential to promote equitable learning environments. Instructional approaches grounded in SCL may transcend gender-based learning preferences, supporting diverse student needs without bias. Furthermore, the correlation analysis revealed no significant relationship between the respondents' perceptions of SCL and their mathematics achievement, failing to reject the null hypothesis. This result implies that while students may hold favorable views of SCL, these perceptions do not necessarily translate to higher mathematics achievement. This further suggests that other variables, such as prior knowledge, cognitive ability, instructional quality, or assessment alignment, may play a more decisive role in influencing academic outcomes. It also highlights the importance of complementing student-centered strategies with differentiated instruction and other effective classroom strategies to address individual learning gaps.

Moreover, the study's results have both theoretical and practical implications. Theoretically, they challenge the assumption that student-centered learning alone guarantees improved academic achievement in mathematics. While SCL emphasizes student engagement, autonomy, and active participation (Hussein *et al*., 2024; Karali & Aydemir, 2018), its effectiveness in boosting mathematics achievement may depend on other factors such as instructional quality, content mastery, and external support. These results highlight the necessity for a practical instructional strategy integrating SCL principles with structured guidance to enhance student learning outcomes. Educators should also ensure that SCL strategies are effectively implemented, considering students' diverse learning needs and cognitive abilities.

Compared to other studies, these results align with research suggesting that the effectiveness of SCL depends on its implementation and the subject matter. For instance, studies have shown that while SCL enhances motivation and engagement, its direct impact on academic achievement is mixed, particularly in mathematics (Doño & Mangila, 2021; Emanet & Kezer, 2021; Xia *et al*., 2022; Zhang *et al*., 2022). Other studies (Handoyo, 2017; Theodoridou, 2021) supports that SCL encourages critical thinking and problem-solving skills, yet its success is contingent upon teacher assistance and student readiness. The absence of gender differences in perception also aligns with previous studies (Cabuquin & Abocejo, 2023; Chen *et al*., 2016; Fleck & Richmond, 2024), reinforcing that SCL benefits both male and female students equally.

Despite its contributions, this study has limitations that should be acknowledged. First, the study was conducted in two central schools in Tacloban City, which may limit the generalizability of the results to other educational settings in the Philippines. Second, the study relied on self-reported perceptions, which may be influenced by social desirability bias or individual differences in interpretation. Additionally, the study only measured perceptions and their relationship with achievement without exploring other mediating variables such as instructional methods, teacher competence, and learning resources. Future studies should consider a more extensive and diverse sample, incorporate qualitative methods to gain deeper insights into students' experiences and explore additional factors influencing the relationship between SCL and mathematics achievement. While students generally perceive SCL as a significant aspect of their mathematics learning experience, its direct impact on achievement remains uncertain. The study's results emphasize the need for strategic implementation of student-centered approaches, ensuring they are complemented by structured support to maximize their effectiveness in enhancing student learning in mathematics.

5. Conclusion and Recommendations

This study examined how sixth-grade students in central schools perceive student-centered learning (SCL) in mathematics. The results revealed that students generally perceive SCL positively, with many viewing it as beneficial for enhancing engagement, comprehension, and problem-solving skills. However, statistical analyses indicated no significant difference in perceptions based on gender and no significant relationship between students' perceptions of SCL and their mathematics achievement. These results suggest that while students value SCL, other contributing factors such as prior knowledge, cognitive ability, instructional quality, or assessment alignment may directly influence mathematics achievement. The study underscores the need to continuously refine SCL strategies to maximize their effectiveness in mathematics education.

Given these results, it is recommended that mathematics educators further integrate student-centered strategies in mathematics instruction, incorporating interactive learning activities, real-world problem-solving tasks, and peer

collaboration to sustain student engagement. Given the no significant relationship between SCL and mathematics achievement, implementing additional support mechanisms, such as differentiated instruction and other strategic interventions may be necessary to address potential learning gaps and enhance student outcomes. Professional development programs should be provided to mathematics educators to enhance their ability to implement and sustain SCL approaches effectively. Furthermore, it is recommended that schools promote formative assessment practices that align with SCL principles to provide timely and personalized feedback. Establishing a strong home-school connection can reinforce SCL by engaging parents in their children's learning journey. Lastly, future instructional planning should consider integrating technology-enhanced learning tools that support autonomy, self-paced learning, and continuous assessment, further strengthening the core principles of SCL in mathematics.

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Author Contributions

All authors contributed equally to the conception, design, data collection, analysis, and writing of this study. All authors reviewed and approved the final manuscript.

Conflict of Interest

The authors declare no conflict of interest in the conduct and publication of this study.

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