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Differential Perceptions of Science Teaching Practices among Teachers and Students at Elementary level: Comparative view of Public and Private Sector

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Abstract

This study examined how 80 teachers and 300 students in public and private secondary schools felt about the way science is taught. It was conducted through a survey. Participants were chosen from secondary classes using a stratified random sample procedure, and a structured questionnaire with a rating scale was given out. The results of statistical research, which included t-tests, showed that there were significant differences in how teachers and students at public and private schools perceived different instructional strategies. There were some statistically significant differences, but not all of them. In order to resolve gaps in collaborative practice, the study recommends putting cross-school professional development workshops into place, funding self-reflection training for public school teachers, and encouraging collaborative sharing of successful classroom management techniques. The results aid in comprehending the varied viewpoints in science education and offer useful suggestions for improving instructional strategies.

Introduction

Secondary science education places a strong emphasis on inquiry-based, hands-on learning to encourage curiosity and critical thinking. Teachers use contemporary educational approaches, incorporating technology and practical applications into their teaching. Students are given the opportunity to practically explore scientific concepts through laboratory experiments, group projects, and interactive simulations, which improves memory and comprehension. Instructors promote thought-provoking, open-ended questions that foster a deeper comprehension of scientific concepts. They ensure diversity by utilizing multimedia tools to address a range of learning styles.

Assessment techniques emphasize problem-solving abilities in addition to knowledge gain. The overall goals of secondary science education are to provide pupils with the necessary abilities for a scientifically literate society and to ignite a lifelong love of learning. Hawkins, et

al., (2001) firstly state that valuing students' perspectives on instruction may strengthen their dedication to learning and, as a result, foster a supportive learning environment where the goal is to make them feel like subjects in teaching rather than objects for teaching. Second, in a good learning environment, kids tend to develop stronger relationships with their teachers in addition to performing well academically (Ben, 2016).

The classroom setting is a crucial component of education. According to Cini, (2016), for students to learn, the classroom should be set up properly. In addition to making the most of class time, this structure must emphasize that students should respect one another and their teachers. Classroom management, according to Mudianingrum, Evenddy, and Rima (2019), is the act of setting up and organizing classroom supplies in order to achieve a particular objective. Time management, motivation, physical environment, communication, and behavior control must all be carefully considered for effective classroom management. The main goals of classroom management are to establish a conducive learning environment, make effective use of time, establish ground rules, and foster productive communication.

In teaching, teachers have more significant duties. The teacher needs to possess five fundamental field skills in order to be more effective: effectively managing time, controlling student conduct and classroom management, presenting lessons, assessing student learning, and providing feedback to students. In addition to being an audience, the teacher also serves as an organizer, a guide, and an evaluator. According to Sadik, &Akbulut, (2015), classroom management is the process of establishing a learning environment that supports instructional activities and raises student accomplishment through ongoing learning. One important component of a teacher's pedagogical competence is classroom management (Klassen, & Chiu, 2010). Leading and guiding the pupils through the teaching-learning process is the primary responsibility of the teacher.

The teacher has to cope with the social, intellectual, and physical aspects of the classroom in order to perform this task to the best of their abilities. Many tasks make up a classroom: carrying out the lesson plan, supplying the resources needed for instruction and learning, fostering an environment in the classroom that encourages student achievement, keeping an eye on student progress, and averting any disciplinary issues (Savran, & Çakıroğlu, 2004). A classroom with poor governance is not a suitable venue for teaching and learning. Thus, classroom management and efficient planning of the teaching and learning process are tightly intertwined.

Cini (2016) defines classroom management as the implementation of rules and teaching techniques that foster a safe and effective learning environment, with an emphasis on expectations for behavior and corrective actions. Classroom management is also listed by Sadik and Akbulut (2015) as one of the abilities of a teacher that affects how well they educate. Making decisions on a range of teaching and learning-related matters, such as where and with whom students should sit, which teaching tactics to use, how to ensure student engagement and

motivation, what resources to use, and how to handle misbehaviors, is a continuous process that teachers engage in.

It is not well known how well students collaborate when learning science, particularly in high school. According to the findings of science teachers' interviews, the focus of current instruction has been primarily on cognitive learning objectives, with less emphasis placed on the development of cooperation skills. In order for students to discover complete science concepts and develop solutions to scientific challenges, collaboration skills are essential in science education (Hidayati, 2019). According to the findings of earlier research done at junior high school by Greenstein (2012), students' collaborative skills in scientific learning were still lacking. Pupils' cooperation abilities still require strengthening when learning science. As a result, it's critical to investigate how well kids collaborate, particularly when learning science. This study's originality lies in this.

The switch from the traditional TCL technique to the SCL approach gives learners more freedom to study and work through issues in small groups or from a distance. Given that the 2020 global pandemic compelled schools to quickly adopt remote learning, this flexibility with SCL is crucial. Cognitive pedagogy is the tool that SCL uses to promote self-learning. Teachers support students' need for effective learning resources while allowing them the flexibility to share their thoughts in the ways, with the people, and at the times that work best for them (Muianga, Barbutiu, Hansson, & Mutimucuio, 2012).

By including students in the process of creating knowledge, active learning pedagogies aim to shift classroom learning toward a more individualized approach. This setting is different from a standard lecture, which depends on students listening passively and focuses on imparting instructor information. In order to assist students learn actively and prepare them for the present and the future, SCL techniques have to be included into the system. Students can design their learning objectives, take responsibility for their learning, and choose their own learning process with this approach (Osman, Jamaludin, & Iranmanesh, 2015). Extended learning choices, blended learning, and a skill-set approach support the tailored learning of the SCL methodology. A greater sense of autonomy is demonstrated by the student, who also shares responsibility for their education with their teachers. Teachers may now employ technology to engage students in deep learning, model learning, and communicate instruction, which is an extra benefit.

Students use technology to establish their learning path, collaborate and connect with others, and access material simultaneously (Glowa & Goodell, 2016). The student-centered approach encompasses all instructional practices that highlight the role of the teacher as a decision-maker and problem-solver in the classroom and see educators as facilitators, mentors, coaches, or advisors in the teaching and learning process. good assessment, in the opinion of Hay and Penney (2012), is a necessary component of learning environments that assist students' comprehension and learning as well as good teaching. The major objective of this study is to give science teachers five areas of focus in order to facilitate effective assessment in the classroom. Teachers can plan, teach, test, and make daily decisions in a way that will improve

their students' learning by carefully considering each of these five key areas at the same time (Kennedy, 2008).

This study presents a paradigm that should be of interest to readers worldwide and is meant to be used by scientific teachers in both elementary and secondary educational settings. various focus areas encourage teachers to carefully consider their individual students as well as entire classes as they learn science within various contexts, and they support teachers in thinking about learning processes and results within dynamic social situations. This method is predicated on the notion that education is shaped by society and culture (Henze, Van Driel, & Verloop, 2008).

The survey research methodology involved a random selection of 300 students and 80 teachers to gather comprehensive insights. A stratified random sampling technique ensured representation. Participants were chosen from secondary classes. A structured questionnaire, employing a rating scale, was administered to assess perceptions and experiences related to the chosen variables. The rating scale, with predefined criteria, enabled participants to express opinions on a range of topics consistently. Data collection adhered to ethical guidelines, ensuring informed consent and confidentiality. Statistical analysis, including inferential methods, was employed to derive meaningful conclusions from the gathered data.

Table 1

Comparative View of Public and Private Secondary School Teachers' Perception About Teaching Practices During Teaching of Science Subjects

Teaching Practices in teaching of science	Category of School	Teachers	Mean value	S. D.	t-value	P
Classroom management activities	Public	44	4.129	.401	-1.81	.081
	Private	36	4.198	.354		

The t-test table presents a comparative analysis of public and private secondary school teachers' perceptions regarding teaching practices in science subjects. 44 instructors in the public schools took part, and the mean result was 4.129 with a.401 standard deviation. 36 educators worked at private schools; as a result, the mean value was slightly higher at 4.198 and the standard deviation was.354. The t-value of -1.81 indicates that there is a mean difference between teachers in public and private schools. Based on conventional significance thresholds, such as 0.05, the p-value of.081 suggests that there is no statistically significant difference. Therefore, the null hypothesis—which holds that there is no appreciable difference in teachers' perceptions of classroom management methods when teaching science in public and private schools—cannot be rejected based on the information currently available.

Table 2

Comparative View of Public and Private Secondary School Teachers' Perception About Teaching Practices During Teaching of Science Subjects

Teaching Practices in teaching of science	Category of School	Teachers	Mean value	S. D.	t-value	P
Collaboration among students	Public	44	4.101	.390	-2.56	.029
	Private	36	4.349	.380		

The t-test table compares the opinions of secondary school instructors in public and private schools with regard to science teaching methods, with a particular emphasis on student collaboration. The mean (standard deviation =.390) of the 44 public school teachers who participated in the survey about their perceptions of teamwork was 4.101. The mean value of 4.349 was higher for private school teachers (36 participants), with a standard deviation of.380. There is a substantial difference between the means of student collaboration between teachers in public and private schools, as indicated by the t-value of -2.56. The associated p-value of.029 is below than the conventional significance level of 0.05, indicating statistical significance. Therefore, the null hypothesis, positing no significant difference in perceptions between public and private school teachers regarding student collaboration during the teaching of science, is rejected based on the given data, implying that there is a notable distinction in views between the two categories of schools.

Table 3

Comparative View of Public and Private Secondary School Teachers' Perception About Teaching Practices During Teaching of Science Subjects

Teaching Practices in teaching of science	Category of School	Teachers	Mean value	S. D.	t-value	P
Students centered learning	Public	44	4.100	.366	-2.55	.031
	Private	36	4.323	.312		

The t-test table compares the viewpoints of scientific instructors in secondary public and private schools, emphasizing student-centered learning in particular. The average perception score of the 44 public school teachers who participated was 4.100, with a standard deviation (S.D.) of.366. Private school instructors (36 participants) had a mean perception score of 4.323, which was greater than the standard deviation of.312. The t-value of -2.55 indicates that there is a

significant difference between the methods of student-centered learning used by instructors in public and private schools. The associated p-value of.031, which is less than the conventional significance level of 0.05, indicates statistical significance. Based on the available information, the null hypothesis—which contends that there is no discernible difference in public and private school teachers' opinions on student-centered learning during science instruction—is thus rejected. This suggests that the two types of schools have somewhat different perspectives on how to apply student-centered learning strategies in science instruction.

Table 4

Comparative View of Public and Private Secondary School Teachers' Perception About Teaching Practices During Teaching of Science Subjects

Teaching Practices in teaching of science	**Category of School**	**Teachers**	**Mean value**	**S. D.**	**t-value**	**P**
Students' self-reflection in learning	Public	44	4.098	.300	-3.33	.004
	Private	36	4.278	.393		

The t-test table compares the viewpoints of scientific instructors in secondary public and private schools, emphasizing how much attention is placed on students' self-reflection during the learning process. The mean perception score of the 44 participating public-school instructors was 4.098, with a standard deviation (S.D.) of.300. The mean perception score of 4.278 for private school teachers (36 participants) was higher, with a standard deviation of.393. The t-value of -3.33 suggests that there is a substantial difference in the ways of student self-reflection in learning between teachers in public and private schools. The associated p-value of.004, which is less than the conventional significance level of 0.05, indicates statistical significance. Consequently, the null hypothesis—which holds that there is no appreciable difference in the opinions of public and private school teachers about students' self-reflection during science instruction—is rejected in light of the information at hand. This shows that there is a definite difference in the two types of schools' perspectives regarding the significance of including or excluding student self-reflection from the science classroom.

Table 5

Comparative View of Public and Private Secondary School Teachers' Perception About Teaching Practices During Teaching of Science Subjects

Teaching Practices in teaching of science	Category of School	Teachers	Mean value	S. D.	t-value	P
Students' behavior management in classroom	Public	44	4.009	.388	-2.55	.009
	Private	36	4.321	.391		

The t-test table compares the viewpoints of science instructors at public and private secondary schools, focusing in particular on how they manage behavior in the classroom. The average perception score of the 44 public school teachers who participated was 4.009, with a standard deviation (S.D.) of.388. The mean perception score of 4.321 for private school teachers (36 participants) was higher, with a standard deviation of.391. The t-value of -2.55 indicates that teachers at public and private schools use very different methods to control conduct in the classroom. The associated p-value of.009, which is smaller than the conventional significance level of 0.05, indicates statistical significance. The null hypothesis, which holds that there is no appreciable difference in the opinions of public and private school instructors regarding how to best control students' behavior in the classroom while teaching science, is thus rejected based on the information that is currently available. This shows that there is a definite difference in belief between the two categories of schools about the value or importance of behavior management for students during scientific classes.

Table 6

Comparative View of Public and Private Secondary School Teachers' Perception About Teaching Practices During Teaching of Science Subjects

Teaching Practices in teaching of science	Category of School	Teachers	Mean value	S. D.	t-value	P
Students' assessment process	Public	44	4.119	.419	-.562	.559
	Private	36	4.215	.388		

The t-test table contrasts the viewpoints of scientific instructors in public and private secondary schools, paying special attention to how students are evaluated. A mean perception score of 4.119 and a standard deviation (S.D.) of.419 were observed among the 44 instructors working in

public schools who participated. A somewhat higher mean perception score of 4.215 with a.388 standard deviation was observed in 36 teachers who worked in private schools. There is no appreciable difference in the means between teachers in public and private schools when it comes to the students' assessment process in science instruction, as indicated by the t-value of -0.562. The observed difference is not statistically significant, as indicated by the matching p-value of.559, as it exceeds the conventional significance level of 0.05. Therefore, the null hypothesis, which posits no significant difference in perceptions between public and private school teachers regarding the students' assessment process during the teaching of science, cannot be rejected based on the given data. This implies that both categories of schools have similar perceptions regarding the assessment process in science education.

Table 7

Comparative View of Public and Private Secondary School Teachers' Perception About Teaching Practices During Teaching of Science Subjects

Teaching Practices in	**Category of School**	**Teachers**	**Mean value**	**S. D.**	**t-value**	**P**
teaching of science	Public	44	4.029	.311	-2.59	.006
	Private	36	4.311	.301		

Without mentioning a specific teaching strategy, the t-test table contrasts the opinions of secondary school instructors in public and private schools about scientific instruction methods. Out of the 44 educators who participated, 44 worked in public schools. The average perception score was 4.029, with a standard deviation (S.D.) of 0.311. Private school instructors (36 participants) showed a marginally higher mean perception score of 4.311, with a little lower standard deviation of 0.301. The significant difference between the means of the opinions held by instructors in public and private schools about the general approaches employed in scientific instruction is indicated by the t-value of -2.59. The accompanying p-value of 0.006, which is less than the conventional significance level of 0.05, indicates statistical significance. Therefore, the null hypothesis, which suggests no significant difference in perceptions between public and private school teachers regarding teaching practices in science, is rejected based on the given data. This implies that there is a notable distinction in overall views between the two categories of schools regarding teaching practices in the context of science education.

Table 8

Comparative View of Public and Private Secondary School Students' Perception About Teaching Practices During Teaching of Science Subjects

Teaching Practices in teaching of science	Category of School	Students	Mean value	S. D.	t-value	P
Classroom management activities	Public	191	4.012	.421	-1.74	.071
	Private	109	4.110	.324		

Students in public and private secondary schools' opinions of science teaching methods are contrasted in the t-test table, with a particular emphasis on classroom management techniques. With 191 pupils from public schools taking part, the mean perception score was 4.012 with a standard deviation (S.D.) of 0.421. With a smaller standard deviation of 0.324, private school students (109 participants) exhibited a significantly higher mean perception score of 4.110. A difference in averages between students in public and private schools with regard to classroom management activities is shown by the t-value of -1.74; nevertheless, the corresponding p-value of 0.071 is higher than the traditional significance level of 0.05. Therefore, based on the available information, it is not possible to reject the null hypothesis, which suggests that there is no substantial difference in students' perceptions of classroom management actions during scientific instruction between public and private schools. This suggests that there is statistically insufficient support for the idea that the two student categories' opinions of scientific classroom management activities differ significantly.

Table 9

Comparative View of Public and Private Secondary School Students' Perception About Teaching Practices During Teaching of Science Subjects

Teaching Practices in teaching of science	Category of School	Students	Mean value	S. D.	t-value	P
Collaboration among students	Public	191	4.099	.370	-2.45	.022
	Private	109	4.319	.360		

Students' opinions on science teaching methods in public and private secondary schools are contrasted in the t-test table, with a particular emphasis on student collaboration. The mean perception score, with 191 students from public schools participating, was 4.099, with a standard deviation (S.D.) of 0.370. Among the 109 participants who attended private schools, the mean

perception score of 4.319 was higher, with a standard deviation of 0.360. The significant difference in the methods of student collaboration between pupils in public and private schools is indicated by the t-value of -2.45. The accompanying p-value of 0.022, which is less than the conventional significance level of 0.05, indicates statistical significance. The null hypothesis, which contends that there is no appreciable distinction between the perceptions of student participation during science instruction in public and private schools, is thus rejected on the basis of the information at hand. This suggests that the two student categories have somewhat different opinions on the value or efficacy of collaborative learning strategies in the context of science education.

Table 10

Comparative View of Public and Private Secondary School Students' Perception About Teaching Practices During Teaching of Science Subjects

Teaching Practices in teaching of science	**Category of School**	**Students**	**Mean value**	**S. D.**	**t-value**	**P**
Students centered learning	Public	191	4.131	.356	-2.46	.034
	Private	109	4.431	.342		

The t-test table presents a comparison of secondary school students' impressions of science teaching approaches in public and private schools, with a particular emphasis on student-centered learning. With 191 pupils from public schools taking part, the mean perception score was 4.131 with a standard deviation (S.D.) of 0.356. With a somewhat lower standard deviation of 0.342, the mean perception score of 104 participants who attended private schools was higher at 4.431. There is a substantial difference in the means of student-centered learning between pupils in public and private schools, as indicated by the t-value of -2.46. Statistical significance is shown by the accompanying p-value of 0.034, which is smaller than the traditional significance level of 0.05. Based on the available information, the null hypothesis—which holds that there is no discernible difference in public and private school students' perceptions of student-centered learning during science instruction—is thus rejected. This suggests that there is a discernible difference in the two student groups' opinions about the significance or use of student-centered learning strategies in the context of science education.

***T*able 11**

Comparative View of Public and Private Secondary School Students' Perception About Teaching Practices During Teaching of Science Subjects

Teaching Practices in teaching of science	Category of School	Students	Mean value	S. D.	t-value	P
Students' self-reflection in learning	Public	191	4.101	.330	-3.24	.003
	Private	109	4.391	.373		

The perceptions of science teaching procedures, with a particular focus on students' self-reflection during learning, are compared between secondary school students in public and private schools using a t-test table. The mean perception score, with 191 students from public schools participating, was 4.101, with a standard deviation (S.D.) of 0.330. There were 109 participants who attended private schools, and their mean perception score was higher, at 4.391 with a somewhat larger standard deviation of 0.373. The t-value of -3.24 indicates that pupils in public and private schools have significantly different learning self-reflection means. The associated p-value of 0.003, which is less than the conventional significance level of 0.05, indicates statistical significance. Thus, the null hypothesis—which suggested that there was no appreciable difference in how students in public and private schools rated their own learning during science instruction—is rejected in light of the information at hand. This suggests that there is a discernible difference in opinion between the two student groups about the significance or application of students' self-reflection in the context of science education.

Table 12

Comparative View of Public and Private Secondary School Students' Perception About Teaching Practices During Teaching of Science Subjects

Teaching Practices in teaching of science	Category of School	Students	Mean value	S. D.	t-value	P
Students' behavior management in classroom	Public	191	4.010	.368	-2.43	.005
	Private	109	4.321	.351		

The t-test table contrasts secondary school students' opinions of science teaching methods across public and private schools, with a particular emphasis on how well students behave in the classroom. With 191 pupils from public schools taking part, the mean perception score was

4.010 with a standard deviation (S.D.) of 0.368. The mean perception score of 4.321 was marginally higher for private school kids (109 participants) with a little lower standard deviation of 0.351. When it comes to students' behavior management in the classroom, there is a substantial difference in the means between students in public and private schools, as indicated by the t-value of -2.43. Statistical significance is shown by the corresponding p-value of 0.005, which is less than the traditional significance level of 0.05. Based on the available information, the null hypothesis—which proposed that there was no discernible difference in public and private school students' opinions about how to manage students' behavior in the classroom when learning science—is thus rejected. This suggests that the two student types have somewhat different opinions on how important or useful it is to control students' behavior in a scientific classroom.

Table 13

Comparative View of Public and Private Secondary School Students' Perception About Teaching Practices During Teaching of Science Subjects

Teaching Practices in teaching of science	Category of School	Students	Mean value	S. D.	t-value	P
Students' assessment process	Public	191	4.129	.429	-.545	.531
	Private	109	4.235	.348		

The t-test table contrasts secondary school students' opinions of scientific teaching methods in public and private schools, paying particular attention to the students' evaluation procedure. With 191 pupils from public schools taking part, the mean perception score was 4.129 with a standard deviation (S.D.) of 0.429. With a smaller standard deviation of 0.348, private school students (109 participants) exhibited a significantly higher mean perception score of 4.235. The t-value of -0.545 shows that, when it comes to students' assessments during the scientific teaching process, there is no discernible difference in averages between students in public and private schools. It is possible that the observed difference is not statistically significant because the corresponding p-value of 0.531 is larger than the standard significance level of 0.05. Therefore, based on the available information, the null hypothesis—which holds that there is no discernible difference in how public and private school students perceive the process of student assessment during scientific instruction—cannot be ruled out. This suggests that the two student categories view the scientific assessment process in a comparable way.

Table 14

Comparative View of Public and Private Secondary School Students' Perception About Teaching Practices During Teaching of Science Subjects

Teaching Practices in teaching of science	Category of School	Students	Mean value	S. D.	t-value	P
	Public	191	4.039	.321	-2.46	.008
	Private	109	4.321	.321		

Without naming a specific teaching method, the t-test table contrasts the opinions of secondary school students attending public and private schools about scientific instruction. The mean perception score, with 191 students from public schools participating, was 4.039, with a standard deviation (S.D.) of 0.321. Private school students (109 participants) showed a higher mean perception score of 4.321 with the same standard deviation of 0.321. The t-value of -2.46 indicates that, in terms of their overall perceptions of the science teaching strategies employed, pupils in public and private schools differ significantly in their means. The associated p-value of 0.008, which is below the conventional significance level of 0.05, indicates statistical significance. Consequently, the null hypothesis—which contends that there is no appreciable distinction in students' opinions of scientific teaching methods between public and private schools—is rejected in light of the material at hand. This suggests that there is a significant difference in the two student groups' general perspectives on the methods of instruction in the context of science education.

Based on the findings, it is advised that,

- ✓ in light of the notable differences in teachers' perspectives of collaborative practices, cross-school professional development workshops be implemented in order to promote knowledge sharing.
- ✓ Given the significant disparity in the value placed on self-reflection, educational institutions ought to provide focused professional development programs for public school teachers. A more reflective teaching approach can be achieved by incorporating training programs that highlight the advantages and techniques of self-reflection, bringing perceptions into line with those of private school rivals.
- ✓ Despite the lack of apparent change in the opinions of classroom management, schools can gain from working together to exchange efficient tactics. Establishing forums where educators from both sectors may share their perspectives and methods for managing the classroom will improve overall efficacy of instruction and foster a more cohesive learning environment.

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