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Effect of Instructional Behavior of Teachers on Students' Motivation Towards Learning Science at Secondary School Level

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Abstract & Indexing

Abstract

This study explores the impact of teachers' instructional behaviors on secondary school students' motivation to learn science in public schools in Lahore. The primary objectives were to evaluate teachers' instructional practices and their influence on students' motivation. A sample of 540 students (320 females and 220 males) was selected through simple random sampling. Utilizing a descriptive, quantitative approach with a causal-comparative design, the research focused on two key variables: teachers' instructional behavior and students' motivation to learn science. Data were gathered using two validated questionnaires: one adapted from Patrick et al. (2013) to assess instructional behavior across four dimensions (instructional, negative teaching, socio-emotional, and organizational behaviors), and the Student Motivation towards Learning Science Questionnaire (SMQ) adapted from Glynn (2011), examining motivation across five domains (career motivation, self-determination, self-efficacy, and grade motivation). Both instruments demonstrated reliability, with a Cronbach's alpha of 0.806. Results revealed no significant gender differences in instructional behavior, except in organizational behavior. The study recommends fostering a supportive classroom environment and further research into factors affecting students' motivation to enhance science learning outcomes.

Keywords

Instructional Behavior of Teachers, Motivation, Science Education, Classroom Environment.

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1. Introduction

This study examines the effect of instructional behavior of teachers on students' motivation towards learning science, and defines the study's problem statement, objectives, questions, significance, and rationale.

Teacher behavior plays a crucial role in influencing student motivation. Actions such as providing feedback, facilitating discussions, and respecting student perspectives foster positive learning environments, leading to greater student engagement (Williams & Williams, 2011; Tournaki & Podell, 2005). Conversely, negative behaviors, like harsh discipline, can reduce motivation and disengagement.

Motivating students in science education is essential, as attitudes formed during secondary education influence future academic and career choices. Teachers instructional behaviors, including communication and classroom management, significantly effect motivation (Riahipour, Ketabi, & Dabbaghi, 2014; Zhang et al., 2012) This study examines the impact of these behaviors on students' motivation to learn science at the secondary level, aiming to understand which instructional practices are most effective in enhancing students' engagement and enthusiasm for science.

The attitude of a teacher significantly affects student motivation. Teachers should be skilled professionals in effective communication, possess a deep understanding of their students, and learn from their experiences. According to Luthans (2009), a teacher's professional conduct greatly influences student motivation. The importance of motivation in the teaching and learning process remains a key concern.

The purpose of this study is to examine the effect of teachers instructional behaviors on students' motivation toward learning science in secondary schools. Specifically, it aims to identify effective instructional practices that foster a positive and engaging classroom environment for science students. By examining the relationship between specific teacher behaviors such as classroom management, feedback, and support and students' motivation, the study seeks to provide insights into enhancing student interest and attitudes toward science. Previous research has shown that effective classroom management and supportive teacher interactions are crucial for motivating students (Williams & Williams, 2011; Mercer & Hedges, 2010).

Ultimately, the findings will help inform educational practices, benefiting teachers, policymakers, and researchers in improving student engagement in science education, where the need for innovative teaching methods is paramount (Koballa & Glynn, 2007; Sarıbıyık et al., 2004).

Analyzing the effect of teachers' instructional behaviors on secondary students' motivation to learn science is crucial, as attitudes formed at this stage can influence future educational and career paths. Many students show low engagement with science, raising questions about the effectiveness of current educational practices. Teachers play a central role in shaping student experiences, as their instructional behaviors, including content delivery and treatment of students, can either motivate or demotivate learners. However, there is insufficient clarity on which specific behaviors effectively foster a motivating learning environment in science classes. Recognizing these actions is essential for developing strategies to improve students' participation and interest in the subject.

Reseach Objectives

1. To investigate the instructional behaviors of teachers at the secondary school level.
2. To examine the effect of instructional behaviors of teachers on students' motivation towards learning science at the secondary school level.
3. To examine the relationship between the instructional behaviors of teachers and students' motivation towards learning science.

2. Literature Review

Motivation in education, particularly in science learning, is deeply influenced by teachers instructional behaviors, which shape students' engagement and success. Effective instructional behaviors, including clarity, structured guidance, and positive teacher-student interactions, align with foundational motivational theories like Self-Determination Theory (Deci & Ryan, 2008).

Self-Determination Theory (SDT)

The Self-Determination Theory (SDT) by Deci and Ryan (2008) emphasizes that students' motivation is heightened when they experience autonomy, competence, and relatedness in their learning environments. Instructional clarity, where teachers set clear objectives and provide structured explanations, aligns with SDT by fostering competence and autonomy, which are key drivers of intrinsic motivation. Research has shown that clarity in instruction allows students to focus on learning tasks, supporting both understanding and engagement (Brekelmans et al., 2000).

Teacher-Student Interaction and the Role of Socio-Emotional Support

The Self-Worth Theory (Covington, 1984) explains that students are motivated by a need to preserve their sense of self-worth, which is closely tied to the quality of teacher-student interactions. When teachers offer socio-emotional support and create a warm, accepting classroom atmosphere, students feel valued and motivated, which positively impacts their engagement in learning activities. Additional studies confirm that positive teacher-student relationships contribute to a classroom climate where students feel secure and are more likely to participate actively.

Types of Motivation in Learning Science

In science education, motivation is commonly categorized into intrinsic, extrinsic, and amotivation. Intrinsic motivation, driven by curiosity and enjoyment, is associated with deeper engagement, which is especially valuable in challenging subjects like science. Research has demonstrated that when students are intrinsically motivated, they are more likely to develop a sustained interest in science learning and to achieve higher levels of academic performance. These findings align with Self-Determination Theory, which posits that intrinsic motivation enhances students' engagement and persistence in learning.

Content Theories of Motivation: Maslow and Herzberg's

Maslow's Hierarchy of Needs theory underscores the importance of meeting students' foundational needs, such as safety and belonging, as a basis for learning. When these needs are satisfied, higher-level needs, like self-esteem and self-actualization, become primary motivators. Similarly, Herzberg's Two-Factor Theory differentiates between hygiene factors, which prevent dissatisfaction, and motivators, which actively enhance satisfaction. In the classroom, basic conditions such as a structured environment prevent disengagement, while motivating factors, like challenging tasks and recognition, foster student engagement and motivation.

Alderfer's ERG Theory and McClelland's Achievement Theory

Alderfer's ERG Theory (Existence, Relatedness, Growth) also applies to classroom motivation, particularly highlighting growth needs in science education, where curiosity and self-improvement drive students to explore scientific concepts. McClelland's Need for Achievement, Affiliation, and Power Theory suggests that students motivated by achievement are likely to be highly engaged in academics, especially when they perceive challenges as opportunities for growth.

Implications for Science Motivation

Intrinsic motivation plays a crucial role in science education, where students' interest and perceived relevance of science impact their engagement and achievement. According to Constructivist Theory, students actively construct knowledge through meaningful interactions

and discovery, underscoring the importance of motivationally supportive instructional strategies. Research in science education has shown that constructivist-based learning, which emphasizes self-directed inquiry, aligns with intrinsic motivational goals and fosters deeper engagement.

3. Research Design

This study employed a descriptive approach, utilizing a causal-comparative research design to examine the effect of teachers instructional behaviors on student motivation in science education. According to Fraenkel, Wallen, and Hyun (2009), this design involves selecting two or more groups that exhibit differences in a specific independent variable. In this case, the independent variable is teachers instructional behavior, and the dependent variable is student's motivation.

3.1 Sample

The study's population consisted of all male and female science students in public secondary schools in the Lahore District, totalling 35,778 male and 46,027 female students (School Education Department, 2018). A simple random sampling technique was employed to select a sample of 540 participants, including 220 male and 320 female students from three Tehsils: Lahore Cantt (87), Model Town (237), and Lahore City (216).

3.2 Instrumentation

The researcher utilized two instruments to assess teachers instructional behavior and students' motivation towards learning science.

The first instrument was the Teaching Behavior Questionnaire (TBQ), adapted from Possel Patrick et al. (2013), consisting of 16 statements measuring instructional behavior, negative teaching behavior, socio-emotional behavior, and organizational behavior.

The second instrument was the Student Motivation towards Learning Science Questionnaire (SMQ), adapted from Shawn M. Glynn (2011), including 19 statements that evaluated five dimensions of motivation: overall motivation, career motivation, self-determination, self-efficacy, and grade motivation.

3.3 Procedure

The researcher obtained permission from the principals of public secondary schools in the Lahore District to administer the questionnaires to Grade IX and X science students. To collect data, the researcher personally visited the selected schools and explained how to fill out the questionnaire. The questionnaires were administered in groups using a random sampling technique, with a total of 540 students participating. Throughout the process, the researcher provided assistance to students whenever they encountered difficulties in understanding any part of the questions. Most students completed the questionnaire within the allotted time, while a few required additional times to finish.

3.4 Data Analysis

Data analysis was done using the Statistical Package for the Social Sciences (SPSS) software. Frequencies and percentages of every statement of the questionnaire were examined. For this research the tests being applied are: descriptive statistics such as Mean and Standard Deviation, as well as techniques including Independent sample t-test, Pearson correlation (r), and Linear Regression analysis to examine the effect of instructional behavior of teachers and students' motivation towards learning science.

Table 1

Mean and Standard Deviation Statistics of Factors

	Mean	**Std. D**
Instructional behavior	14.74	1.94
Negative teaching behavior	8.02	2.33
Socio-Emotional behavior	15.95	3.06
Organizational behavior	14.06	2.33
Motivation	13.80	2.58
Career motivation	14.70	2.06
Self-determination	13.87	2.35
Self-efficacy	14.63	1.85
Grade motivation	10.70	1.41

Description

In Table 1, data from the survey was analyzed using descriptive statistics, including means and standard deviations. The mean and standard deviation for socio-emotional behavior are the highest among all factors (M = 15.95, SD = 3.06). Instructional behavior has the second highest mean (M = 14.74, SD = 1.94), followed by career motivation (M = 14.70, SD = 2.06) in third place. Self-efficacy ranks fourth (M = 14.63, SD = 1.85), while organizational behavior is fifth (M = 14.06, SD = 2.33). Self-determination is sixth (M = 13.87, SD = 2.35), and motivation ranks seventh (M = 13.80, SD = 2.58). Grade motivation is eighth (M = 10.70, SD = 1.41). Negative teaching behavior has the lowest mean (M = 8.02, SD = 2.33).

Table 2: Regression Analysis of independent variables and dependent variables

Coefficient model to determine the predictive power of instructional behavior of teachers on students' motivation towards learning science

Model	Unstandardized co-efficient	Standardized co-efficient							
	B	Std. Error	β	t	p	df	f	R	R^2
Motivation	8.274	.818		10.11	.000	538	46.41	.282	.079
IB	.375	.055	.282	6.81					

Dependent variable: Motivation

Description

Table 2 shows that linear regression was applied to examine the effect of instructional behavior on students' motivation. Instructional behavior was found significant ($R^2 = .079$) at $p \leq 0.05$, explaining 7.9% of the variance in motivation. Instructional behavior significantly

impacts motivation (β = .282, F = 46.41, p = .000), indicating a 7.9% variance in motivation due to instructional behavior.

Table 3: *Coefficient model to determine the predictive power of negative behavior of teachers' on motivation towards learning science*

Model	Unstandardized co-efficient	Standardized co-efficient							
	B	Std. Error	β	t	p	df	F	R	R^2
Motivation	12.67	.395		32.086	.003	538	8.835	.12	.016
NTB	.141	.047	.127	2.972					

Dependent variable: Motivation

Description

Table 3 shows that linear regression was applied to assess the effect of negative teaching behavior (IV) on motivation (DV). Negative behavior was found significant (R^2 = .016) at $p \leq 0.05$, explaining 1.6% of the variance in motivation. Negative behavior significantly impacts motivation (β = .127, F = 8.835, p = .003), indicating a 1.6% variance in motivation due to negative behavior.

Table 4: Coefficient model to determine the predictive power of Socio-Emotional behavior of teachers' on motivation towards learning science

Model	Unstandardized co-efficient	Standardized co-efficient							
	B	Std. Error	β	t	p	df	F	R	R^2
Motivation	11.864	.584		20.30	.001	538	11.40	.144	.021
SEM	.121	.036	.144	3.376					

Dependent variable: Motivation

Description

Table 4 shows that linear regression was used to examine the effect of socio-emotional behavior on motivation. Socio-emotional behavior was found significant (R^2 = .021) at $p \leq 0.05$, explaining 2.1% of the variance in motivation. It significantly impacts motivation (β = .144, F = 11.40, p = .001), indicating a 2.1% variance in motivation due to socio-emotional behavior.

Table 5: *Coefficient model to determine the predictive power of organizational behavior of teachers' on motivation towards learning science*

Model	Unstandardized co-efficient	Standardized co-efficient							
	B	Std. Error	β	t	p	df	F	R	R^2
Motivation	9.709	.656		14.795	.000	538	39.94	.263	.069
OB	.291	.046	.263	6.320					

Dependent variable: Motivation

Description

Table 5 indicated that linear regression was used to assess the effect of organizational behavior on motivation. Organizational behavior was found significant ($R^2 = .069$) at $p \leq 0.05$, explaining 6.9% of the variance in motivation. It significantly impacts motivation ($\beta = .263$, $F = 39.943$, $p = .000$), indicating a 6.9% variance in motivation due to organizational behavior.

4. Discussion

The study revealed significant differences in instructional behaviors between male and female students, with female students scoring higher on average in instructional, negative teaching, socio-emotional, and organizational behaviors. These findings align with prior research, such as Wang et al. (2014), which also noted that female students tend to engage more in positive instructional behaviors, suggesting they may be more nurturing and attentive to students' needs.

Additionally, instructional behavior was shown to significantly predict students' motivation to learn science (R^2=.079), while negative behavior (R^2=.016), socio-emotional behavior (R^2=.105), and organizational behavior (R^2=.069) each played a predictive role. These findings support prior research by Skinner and Belmont (1993), emphasizing the role of positive student behaviors in boosting engagement and motivation, and Ryan and Deci's (2000) self-determination theory, highlighting the impact of socio-emotional support on intrinsic motivation.

The study, conducted with 540 secondary school students, identified students' behaviors as key motivators, emphasizing the need for positive behaviors to promote motivation. Results showed that socio-emotional, organizational, and instructional behaviors are highly effective in motivating students academically. Supporting research, like Rubie-Davies (2007), indicates that organizational behaviors improve class time efficiency, positively impacting motivation, engagement, and learning outcomes.

These findings highlight the critical role of teachers in motivating students to learn science. Positive teacher behaviors boost student motivation, while negative behaviors can reduce students' career aspirations. Teachers who offer emotional support help students feel more in control of their learning, and organized teachers enhance students' confidence in their abilities. This study underscores teachers influence on student engagement and self-confidence in science.

Conclusion

The study concludes that female teachers exhibit greater organizational behavior than male teachers, indicating a more structured teaching style, though there is no significant gender difference in socio-emotional behavior. Female teachers showed more instructional and organizational behaviors overall. Positive teaching practices like effective instruction, organization, and emotional support enhance students' motivation to learn science. Instructional, negative, socio-emotional, and organizational behaviors are positively linked to students' motivation, including career motivation, self-determination, self-efficacy, and grade motivation. Negative teaching behaviors significantly lower motivation, highlighting the need to reduce negative classroom interactions. Socio-emotional behavior positively influences self-determination and self-efficacy but has no significant impact on grade motivation, suggesting its specific role in fostering certain motivational aspects.

Recommendations

- Teachers should foster a friendly, interactive classroom environment to boost student motivation.
- Teachers need to establish a supportive, motivating atmosphere that strengthens students' engagement and enhances learning outcomes.
- Classroom teachers should explore factors that motivate or discourage student learning at the secondary level.
- Teachers can apply action research to assess how training programs affect their teaching and student motivation.

Recommendations for Future Research

- Conduct qualitative research to explore reasons behind differences in instructional behaviors between male and female students and their effect on student motivation.
- Replicate studies in diverse educational and cultural contexts to assess the consistency of findings.
- Further examine motivational and demotivational factors affecting private school students.

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