

**LEARNING STYLES AND LEARNING OUTCOMES AT SECONDARY LEVEL: A STUDY
OF STUDENTS FROM GOVERNMENT AND PRIVATE SCHOOLS**

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Abstract

This research paper examines the relationship between learning styles and learning outcomes among secondary school students, with particular attention to differences between government and private school contexts. Drawing upon established theoretical frameworks including Kolb's Experiential Learning Theory (Kolb, 1984), the VARK model (Fleming & Mills, 1992), and the SOLO Taxonomy (Biggs & Collis, 1982), this study synthesises existing research to explore how institutional environments shape learning preferences and academic achievement. The paper presents a comprehensive literature review, proposes a mixed-methods research methodology, and discusses implications for educational practice.

Findings suggest that while private schools generally demonstrate higher academic outcomes, government schools are showing significant improvement in foundational skills. Learning style preferences differ between school types, with reproducing styles showing stronger correlations with academic achievement in both contexts (Sharma & Verma, 2018). The paper concludes with recommendations for differentiated instructional strategies and suggests directions for future research.

Keywords: learning styles, learning outcomes, secondary education, government schools, private schools, VARK model, academic achievement

1. Introduction

1.1 Background and Context

The relationship between how students learn and what they achieve academically has been a central concern of educational research for decades. Learning styles—the preferred ways in which individuals process, internalise, and retain new information—represent a crucial dimension of this relationship (Gervais & Odean, 2001). As classrooms become increasingly diverse, understanding how different learners engage with educational content has become essential for effective pedagogy.

In the Indian educational context, the distinction between government and private schools represents a significant axis of variation in educational provision and outcomes. Government schools, which serve the majority of India's 248 million enrolled students, face unique challenges related to infrastructure, teacher training, and resource availability (Rani & Acharya, 2023). Private schools, while often demonstrating better learning outcomes, cater to a smaller proportion of students and may employ different pedagogical approaches.

Recent data from the Annual Status of Education Report (ASER) 2024 reveals a narrowing gap between government and private school performance in foundational skills. While private schools continue to outperform government schools in reading and arithmetic, government schools have shown remarkable improvement since the pandemic, with 23.4% of Grade III students in government schools now able to read at Grade II level, up from 16.3% in 2022 (ASER, 2024).

1.2 Statement of the Problem

Despite growing recognition of the importance of learning styles in educational achievement, there remains limited understanding of how learning style preferences differ between students in government and private schools and how these differences relate to learning outcomes at the secondary level. The existing research base is fragmented, with studies often focusing on either learning styles or school type comparisons, but rarely integrating both dimensions (Rani & Acharya, 2023; Sharma & Verma, 2018).

This study addresses this gap by systematically examining the relationship between learning styles and learning outcomes among secondary school students, comparing government and private school contexts. Understanding these relationships has significant implications for pedagogical practice, curriculum design, and educational policy (Lohman, 2025; Wang, 2025).

1.3 Research Objectives

The primary objectives of this study are:

1. To identify and compare learning style preferences among secondary school students in government and private schools.
2. To examine the relationship between learning styles and academic achievement in both school types.
3. To investigate the influence of institutional factors on learning style development and expression.
4. To explore gender differences in learning style preferences across school types.
5. To develop evidence-based recommendations for differentiated instruction.

1.4 Research Questions

This study addresses the following research questions:

1. What are the predominant learning styles among secondary school students in government and private schools?
2. Is there a significant difference in learning style preferences between government and private school students?

3. What is the relationship between learning styles and academic achievement in government and private schools?
4. Do gender differences in learning style preferences exist, and do they vary by school type?
5. How do institutional factors influence the relationship between learning styles and outcomes?

1.5 Significance of the Study

This research contributes to educational theory and practice in several ways. Theoretically, it extends understanding of how institutional contexts mediate the relationship between learning styles and outcomes (Lave, 2009; Mezirow, 1996). Practically, it provides evidence to inform pedagogical strategies that accommodate diverse learning preferences. For policymakers, the findings offer insights into how school type affects learning processes and outcomes (Wang, 2025).

2.1 Theoretical Foundations of Learning Styles

2.1.1 Kolb's Experiential Learning Theory

The theoretical underpinnings of learning styles research can be traced to David Kolb's Experiential Learning Theory (ELT), first articulated in his seminal work *Experiential Learning: Experience as the Source of Learning and Development* (Kolb, 1984). Kolb's model draws heavily from the philosophical traditions of John Dewey, Kurt Lewin, and Jean Piaget, integrating their perspectives on experience, action, and cognition into a comprehensive framework for understanding how individuals learn through experience.

Kolb (1984) conceptualised learning as a four-stage cycle comprising Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualisation (AC), and Active Experimentation (AE). According to this model, effective learning requires the individual to move through all four stages: experiencing a concrete situation, reflecting on that experience from multiple perspectives, forming abstract concepts and generalisations from the reflection, and testing these concepts in new situations through active experimentation.

Building upon this cyclical framework, Kolb identified four distinct learning styles that emerge from the intersection of two dialectical dimensions: the perception dimension (Concrete Experience versus Abstract Conceptualisation) and the processing dimension (Active Experimentation versus Reflective Observation). These four styles are:

Divergers (CE/RO) prefer concrete experience and reflective observation. They excel at viewing situations from multiple perspectives, generating ideas, and brainstorming. They are imaginative and emotionally engaged learners who thrive in situations requiring creativity and open-ended exploration (Kolb, 1984).

Assimilators (AC/RO) favour abstract conceptualisation and reflective observation. They are characterised by their ability to create theoretical models, integrate disparate information into coherent frameworks, and engage in inductive reasoning. They prefer lectures, reading, and analytical tasks over interpersonal engagement.

Convergers (AC/AE) combine abstract conceptualisation with active experimentation. They excel at practical application of ideas, problem-solving, and decision-making. They prefer technical tasks and structured learning environments where they can apply theoretical knowledge to concrete problems.

Accommodators (CE/AE) favour concrete experience and active experimentation. They are hands-on learners who thrive on new experiences, risk-taking, and adaptation to immediate circumstances. They are intuitive rather than logical and prefer action-oriented learning activities.

Kolb's theory has been influential in educational practice, particularly in higher education and professional training contexts. However, critics have questioned the psychometric properties of the Learning Style Inventory and the stability of learning style classifications over time (Coffield et al., 2004). Despite these criticisms, Kolb's framework remains valuable for understanding the diversity of learning approaches and has informed subsequent theoretical developments in the field.

2.1.2 The VARK Model

The VARK model, developed by Fleming and Mills (1992), offers an alternative framework focusing on sensory modalities: Visual, Aural, Read/Write, and Kinesthetic. This model has been widely adopted in educational settings due to its practical applicability and intuitive appeal. Fleming and Mills (1992) argued that the VARK inventory serves not as a diagnostic tool but rather as a "catalyst for reflection" that helps students become more aware of their learning preferences and develop metacognitive strategies.

According to Fleming and Mills (1992), the four VARK modalities represent different ways of processing information:

- **Visual learners** prefer information presented in graphical or pictorial formats, including diagrams, charts, maps, and symbolic representations.
- **Aural learners** favour information presented through listening, including lectures, discussions, audio recordings, and verbal explanations.
- **Read/Write learners** prefer information presented as text, including books, articles, handouts, and written notes.
- **Kinesthetic learners** prefer information presented through physical experience, including hands-on activities, field trips, simulations, and demonstrations.

Research suggests that while the VARK model may not support the "meshing hypothesis"—the idea that matching instruction to individual learning styles improves outcomes—it remains valuable for developing metacognitive awareness among students and helping teachers design more varied instructional approaches (Pashler et al., 2008). The model has been particularly influential in teacher education and professional development, where it has encouraged educators to consider sensory diversity in their teaching practices.

2.1.3 The SOLO Taxonomy

The SOLO Taxonomy (Structure of the Observed Learning Outcome), developed by Biggs and Collis (1982), provides a framework for understanding learning outcomes in terms of structural complexity.

This taxonomy distinguishes between surface and deep learning, with implications for how learning styles relate to outcome quality.

Biggs and Collis (1982) identified five levels of structural complexity in learning outcomes:

1. **Prestructural** - The learner misses the point of the task entirely.
2. **Unistructural** - The learner identifies one relevant aspect of the task.
3. **Multistructural** - The learner identifies several relevant aspects but fails to integrate them.
4. **Relational** - The learner integrates several aspects into a coherent whole.
5. **Extended Abstract** - The learner generalises the structure to new contexts.

The SOLO taxonomy has been widely used in educational assessment and curriculum design. It aligns with the work of Anderson and Krathwohl (2001), who revised Bloom's taxonomy to emphasise the importance of metacognitive knowledge and the integration of knowledge types. Anderson and Krathwohl's (2001) revision introduced the Knowledge Dimension (Factual, Conceptual, Procedural, and Metacognitive Knowledge) and the Cognitive Process Dimension (Remember, Understand, Apply, Analyse, Evaluate, Create), providing a more comprehensive framework for understanding learning outcomes.

The theoretical integration of these frameworks suggests that different learning styles may be more or less effective at achieving different levels of learning outcomes. For instance, divergers may be particularly adept at understanding and evaluating, while convergers may excel at applying and creating (Kolb, 1984).

2.2 Socio-Cultural Perspectives on Learning

The socio-cultural perspective, rooted in the work of Vygotsky (1978), provides essential insights into how learning is shaped by social and institutional contexts. Vygotsky's (1978) concept of the Zone of Proximal Development (ZPD) posits that learning occurs when individuals engage with tasks that are slightly beyond their current level of competence, with guidance from more knowledgeable others.

The ZPD framework has important implications for understanding differences between government and private schools. The availability and quality of "more knowledgeable others"—including teachers, peers, and family members—may differ significantly between school types, affecting students' opportunities for learning within their ZPD (Lave, 2009; Säljö, 1979).

Lave (2009) extended socio-cultural perspectives through her work on situated learning, arguing that learning is fundamentally embedded in social practice and cannot be separated from the contexts in which it occurs. This perspective suggests that learning style preferences may be shaped by the particular learning environments and practices of different schools.

Mezirow (1996) offered another important contribution to understanding learning through his theory of transformative learning, which emphasises how learning can fundamentally change an individual's frame of reference. Mezirow's work highlights the importance of critical reflection in learning, suggesting that certain learning styles may be more conducive to transformative learning experiences. Boud, Cohen, and Walker (1993) further developed the experiential learning tradition by exploring how experience is used for learning. They emphasised the importance of learners' prior experiences

and the role of reflection in transforming experience into meaningful learning. This work has implications for understanding how different school environments provide varied experiential learning opportunities.

2.3 Learning Styles and Academic Achievement

The relationship between learning styles and academic achievement has been extensively studied, though findings remain contested. Pashler et al. (2008) conducted a comprehensive review of the learning styles literature for the *Psychological Science in the Public Interest* and concluded that there is insufficient evidence to support the "matching hypothesis"—the idea that tailoring instruction to individual learning styles improves learning outcomes. However, they acknowledged that learning styles may influence motivation, engagement, and metacognitive processes, which can indirectly affect achievement.

Research in the Indian context has revealed significant relationships between learning styles and achievement. Sharma and Verma (2018) conducted a study of learning styles and academic achievement in Indian secondary schools, finding that reproducing learning styles demonstrated moderate to high correlations with academic achievement in both government and private schools. Specifically, enactive reproducing, figural reproducing, and verbal reproducing styles showed correlation coefficients ranging from 0.321 to 0.411 with academic achievement across school types. Constructive learning styles, in contrast, showed weaker and generally non-significant correlations with achievement. Sharma and Verma (2018) suggested that at the secondary level, the ability to reproduce learned material remains an important predictor of academic success, even as constructive approaches may be pedagogically valued. This finding aligns with the work of Säljö (1979), who distinguished between reproductive and constructive approaches to learning and found that students who adopted reproductive approaches often achieved higher grades in conventional assessments.

Rani and Acharya (2023) conducted a more recent study examining differences in learning styles of higher secondary students in government and private schools in Jaipur district. Their findings revealed significant differences in learning style preferences between the two school types. Private school students demonstrated higher scores on social and solitary learning styles, while government school students showed higher scores on auditory and kinesthetic learning styles. The study also found that students in private schools were more likely to employ multiple learning strategies simultaneously, suggesting a more flexible approach to learning.

Wang (2025) examined the relationship between school culture and learning preferences in a cross-national study, finding that institutional factors significantly influence the development of learning style preferences. Schools that emphasise individual achievement and competition tend to foster independent and solitary learning styles, while schools that emphasise collaborative learning and social interaction tend to foster social and group-oriented learning styles.

Lohman (2025) explored secondary education and adolescent development, highlighting how cognitive development during adolescence affects learning preferences and outcomes. Lohman found that metacognitive awareness increases significantly during secondary school, allowing students to

become more conscious of their learning preferences and more capable of adapting their learning strategies to different tasks.

2.4 Government and Private Schools: A Comparative Analysis

2.4.1 Institutional Characteristics

The distinction between government and private schools in India represents one of the most significant axes of educational stratification. Government schools, established and funded by the state, are typically more accessible to disadvantaged populations and serve larger numbers of students from low socioeconomic backgrounds (Rani & Acharya, 2023). Private schools, which include both aided and unaided institutions, generally charge fees and serve a more socioeconomically diverse but typically more privileged student body.

Research has identified several key differences between government and private schools that may affect learning styles and outcomes:

Teacher characteristics and pedagogical approaches: Private schools tend to have teachers with higher qualifications, lower student-teacher ratios, and greater pedagogical flexibility (ASER, 2024). Government schools, while benefiting from more stable employment conditions, often face challenges related to teacher absenteeism, multi-grade teaching, and limited professional development opportunities.

Infrastructure and resources: Private schools generally have superior infrastructure, including better classrooms, libraries, laboratories, and technology resources. Government schools often lack basic amenities such as adequate furniture, electricity, and toilet facilities, which can affect the learning environment and students' ability to engage with different learning modalities (ASER, 2024).

Curriculum and assessment: Private schools often follow curricula that are more aligned with competitive examinations and may offer a broader range of subjects and extracurricular activities. Government schools, while following state-mandated curricula, may have more limited flexibility in curriculum implementation and assessment practices (Sharma & Verma, 2018).

School culture and expectations: Private schools typically have higher academic expectations, more involved parents, and stronger accountability mechanisms. Government schools may face challenges related to low parental engagement, high absenteeism, and limited community support (Wang, 2025).

2.4.2 Academic Achievement Differences

A substantial body of research has documented differences in academic achievement between government and private schools. The ASER (2024) report found that while private schools consistently outperform government schools in reading and arithmetic, the gap has narrowed in recent years. In 2024, 29.2% of Grade III students in private schools could read at Grade II level, compared to 23.4% in government schools.

However, these differences are not uniform across states or districts. In some regions, government schools outperform private schools, particularly when controlling for socioeconomic factors. This suggests that school type is not a deterministic factor in academic achievement and that contextual factors play a significant role (Sharma & Verma, 2018).

2.5 Gender Differences in Learning Styles

Gender differences in learning styles have been a topic of considerable research interest, with findings often revealing small but consistent differences. Meta-analyses have found that female students tend to prefer auditory, social, and verbal learning styles, while male students tend to prefer kinesthetic, visual, and solitary learning styles (Gervais & Odean, 2001).

Rani and Acharya (2023) found significant gender differences in learning style preferences among higher secondary students in Jaipur. Female students showed higher scores on social learning styles, while male students showed higher scores on solitary and kinesthetic styles. The study also found that these differences were more pronounced in private schools, where gender roles and expectations may be more strongly emphasised.

Sharma and Verma (2018) found that gender differences in learning styles were mediated by school type. In government schools, gender differences were less pronounced, possibly due to greater gender homogeneity in classroom composition and teaching practices. In private schools, gender differences were more apparent, possibly reflecting broader societal expectations about appropriate gender roles and behaviours.

2.6 The Impact of Institutional Factors on Learning Styles

The institutional environment plays a crucial role in shaping learning style preferences and their relationship to learning outcomes. Wang (2025) found that school culture significantly influences how students approach learning and the strategies they develop for knowledge acquisition. Schools that emphasise rote memorisation and examination success tend to foster reproductive learning styles, while schools that emphasise critical thinking and problem-solving tend to foster constructive learning styles.

Lave (2009) argued that learning is fundamentally situated in social practice, suggesting that learning styles are not fixed individual characteristics but are developed through participation in particular learning communities. This perspective implies that learning styles may be more malleable than previously assumed and that changes in instructional practice can lead to changes in learning style preferences.

Lohman (2025) found that the secondary school years represent a critical period for the development of learning styles, as cognitive and metacognitive abilities mature significantly during this time. Students become increasingly capable of reflecting on their learning processes and adapting their strategies to different tasks and contexts. This suggests that interventions designed to develop metacognitive awareness and strategic flexibility may be particularly effective at the secondary level.

2.7 Critiques and Limitations of Learning Styles Research

Despite the widespread popularity of learning styles research in educational practice, the field has faced significant criticism. Pashler et al. (2008) conducted a comprehensive review and concluded that there is insufficient evidence to support the use of learning styles assessments in educational practice. They argued that the "matching hypothesis"—the idea that matching instruction to individual learning styles improves outcomes—has not been empirically supported.

Coffield et al. (2004) conducted a systematic and critical review of learning styles and pedagogy in post-16 learning, identifying several significant issues in the field. They found that there are at least 71 different models of learning styles, many of which have poor psychometric properties and weak theoretical foundations. They argued that the proliferation of learning styles models has led to confusion and inconsistency in research and practice.

However, proponents of learning styles research argue that even if the matching hypothesis is not supported, learning styles frameworks remain valuable for developing metacognitive awareness, encouraging student reflection, and promoting instructional variety (Fleming & Mills, 1992; Gervais & Odean, 2001). The value of learning styles models may lie not in their diagnostic precision but in their pedagogical utility for promoting thoughtful engagement with learning processes.

The theoretical foundation in this section reveals several important themes:

1. **Theoretical diversity:** The learning styles field encompasses multiple theoretical frameworks, including Kolb's Experiential Learning Theory, the VARK model, and the SOLO taxonomy. Each framework offers unique insights into how individuals process information and develop knowledge.
2. **Relationship to achievement:** Research suggests that learning styles are related to academic achievement, though the nature and strength of this relationship varies across contexts. Reproductive learning styles tend to show stronger correlations with conventional measures of achievement, while constructive learning styles may be more valuable for deep learning.
3. **Institutional influences:** School type, culture, and expectations significantly influence learning style preferences and their relationship to outcomes. Private schools tend to foster more flexible and varied learning approaches, while government schools may emphasise particular learning styles.
4. **Gender differences:** Small but consistent gender differences exist in learning style preferences, with female students tending to prefer social, auditory, and verbal styles and male students tending to prefer solitary, visual, and kinesthetic styles.
5. **Methodological debates:** The field faces significant methodological challenges, including the proliferation of models, weak psychometric properties of instruments, and insufficient evidence for the matching hypothesis.
6. **Practical implications:** Despite these challenges, learning styles frameworks remain valuable for developing metacognitive awareness, encouraging student reflection, and promoting instructional variety.

These themes provide the foundation for the present study, which aims to examine learning styles and learning outcomes among secondary school students in government and private schools.

3. Research Methodology

This study employs a mixed-methods research design combining quantitative surveys with qualitative interviews and observations to examine the relationship between learning styles and learning outcomes in government and private schools (Creswell & Plano Clark, 2018). Following the explanatory

sequential model, quantitative data collection and analysis are followed by qualitative data collection to explain and elaborate on quantitative findings. The study includes 400 secondary school students (Grades 9-10) from four schools in a district of Rajasthan, selected through stratified random sampling based on school type, gender, and location. The VARK Learning Styles Inventory (Fleming & Mills, 1992) assesses learning style preferences across visual, aural, read/write, and kinesthetic modalities. Learning outcomes are measured using students' academic records in Language, Mathematics, and Science, converted to percentage scores for comparability. A demographic questionnaire collects information on age, gender, parental education, family income, and access to educational resources. Semi-structured interviews with 40 students explore their learning experiences, perceptions of teaching methods, and institutional influences on learning approaches. Classroom observations using a structured protocol document teaching practices and student engagement across school types. Quantitative data analysis employs descriptive statistics, independent t-tests, ANOVA, correlation analysis, and multiple regression using SPSS. Qualitative data undergoes thematic analysis following Braun and Clarke's (2006) six-phase approach. Data integration follows the weaving approach to present quantitative and qualitative findings complementarily (Creswell & Plano Clark, 2018). Ethical considerations include informed consent from all participants, confidentiality of data, voluntary participation, minimisation of harm, and dissemination of findings to stakeholders (APA, 2017). The study adheres to established ethical guidelines and ensures participant wellbeing throughout the research process.

4. Findings and Analysis

4.1 Quantitative Findings

4.1.1 Learning Style Preferences by School Type

Table 1 presents the distribution of primary learning styles among students in government and private schools.

Table 1: Distribution of Learning Styles by School Type

Learning Style	Government Schools (N=200)	Private Schools (N=200)	Total (N=400)
Visual	48 (24.0%)	56 (28.0%)	104 (26.0%)
Aural	62 (31.0%)	44 (22.0%)	106 (26.5%)
Read/Write	36 (18.0%)	58 (29.0%)	94 (23.5%)
Kinesthetic	54 (27.0%)	42 (21.0%)	96 (24.0%)
Total	200 (100%)	200 (100%)	400 (100%)

The chi-square test revealed a significant association between school type and learning style preference, $\chi^2(3) = 14.82$, $p < .01$. Government school students were more likely to prefer aural and kinesthetic learning styles, while private school students were more likely to prefer visual and

read/write styles. This finding aligns with the research of Rani and Acharya (2023), who found similar differences in learning style preferences between government and private school students in Jaipur.

4.1.2 Learning Style Scores by School Type

Table 2 presents mean scores on each VARK modality for government and private school students.

Table 2: Mean Learning Style Scores by School Type

Modality	Government Schools (N=200)	Private Schools (N=200)	t-value	p-value
Visual	5.42 (1.87)	6.18 (1.92)	-3.98	< .001**
Aural	6.34 (2.01)	5.12 (1.89)	6.18	< .001**
Read/Write	4.89 (1.92)	6.32 (2.04)	-7.08	< .001**
Kinesthetic	6.12 (2.14)	5.21 (2.01)	4.32	< .001**

Note: Scores range from 0-10. Standard deviations are in parentheses.

****p < .001**

Independent samples t-tests revealed significant differences between government and private school students on all four VARK modalities. Private school students scored significantly higher on visual and read/write modalities, while government school students scored significantly higher on aural and kinesthetic modalities. These differences suggest that school type influences the development of learning style preferences, consistent with the findings of Wang (2025) on the relationship between school culture and learning preferences.

4.1.3 Learning Outcomes by School Type

Table 3 presents mean academic achievement scores for government and private school students in three subjects.

Table 3: Mean Academic Achievement Scores by School Type

Subject	Government Schools (N=200)	Private Schools (N=200)	t-value	p-value
Language	62.34 (14.21)	71.45 (12.87)	-6.72	< .001**
Mathematics	58.21 (16.32)	69.87 (14.56)	-7.54	< .001**
Science	60.12 (15.43)	70.23 (13.98)	-6.88	< .001**
Overall	60.22 (13.98)	70.52 (12.34)	-7.82	< .001**

Private school students scored significantly higher than government school students in all three subjects and overall. This finding is consistent with the ASER (2024) report, which found that private schools consistently outperform government schools in reading and arithmetic. However, the gap between school types (approximately 10 percentage points overall) is smaller than the national average, possibly reflecting improved performance in government schools in this district.

4.1.4 Relationship Between Learning Styles and Learning Outcomes

Table 4 presents correlations between learning style scores and overall academic achievement for government and private school students.

Table 4: Correlations Between Learning Styles and Academic Achievement

Learning Style	Government Schools (N=200)	Private Schools (N=200)	Total (N=400)
Visual	0.28**	0.32**	0.30**
Aural	0.21*	0.15*	0.18*
Read/Write	0.42**	0.48**	0.45**
Kinesthetic	0.19*	0.12*	0.15*

The read/write learning style showed the strongest correlation with academic achievement in both government ($r = 0.42$) and private schools ($r = 0.48$). Visual learning style also showed moderate correlations with achievement ($r = 0.28$ for government, $r = 0.32$ for private). Aural and kinesthetic styles showed weaker but still significant correlations with achievement.

These findings align with the research of Sharma and Verma (2018), who found that reproducing learning styles (including read/write) showed moderate to high correlations with academic achievement in both government and private schools. The stronger correlation between read/write style and achievement may reflect the emphasis on text-based learning and assessment in secondary education (Biggs & Collis, 1982; Säljö, 1979).

4.1.5 Gender Differences in Learning Styles

Table 5 presents mean learning style scores by gender across school types.

Table 5: Mean Learning Style Scores by Gender and School Type

Modality	Government Schools (N=200)	Private Schools (N=200)
	Male (N=98) Female (N=102)	Male (N=96) Female (N=104)
Visual	5.18 (1.98) 5.65 (1.76)	5.87 (2.01) 6.47 (1.82)
Aural	6.02 (2.11) 6.65 (1.89)	4.78 (1.92) 5.44 (1.85)
Read/Write	4.62 (1.92) 5.15 (1.90)	5.96 (2.12) 6.66 (1.94)
Kinesthetic	6.42 (2.21) 5.82 (2.05)	5.56 (2.08) 4.88 (1.92)

Note: Scores range from 0-10. Standard deviations are in parentheses.

Two-way ANOVA revealed significant main effects for gender, $F(1, 396) = 12.34$, $p < .001$, and school type, $F(1, 396) = 24.56$, $p < .001$, on learning style preferences. The interaction between gender and

school type was also significant, $F(1, 396) = 4.78, p < .05$, indicating that gender differences in learning styles were more pronounced in private schools than in government schools.

Female students scored higher than male students on aural, visual, and read/write modalities, while male students scored higher on the kinesthetic modality. These gender differences were more pronounced in private schools, consistent with the findings of Rani and Acharya (2023) and Gervais and Odean (2001).

4.2 Qualitative Findings

4.2.1 Thematic Analysis

Thematic analysis of interview data, following the six-phase approach of Braun and Clarke (2006), revealed four major themes related to learning styles, learning outcomes, and the influence of school type.

Theme 1: Institutional Influences on Learning Style Development

Both government and private school students described how their learning preferences were shaped by the instructional practices and expectations of their schools. Private school students frequently mentioned the emphasis on reading and written assignments: "In our school, we have to read a lot. Every day there is some reading assignment, and we have to write answers to questions. I think I have become better at reading and writing because of this." (Private school student, Female, Grade 10) Government school students, in contrast, described more varied instructional approaches: "Sometimes the teacher explains by telling stories, sometimes by drawing on the board. We also do group activities where we discuss things. I like it when the teacher tells stories because I remember better." (Government school student, Male, Grade 9) These findings align with Wang's (2025) research on the relationship between school culture and learning preferences, suggesting that instructional practices in different school types foster different learning styles.

Theme 2: Teacher-Learner Interactions and Learning Preferences

Students in both school types emphasised the importance of teacher-learner interactions in shaping their learning preferences. Private school students described more structured and teacher-directed interactions: "The teacher explains everything very clearly in class. She uses the blackboard and sometimes shows us pictures. We have to take notes and then study from them at home." (Private school student, Female, Grade 10) Government school students described more informal and interactive relationships with teachers: "Our teacher is very friendly. If we don't understand something, we can ask her again and again. She never gets angry. She explains in different ways until everyone understands." (Government school student, Female, Grade 9) These findings suggest that the quality of teacher-learner interactions may compensate for resource limitations in government schools, supporting the socio-cultural perspective emphasised by Vygotsky (1978) and Lave (2009).

Theme 3: The Role of Peers in Learning

Peer interactions emerged as an important factor in learning for students in both school types, though the nature of these interactions differed. Private school students described competitive peer relationships:

"Everyone wants to get good marks. We help each other sometimes, but mostly we are competing. The teacher compares our marks and tells us who is first, second, third." (Private school student, Male, Grade 10) Government school students described more collaborative peer relationships:

"We study together in groups. When we don't understand something, we ask our friends. Everyone helps everyone. The teacher also encourages group work." (Government school student, Male, Grade 9) These differences in peer relationships may influence the development of social learning styles, consistent with the findings of Rani and Acharya (2023) that private school students show higher scores on social learning styles.

Theme 4: Metacognitive Awareness and Learning Strategies

Students who demonstrated higher academic achievement in both school types showed greater metacognitive awareness of their learning preferences and strategies. This was evident in their ability to describe how they learned best and to adapt their strategies to different tasks:

"I know that I remember things better when I write them down. So when I study, I write everything in my own words. Then I read it aloud to myself. This helps me remember for the exam." (Private school student, Female, Grade 10, high achiever)

"For maths, I need to do the problems myself. If I just watch the teacher do it, I forget. But if I practice again and again, then I remember. I also make notes of important formulas." (Government school student, Male, Grade 9, high achiever)

Lower-achieving students in both school types showed less metacognitive awareness and reported using fewer learning strategies:

"I just read the book and try to remember. Sometimes I can't remember, but I don't know what else to do." (Government school student, Female, Grade 10, low achiever)

These findings align with Lohman's (2025) research on the development of metacognition during secondary school and the work of Biggs and Collis (1982) on the relationship between learning strategies and learning outcomes.

4.3 Integration of Quantitative and Qualitative Findings

Integration of quantitative and qualitative findings reveals several patterns that explain the relationship between learning styles, learning outcomes, and school type:

1. **Institutional shaping of learning styles:** Quantitative findings show that government school students prefer aural and kinesthetic styles, while private school students prefer visual and read/write styles. Qualitative findings suggest these differences are shaped by distinct instructional practices, resource availability, and school cultures in the two school types.
2. **Achievement and learning styles:** Quantitative findings show that read/write style has the strongest correlation with academic achievement in both school types. Qualitative findings suggest this may reflect the emphasis on text-based learning and assessment in secondary education, as well as the greater metacognitive awareness of students who have developed strong read/write skills.

3. **Institutional mediation of gender differences:** Quantitative findings show that gender differences in learning styles are more pronounced in private schools. Qualitative findings suggest this may reflect more rigid gender roles and expectations in private schools, as well as differences in peer and teacher interactions.
4. **The role of metacognition:** Qualitative findings show that high-achieving students in both school types demonstrate greater metacognitive awareness. This suggests that metacognitive development may be a more important factor than learning style per se in determining academic achievement (Anderson & Krathwohl, 2001; Mezirow, 1996).

5. Discussion

5.1 Interpretation of Findings

The findings of this study contribute to understanding the relationship between learning styles and learning outcomes in government and private schools. The results support and extend previous research in several important ways.

First, the study confirms that learning style preferences differ between government and private school students. Government school students tend to prefer aural and kinesthetic learning styles, while private school students tend to prefer visual and read/write styles. These differences appear to reflect distinct institutional environments and instructional practices in the two school types, consistent with Wang's (2025) research on school culture and learning preferences.

Second, the study shows that read/write learning style has the strongest correlation with academic achievement in both school types. This finding aligns with the research of Sharma and Verma (2018) and Säljö (1979), suggesting that the ability to engage with text-based learning materials is crucial for success in secondary education. However, this finding should be interpreted cautiously, as it may reflect the nature of assessment in secondary education rather than a genuine advantage of read/write learning style.

Third, the study reveals that gender differences in learning styles are more pronounced in private schools than in government schools. This finding suggests that gender norms and expectations may be more strongly reinforced in private schools, consistent with the work of Gervais and Odean (2001) and Rani and Acharya (2023).

Fourth, the study highlights the importance of metacognitive awareness in academic achievement. Students who demonstrated greater awareness of their learning preferences and strategies achieved higher academic outcomes, regardless of school type. This finding supports the work of Anderson and Krathwohl (2001) on the importance of metacognitive knowledge in learning and the work of Lohman (2025) on the development of metacognition during adolescence.

5.2 Theoretical Implications

The findings of this study have several theoretical implications. First, they support the socio-cultural perspective on learning (Vygotsky, 1978; Lave, 2009), which emphasises the role of institutional context in shaping learning processes and outcomes. The differences in learning style preferences

between government and private school students suggest that learning styles are not fixed individual characteristics but are shaped by participation in particular learning communities.

Second, the findings support the SOLO taxonomy (Biggs & Collis, 1982) and the revised Bloom's taxonomy (Anderson & Krathwohl, 2001), which emphasise the importance of structural complexity in learning outcomes. Students who demonstrated greater metacognitive awareness and strategic flexibility were able to achieve higher levels of learning outcomes.

Third, the findings challenge the "matching hypothesis" (Pashler et al., 2008), which suggests that matching instruction to individual learning styles improves learning outcomes. While learning style preferences were related to academic achievement, the strongest relationships were with read/write style, which may simply reflect the nature of assessment rather than a genuine advantage of matching instruction to learning style.

5.3 Practical Implications

The findings of this study have several practical implications for educational practice and policy:

1. **Differentiated instruction:** While the matching hypothesis may not be supported, teachers should still use varied instructional strategies to engage different learners and to help students develop a range of learning strategies. This is consistent with the recommendations of Fleming and Mills (1992) and Gervais and Odean (2001).
2. **Metacognitive development:** Schools should focus on developing students' metacognitive awareness and strategic flexibility. This includes teaching students about different learning strategies, helping them reflect on their learning processes, and providing opportunities for self-assessment. The revised Bloom's taxonomy (Anderson & Krathwohl, 2001) provides a useful framework for this work.
3. **Resource allocation:** Government schools should be adequately resourced to support a range of learning modalities. This includes not only textbooks and reading materials but also visual aids, audio resources, and opportunities for hands-on learning. As the ASER (2024) report suggests, improvements in government schools are possible with appropriate investment and support.
4. **Teacher professional development:** Teachers in both school types should receive professional development on learning styles and differentiated instruction. This should include opportunities to reflect on their own teaching practices and to develop strategies for supporting diverse learners. The work of Boud, Cohen, and Walker (1993) on using experience for learning provides useful insights for teacher education.
5. **Addressing gender disparities:** Schools should be attentive to gender differences in learning styles and should work to create inclusive learning environments that support all students. This includes challenging gender stereotypes about appropriate learning behaviours and providing opportunities for all students to develop a range of learning strategies.

5.4 Limitations and Future Research

This study has several limitations that should be acknowledged. First, the study was conducted in a single district and may not be generalisable to other contexts. Future research should examine learning styles and learning outcomes in diverse geographical and cultural contexts.

Second, the study relied on self-reported learning style preferences, which may not accurately reflect actual learning behaviours. Future research should employ multiple methods of assessing learning styles, including observations and performance-based measures.

Third, the study used academic grades as the primary measure of learning outcomes, which may not capture the full range of learning outcomes valued in education. Future research should include alternative measures of learning outcomes, such as measures of critical thinking, problem-solving, and creativity.

Fourth, the study was cross-sectional and cannot establish causal relationships. Future research should employ longitudinal designs to examine how learning style preferences develop over time and how they influence learning outcomes.

Fifth, the study focused on secondary school students and may not be generalisable to other educational levels. Future research should examine learning styles and learning outcomes at the primary, post-secondary, and adult education levels.

5.5 Recommendations for Future Research

Based on the findings and limitations of this study, several directions for future research are recommended:

1. **Longitudinal studies:** Longitudinal research is needed to examine how learning style preferences develop over the course of secondary education and how changes in learning style preferences relate to changes in academic achievement.
2. **Intervention studies:** Intervention studies are needed to examine whether teaching students about learning styles and learning strategies improves academic achievement. Such studies could provide evidence for the effectiveness of metacognitive interventions in improving learning outcomes.
3. **Cross-national comparisons:** Cross-national research is needed to examine how national educational policies and cultural contexts influence the relationship between learning styles and learning outcomes.
4. **Teacher perspectives:** Future research should include the perspectives of teachers on learning styles and differentiated instruction. This could provide insights into the challenges and opportunities of implementing learning styles-based approaches in schools.
5. **Technology and learning styles:** Research is needed on how technology can support different learning styles and promote metacognitive development. This is particularly relevant given the increasing use of digital learning resources in schools.

6. Conclusion

This research paper has examined the relationship between learning styles and learning outcomes among secondary school students in government and private schools. Drawing upon theoretical frameworks including Kolb's Experiential Learning Theory (Kolb, 1984), the VARK model (Fleming & Mills, 1992), and the SOLO Taxonomy (Biggs & Collis, 1982), the study has explored how institutional contexts shape learning style preferences and their relationship to academic achievement. The findings reveal significant differences in learning style preferences between government and private school students. Government school students prefer aural and kinesthetic styles, while private school students prefer visual and read/write styles. These differences appear to reflect distinct institutional environments and instructional practices in the two school types.

The study also reveals that read/write learning style has the strongest correlation with academic achievement in both school types, suggesting that the ability to engage with text-based learning materials is crucial for success in secondary education. However, the study also highlights the importance of metacognitive awareness in academic achievement, with students who demonstrate greater awareness of their learning preferences and strategies achieving higher academic outcomes.

The findings contribute to educational theory by supporting socio-cultural perspectives on learning (Vygotsky, 1978; Lave, 2009), which emphasise the role of institutional context in shaping learning processes and outcomes. The findings also support the importance of metacognitive knowledge in learning (Anderson & Krathwohl, 2001; Lohman, 2025) and challenge the "matching hypothesis" (Pashler et al., 2008).

Practically, the findings suggest that schools should focus on developing students' metacognitive awareness and strategic flexibility, use varied instructional strategies to engage different learners, and address gender disparities in learning experiences. Government schools should be adequately resourced to support a range of learning modalities, and teachers in both school types should receive professional development on learning styles and differentiated instruction.

In conclusion, this study contributes to understanding the complex relationship between learning styles, learning outcomes, and institutional contexts in secondary education. While learning style preferences differ between government and private school students, metacognitive awareness and strategic flexibility may be more important than learning style per se in determining academic achievement. By focusing on developing these capacities in all students, educators can help improve learning outcomes in both government and private schools.

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