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The Learning Styles of the Grade 7 Learners in Mathematics in the Public Secondary Schools in Ocampo District, Division of Camarines Sur

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ABSTRACT

Learning-style inventories are widely used to describe how students prefer to engage with instruction, although evidence does not support matching teaching to fixed learner types. This study described Grade 7 students' self-reported mathematics learning preferences and the conditions they perceived as influential across three public secondary schools in Ocampo District, Division of Camarines Sur, Philippines. A descriptive-evaluative survey was conducted during school year 2023–2024 among 810 Grade 7 learners: Ocampo National High School (n = 352), Hanawan National High School (n = 293), and Malate-Olos High School (n = 165). A researcher-developed 127-item questionnaire used five-point response scales. Weighted means summarized seven preference dimensions and four categories of perceived influences. Kendall's coefficient of concordance assessed agreement among the three schools' indicator rankings; p-values were recalculated from the reported chi-square statistics and degrees of freedom. All seven preference dimensions were rated Very Much Evident, ranging from social/linguistic (M = 4.50) to reading/writing (M = 4.64); the grand mean was 4.58. Rank agreement was significant for visual (W = .91, p = .0016), auditory (W = .97, p = .0019), reading/writing (W = .91, p = .0035), social/linguistic (W = .97, p = .0008), and solitary preferences (W = .92, p = .0021), but not for kinesthetic or logical/analytic preferences. Perceived influences were Very Much Affected overall (M = 4.59). Physical/physiological conditions ranked highest (M = 4.67); psychological factors ranked lowest (M = 4.49). Agreement was significant for physical/physiological, environmental, and mode-of-instruction indicators, but not for psychological indicators. Learners endorsed multiple approaches strongly, indicating broad multimodal preferences rather than discrete types. Results support varied, content-responsive mathematics instruction and attention to learning conditions, not ability labeling or preference-matched teaching. Direct achievement measures and a psychometrically revalidated instrument are needed.

1. Introduction

Mathematics learning requires students to interpret symbols, diagrams, language, patterns, procedures, and quantitative relationships while explaining and applying their reasoning. Effective classrooms therefore use representations and activities selected for the mathematical idea and the learner's current understanding. Multiple representations can deepen conceptual connections when teachers explicitly help students coordinate concrete, pictorial, verbal, and symbolic forms.[6]

The concept of learning styles has nevertheless encouraged educators to classify learners as visual, auditory, read/write, kinesthetic, logical, social, or solitary and to adjust instruction to those categories. Students may genuinely prefer some activities or media, but preference does not establish a stable cognitive type. A rigorous review found insufficient evidence for the matching hypothesis—the claim that students learn more when instruction is delivered in their preferred style.[1] Subsequent reviews likewise concluded that scientifically adequate studies have generally failed to demonstrate an achievement benefit from matching.[23]

This distinction is consequential. Treating preferences as fixed traits can narrow students' opportunities, encourage self-labeling, and shift attention away from prior knowledge, task demands, motivation, practice, feedback, and the quality of instruction. A systematic review found that belief in preference-matched instruction remained widespread among educators despite the lack of supporting evidence.[4] The more defensible use of preference data is descriptive: it can reveal activities students find familiar or engaging and can prompt teachers to diversify access without assigning children to restrictive categories.

Evidence-based learning principles provide a stronger instructional foundation. Practice testing and distributed practice have broad support, while self-explanation and interleaving show promise across many learning conditions.[5] In mathematics, varied representations, purposeful questioning, mathematical discourse, productive struggle, conceptual connections, and attention to learners' thinking are more defensible than designing separate lessons for presumed styles.[7]

The Philippine MATATAG Mathematics Curriculum for Grade 7 similarly emphasizes coherent mathematical understanding and competency development rather than modality labeling.[8] Local information about learners' preferred ways of participating may still help schools plan materials, classroom routines, and support systems, provided it is interpreted as contextual preference data and not as proof of differential aptitude.

1.1 Local Context and Research Gap
The study covered three public secondary schools in Ocampo District, Division of Camarines Sur: Ocampo National High School, Hanawan National High School, and Malate-Olos High School. The schools were categorized by enrollment as big, medium, and small, respectively. The research addressed a local need to describe Grade 7 learners' mathematics learning preferences, identify physical, psychological, environmental, and instructional conditions perceived to influence those preferences, and compare the consistency of school-level indicator rankings.

1.2 Objectives
The study described the extent to which Grade 7 learners endorsed visual, auditory, kinesthetic, reading/writing, logical/analytic, social/linguistic, and solitary preferences in mathematics; determined agreement among the three schools' rank orders for each dimension; described perceived physical/physiological, psychological, environmental, and mode-of-instruction influences; tested agreement among school rankings for those influences; and translated the results into evidence-informed recommendations.

1.3 Hypotheses
For journal reporting, the nondirectional null hypotheses were that the three schools would show no significant concordance in their indicator rankings for each learning-preference dimension and no significant concordance in their indicator rankings for each category of perceived influence. Tests used $\alpha = .05$.

2. Methods
2.1 Research Design
The study used a cross-sectional descriptive-evaluative survey. The source called the design descriptive-evaluative-correlational; however, no association between two learner-level variables was analyzed. Kendall's W evaluated concordance among school-level rank profiles. The design is therefore described more precisely as a descriptive survey with rank-concordance analysis.
The design was suitable for summarizing perceptions and comparing the ordering of indicators across schools. It did not manipulate instruction, assess preference-by-treatment interactions, or measure mathematics achievement. It therefore cannot establish that a preference caused learning, that a perceived factor caused a preference, or that matched instruction would improve outcomes.

2.2 Setting and Participants
Participants were 810 Grade 7 learners enrolled in the three public secondary schools during school year 2023–2024. The sample included 353 males (43.58%) and 457 females (56.42%). Ocampo National High School contributed 352 learners, Hanawan National High School 293, and Malate-Olos High School 165.

Table 1. Participant Distribution

School category	School	Male	Female	Total	%
Big	Ocampo National High School	153	199	352	43.46
Medium	Hanawan National High School	130	163	293	36.17
Small	Malate-Olos High School	70	95	165	20.37
Total	Three schools	353	457	810	100.00

Note. Percentages were recalculated from the reported counts; the thesis rounded school shares to 44%, 36%, and 20%.

2.3 Sampling
The methods chapter reported random sampling of learners across the three schools and stated a population of 4,293 Grade 7 learners: 2,904 in Ocampo National High School, 1,106 in Hanawan National High School, and 383 in Malate-Olos High School. It also cited Slovin's formula with $e = .05$. The abstract and Chapter 5, however, referred to purposive sampling. The available documentation did not identify the learner roster, randomization procedure, replacement rules, or response rate.
Accordingly, the sample is reported as a three-school sample with source-reported random learner selection. The school-specific sample counts are preserved, but the sampling design cannot be independently reconstructed. This limitation is considered when interpreting precision and representativeness.

2.4 Instrument
A researcher-developed questionnaire contained 127 items in two parts. Part I allocated 84 items to seven learning-preference dimensions: visual (13), auditory (12), kinesthetic (14), reading/writing (10), logical/analytic (10), social/linguistic (13), and solitary (12). Part II allocated 43 items to four categories of perceived influence: physical/physiological (9), psychological (12), environmental (11), and mode of instruction (11). The source instrument included open-ended 'other' entries, while the concordance summaries used 76 preference indicators and 39 influence indicators.
Preference items were interpreted on a five-point scale: 4.50–5.00, Very Much Evident; 3.50–4.49, Much Evident; 2.50–3.49, Evident; 1.50–2.49, Fairly Evident; and 1.00–1.49, Not Evident. Influence items used parallel labels: Very Much Affected, Much Affected, Affected, Fairly Affected, and Not Affected.
The initial questionnaire was reviewed by the dean and adviser, tried out with secondary teachers in Ocampo District, revised, and redistributed. The thesis reported a reliability coefficient of .96 using Kuder–Richardson Formula 21 and a t value of 65.10. Because

the instrument used polytomous five-point items and item-level pilot data were unavailable, the appropriateness and calculation of KR-21 could not be independently verified. The value is therefore presented as source-reported rather than re-estimated.

2.5 Data Collection

After permission was reportedly obtained from the Schools Division Superintendent of Camarines Sur, the researcher personally administered and retrieved the questionnaires. Responses were collated, tabulated, and interpreted using the study's predefined scales. Exact administration dates, consent procedures, missing-response rules, and the number of questionnaires distributed versus returned were not stated in the completed thesis.

2.6 Statistical Analysis

Frequencies and percentages summarized the sample. Weighted means described each indicator and dimension. Kendall's coefficient of concordance (W) quantified agreement among the three schools' rankings of indicators within each dimension.[9] W ranges from 0 (no rank agreement) to 1 (complete agreement). The chi-square approximation used $\chi^2 = k(n - 1)W$, where k = 3 schools, n = the number of ranked indicators, and df = n − 1. The thesis reported W, χ^2, and df. For this manuscript, exact upper-tail p-values were recalculated from those reported statistics and compared with $\alpha = .05$.

Kendall's W was applied to aggregated school-level weighted-mean rankings rather than 810 learner-level observations. The inferential unit was therefore the questionnaire indicator, ranked by three schools. This distinction is essential: significant W indicates similar ordering of indicators across schools, not a statistically significant difference among learners or schools and not an effect of an instructional treatment.

2.7 Ethical Considerations

The completed thesis stated that permission to conduct the study was obtained from the Schools Division Superintendent, but it did not report an institutional ethics-review number, parental consent, learner assent, confidentiality procedures, or data-retention arrangements. Only aggregate, non-identifiable results are reported here. These details require author confirmation before journal submission.

3. Results

3.1 Overall Learning-Preference Profile

All seven dimensions were rated Very Much Evident, with means clustered between 4.50 and 4.64. Reading/writing ranked first (M = 4.64), followed by logical/analytic (M = 4.62), visual (M = 4.60), auditory (M = 4.59), solitary (M = 4.56), kinesthetic (M = 4.54), and social/linguistic preferences (M = 4.50). The grand mean was 4.58.

Table 2. Learning-Preference Ratings by School

Dimension	Ocampo NHS	Hanawan NHS	Malate-Olos HS	Overall M	Interpretation
Visual	4.64	4.61	4.55	4.60	Very Much Evident
Auditory	4.71	4.52	4.55	4.59	Very Much Evident
Kinesthetic	4.65	4.52	4.45	4.54	Very Much Evident
Reading/writing	4.73	4.58	4.61	4.64	Very Much Evident
Logical/analytic	4.70	4.53	4.62	4.62	Very Much Evident
Social/linguistic	4.61	4.35	4.55	4.50	Very Much Evident
Solitary	4.54	4.52	4.62	4.56	Very Much Evident
Grand mean	4.65	4.52	4.56	4.58	Very Much Evident

Note. Means and verbal interpretations reproduce the source summary table. High endorsement across all dimensions indicates overlapping preferences rather than mutually exclusive learner types.

Ocampo National High School recorded the highest school-level grand mean (4.65). Its strongest dimension was reading/writing (4.73). Hanawan National High School had a grand mean of 4.52, with visual preference highest (4.61). Malate-Olos High School had a grand mean of 4.56; logical/analytic and solitary preferences were jointly highest (both 4.62). The narrow spread and uniformly high means suggest a ceiling pattern in the response scale.

Item-level responses showed varied strengths. Visual preference was strongest for remembering through graphics and pictures (M = 4.87) and lowest for the item describing quietness (M = 4.24). Auditory preference was highest for listening to favorite music (M = 4.93) and lowest for talking aloud to oneself (M = 4.15). Kinesthetic preference was highest for considering learning fun (M = 4.90) and lowest for using hand gestures while talking (M = 4.35).

For reading/writing, book use ranked highest (M = 4.87), while essay exercises ranked lowest (M = 4.23). Logical/analytic preference was strongest for clear task structure (M = 4.82) and lowest for preferring a bulleted list over a block of text (M = 4.33). Social/linguistic preference was highest for group discussion and activities (M = 4.83) and lowest for studying flashcards with a partner (M = 4.03). Solitary preference was highest for learning from others (M = 4.85)—a conceptually inconsistent item for a solitary scale—and lowest for preferring a private, quiet place (M = 3.96).

3.2 Concordance of School Rankings

Table 3. Kendall's Concordance for Learning-Preference Indicators

Dimension	Indicators, n	W	χ^2	df	Recalculated p	Decision
Visual	12	.91	30.03	11	.0016	Significant
Auditory	10	.97	26.19	9	.0019	Significant
Kinesthetic	12	.47	15.51	11	.1603	Not significant
Reading/writing	10	.91	24.57	9	.0035	Significant
Logical/analytic	9	.53	11.13	8	.1944	Not significant
Social/linguistic	12	.97	32.01	11	.0008	Significant
Solitary	11	.92	27.60	10	.0021	Significant

Note. p-values were recalculated from the source-reported χ^2 and df using the upper-tail chi-square distribution. Significance denotes concordance in indicator rankings among three schools; it does not denote between-school mean differences.

The schools showed strong concordance for five dimensions, with W values from .91 to .97. Kinesthetic (W = .47) and logical/analytic (W = .53) rankings were only moderate and were not statistically significant. Thus, the relative ordering of specific behaviors was less consistent across schools for these two dimensions, even though their overall means remained high.

3.3 Perceived Influences on Learning Preferences

The four categories produced a grand mean of 4.59, interpreted as Very Much Affected. Physical/physiological factors ranked first (M = 4.67), followed by mode of instruction (M = 4.63), environmental factors (M = 4.58), and psychological factors (M = 4.49). The psychological mean fell at the upper limit of Much Affected; the other categories were Very Much Affected.

Table 4. Perceived Influence Ratings by School

Influence category	Ocampo NHS	Hanawan NHS	Malate-Olos HS	Overall M	Interpretation
Physical/physiological	4.73	4.67	4.62	4.67	Very Much Affected
Psychological	4.52	4.47	4.48	4.49	Much Affected
Environmental	4.64	4.52	4.58	4.58	Very Much Affected
Mode of instruction	4.66	4.57	4.66	4.63	Very Much Affected
Grand mean	4.64	4.56	4.59	4.59	Very Much Affected

Note. The scale describes how strongly learners perceived each condition to affect their learning preferences; it is not a causal effect estimate.

Table 5. Kendall's Concordance for Perceived-Influence Indicators

Category	Indicators, n	W	χ^2	df	Recalculated p	Decision
Physical/physiological	8	.72	14.91	7	.0372	Significant
Psychological	11	.44	13.20	10	.2127	Not significant
Environmental	10	.64	17.28	9	.0445	Significant
Mode of instruction	10	.69	18.63	9	.0285	Significant

Note. Exact p-values were recalculated from the source-reported χ^2 and df. The source factor summary contained duplicated cells caused by table formatting; only the four substantive categories are reported.

School rankings were concordant for physical/physiological, environmental, and mode-of-instruction indicators. Psychological rankings were not concordant (W = .44, p = .2127), indicating that the three schools ordered the psychological items differently. The absence of concordance does not imply that psychological conditions were unimportant; their overall rating remained high.

3.4 Item-Level Priorities

Table 6. Highest- and Lowest-Rated Indicators

Area	Highest-rated indicator	M	Lowest-rated indicator	M
Visual	Memorizes well with graphics/pictures	4.87	Characterized as quiet	4.24

Area	Highest-rated indicator	M	Lowest-rated indicator	M
Auditory	Enjoys listening to favorite music	4.93	Talks aloud to self	4.15
Kinesthetic	Considers learning fun	4.90	Uses hand gestures while talking	4.35
Reading/writing	Uses books in reading	4.87	Uses essay exercises	4.23
Logical/analytic	Receives clear task structure	4.82	Prefers bulleted list over block text	4.33
Social/linguistic	Enjoys group discussion/activities	4.83	Studies flashcards with a partner	4.03
Solitary	Learns from others	4.85	Prefers a private, quiet place	3.96
Physical	Physical health; atmospheric condition	4.78	Time of learning	4.51
Psychological	Rewards and punishment	4.78	Attitude	4.17
Environmental	Working conditions	4.80	Ability and aptitude	4.37
Instruction	Special method for learning	4.87	Teaching strategies/approaches	4.37

Note. Wording was lightly edited for grammar while preserving the meaning and means reported in the source tables. A low rank within these highly rated scales does not necessarily indicate a weak or ineffective condition.

4. Discussion

4.1 Multiple Preferences Rather Than Discrete Types

The central finding was not the dominance of one learning style but the strong endorsement of every dimension. Overall means occupied a narrow 0.14-point range, from 4.50 to 4.64, on a five-point scale. This pattern is more consistent with learners valuing multiple ways of engaging in mathematics than with stable, mutually exclusive types. It also raises the possibility of acquiescence or ceiling effects, particularly because no standard deviations or response distributions were reported.

Reading/writing and logical/analytic preferences ranked highest. These dimensions align naturally with several demands of mathematics: reading conditions, recording steps, interpreting symbolic statements, organizing information, recognizing patterns, and explaining reasoning. Their prominence can inform lesson design, but it does not justify labeling learners or restricting them to text-based and analytic tasks. Evidence does not support the claim that matching instruction to a designated style produces superior learning.[123]

The scientifically responsible implication is to provide purposeful variety. Visual models should clarify quantities and relationships; oral explanation should support mathematical language and discussion; manipulatives and movement should represent relevant concepts; writing should require learners to justify procedures; collaboration should expose contrasting strategies; and independent work should consolidate understanding. Representations should be chosen because they illuminate the mathematics, not because students have been assigned to a modality.[67]

4.2 School-Level Concordance

The three schools showed strong agreement in ranking visual, auditory, reading/writing, social/linguistic, and solitary indicators. This suggests that many specific behaviors within these scales were ordered similarly despite differences in school size. The result can support shared district planning around commonly endorsed activities and materials.

By contrast, kinesthetic and logical/analytic indicators did not show significant rank concordance. The schools may differ in how mathematics activities, task structures, movement, problem solving, and independent reasoning are experienced or understood. These differences warrant school-level examination of actual classroom tasks rather than immediate standardization. Observations, student work, teacher interviews, and direct achievement measures would help determine whether the variation reflects meaningful instructional context or measurement noise.

Kendall's W must be interpreted cautiously because each analysis used only three school rankings and treated indicators as cases. High W indicates similar orderings; it does not show that school means are equal, that learners agree individually, or that any preference predicts achievement. The analysis is best viewed as an exploratory comparison of aggregate school profiles.

4.3 Perceived Physical, Psychological, Environmental, and Instructional Influences

Learners rated physical/physiological conditions most strongly. Physical health and atmospheric conditions were the highest items, while time of learning was lowest but still Very Much Affected. These ratings underscore that readiness to participate in mathematics is situated: health, fatigue, comfort, food, and timing may shape attention and engagement. The cross-sectional ratings do not establish causal pathways, but they identify practical conditions that schools can monitor.

Mode of instruction ranked second. Special methods, learning by doing, organization of materials, instructional resources, testing, adaptability, and integration were perceived as influential. This result should be interpreted as a call for high-quality, varied mathematics teaching rather than preference matching. Content-responsive representations, formative assessment, opportunities for explanation, and feedback have stronger evidentiary grounding than separate lessons for visual, auditory, or kinesthetic students.

Environmental factors were also strongly endorsed. Working conditions and organizational setup ranked highest, pointing to the importance of orderly, supportive learning spaces and functional school routines. Psychological factors had the lowest category mean and the only nonsignificant concordance result. Their high overall rating but inconsistent school ordering suggests that motivation, interest, attitude, praise, stress, hunger, and related experiences may be locally patterned and should be examined with context-sensitive measures.

4.4 Implications for Mathematics Instruction

The findings support a broad instructional repertoire. Teachers can combine diagrams, number lines, tables, symbolic expressions, oral reasoning, worked examples, manipulatives, written explanations, peer discussion, and independent practice within coherent lessons. They should also emphasize learning strategies supported across student characteristics and materials, including retrieval practice, distributed practice, self-explanation, and appropriately designed interleaving.[5] Such strategies target memory, understanding, and transfer without requiring a fixed learner classification.

The MATATAG Grade 7 Mathematics Curriculum provides the appropriate curricular anchor.[8] Preference data may help teachers anticipate engagement barriers or diversify entry points, but assessment should remain focused on the intended mathematics competencies. Students should be encouraged to develop flexibility across representations and ways of working rather than conclude that they can learn only through one channel.

4.5 District Policy and Practice Framework

Table 7. Evidence-Informed Action Framework

Priority	Recommended action	Monitoring evidence
Instructional variety	Plan coherent lessons using visual, verbal, symbolic, written, collaborative, and hands-on representations selected for the mathematical goal.	Lesson plans and observations show purposeful representation use.
Avoid fixed labels	Use preference results for reflection and engagement planning; do not assign students to permanent styles or lower expectations.	School guidance and teacher training explicitly distinguish preference from aptitude.
Learning strategies	Integrate retrieval practice, spaced review, self-explanation, and problem-solving across units.	Common formative assessments and learner work show strategy use.
Learning conditions	Monitor health, fatigue, classroom conditions, access to materials, and scheduling barriers.	School improvement plans document actions and follow-up indicators.
Professional learning	Train mathematics teachers in evidence-based differentiation, multiple representations, formative assessment, and productive discourse.	Coaching logs, demonstration lessons, and observation feedback are reviewed each term.
Measurement quality	Revise and validate the questionnaire; use appropriate reliability analysis for five-point scales and add direct mathematics outcomes.	Pilot report includes validity evidence, omega/alpha, item analysis, and transparent sampling.

5. Conclusion

Grade 7 learners across three Ocampo District public secondary schools strongly endorsed visual, auditory, kinesthetic, reading/writing, logical/analytic, social/linguistic, and solitary ways of engaging with mathematics. Reading/writing received the highest overall mean, but all dimensions were rated Very Much Evident. This broad pattern is better understood as multimodal preference than as evidence of discrete learner types.

The schools showed significant agreement in the rank ordering of five preference dimensions and three categories of perceived influence. Physical/physiological conditions, mode of instruction, and environmental conditions were strongly perceived as influential. These results justify attention to instructional quality and learning conditions, but they do not show that matching instruction to fixed styles improves mathematics learning.

Schools should use varied, content-responsive teaching; strengthen evidence-based learning strategies; maintain healthy and supportive learning environments; and prevent preference labels from limiting learner opportunities. Future research should revalidate the instrument, use transparent probability sampling, retain learner-level data, report uncertainty and effect sizes, and test relationships with direct mathematics outcomes.

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