Original Article

VARK Learning Preferences and Teaching Styles in Science during Distance Learning

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Abstract

The COVID-19 pandemic significantly transformed the delivery of science education, requiring schools to adopt distance learning modalities. This study examined the learning styles of Grade 8 students and the teaching styles of Science teachers during distance learning at a private Catholic school in the Philippines during the School Year 2021–2022. Using a descriptive-comparative research design, data were collected from 99 students using a researcher-developed questionnaire based on the VARK framework. Findings revealed that students demonstrated high preferences across all VARK learning style dimensions, with Visual emerging as the dominant learning style. Teachers were perceived as employing all teaching style dimensions at a high level, with Reading/Writing identified as the most frequently used instructional approach. Results further revealed a significant difference between students' learning styles and teachers' teaching styles ($t = -2.084$, $p = 0.040$), indicating a mismatch between students' preferred learning styles and the teaching styles they experienced during distance learning. The study concludes that, while teachers used diverse instructional approaches, the dominant teaching style did not fully align with students' preferred learning styles. These findings underscore the importance of adopting flexible and multimodal instructional strategies that address diverse learner preferences and enhance science learning experiences in distance and blended learning environments.

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1. Introduction

The COVID-19 pandemic led to rapid changes in education systems. As the pandemic spread, educational systems were forced to use alternative modes of instruction to ensure that all students had the opportunity to continue their education. One of the areas of education that has changed most dramatically with the shift from in-class to online instruction is science education, as it is often heavily dependent on an active classroom environment, laboratory work, experimentation, and direct interaction between students and teachers. The sudden shift back to online classes from in-person classes for teachers and students was challenging because everyone had to learn new instructional and delivery methods, new technologies, and new forms of independent learning. Because of the challenges imposed on educators and students, teachers had to develop and implement various forms of instructional flexibility and respond to students' learning needs in the context of remote learning (Pokhrel & Chhetri, 2021).

Globally, the transitions to distance education revealed unfairness in access to education, technology, and student engagement. Many students found self-directed learning difficult; they lacked access to technology to support their education, and many had low motivation for school and their education during the period of closure (OECD, 2020). Similarly, Lorente et al. (2020) argued that the sudden adoption of technology to support students' education revealed a significant disparity in the availability of high-quality education. Schools and teachers utilized various approaches to continue supporting students' learning and engaging students in learning through methods of instruction and education delivery using remote technologies, despite the challenges associated with remote instruction (Zancajo et al., 2022).

One variable associated with effective instruction and academic achievement is students' learning style preferences. Learning style preferences are the preferred ways a student learns, in terms of how they process, organize, and retain information. There is considerable literature supporting the use of the VARK model developed by Fleming. This model divides learners into four distinct categories (visual, auditory, reading/writing, kinesthetic) and bases the information students receive by these categories. The literature also consistently indicates that students learn best when the teaching methods used match their learning styles. Therefore, in distance learning settings, teachers must understand how students learn to help them process the different types of materials available across today's technological platforms.

Specifically, science education requires the use of learner-centered and multimodal instructional approaches because, in order to understand the concepts taught in Science, students typically must use visualization (including diagrams),

conduct experiments, collaborate, and utilize the materials they are taught. Due to technological and logistical limitations encountered during emergency remote distancing, teachers typically relied heavily on modular instruction, written assignments, and asynchronous activities to deliver instruction. As noted by Bulusan et al. (2022), during these classes, students often struggled to maintain motivation, concentration, and involvement. These findings emphasize the importance of teachers designing their instructional practices to account for students' preferred learning modalities to optimize student engagement and comprehension in science education.

While previous studies have examined learning and teaching styles and their influence on academic performance, limited research has explored these variables in the context of science instruction during distance learning among junior high school students in the Philippines. Existing studies have largely focused on higher education settings or general online learning environments, with relatively few examining the learning styles of secondary school students alongside those of their science teachers. Furthermore, the shift to distance learning during the COVID-19 pandemic altered instructional delivery and learning experiences, potentially influencing both students' learning preferences and teachers' instructional practices. As a result, it is necessary to examine the extent to which various learning and teaching styles were employed during science instruction in a distance-learning environment.

Therefore, this study aimed to determine the extent of Grade 8 students' learning styles and the teaching styles employed by their Science teachers during distance learning at a private Catholic school in the Philippines during the School Year 2021–2022. Specifically, the study examined students' learning styles across the four VARK dimensions—Visual, Auditory, Reading/Writing, and Kinesthetic—and determined the extent to which their Science teachers were perceived as employing these teaching styles. Furthermore, the study examined whether there was a significant difference between students' learning styles and teachers' teaching styles during distance learning.

This study is significant because it provides empirical evidence on students' learning preferences and the teaching styles used in science instruction during distance learning. The findings may assist educators in designing more responsive and inclusive instructional practices that address diverse learner needs through a variety of teaching approaches. Moreover, the study contributes to the growing body of literature on science education during alternative learning modalities and may serve as a basis for improving instructional planning, learner engagement, and the delivery of science education in distance, blended, and flexible learning environments.

2. Methodology

2.1 Research Design and Locale

This study employed a quantitative, descriptive-comparative research design to examine the learning styles of Grade 8 students and the teaching styles of Science teachers during distance learning. The descriptive component of the study was used to

determine and describe students' learning style preferences and teachers' instructional practices, based on the VARK framework. Specifically, weighted means and rankings were utilized to identify the dominant learning and teaching styles exhibited by the participants.

The comparative component was used to determine whether there was a significant difference between students' learning styles and their Science teachers' teaching styles. To address this objective, a paired-samples t-test was conducted to compare the respondents' learning style and teaching style scores. This approach enabled the researcher not only to describe existing patterns but also to statistically examine the degree of alignment between students' preferred learning styles and teachers' instructional practices during distance learning.

The study was conducted at a private Catholic school in the Philippines during the 2021–2022 School Year, when distance learning was implemented due to the COVID-19 Pandemic. The school utilized flexible learning modalities, such as Modular and Online Instruction, to maintain educational continuity due to the public health crisis.

2.2 Respondents and Sampling

The participants in this research project were 8th-grade junior high school students who were registered at the time of the survey during the school year. 132 students were enrolled at the time of this survey in four different sections of 8th grade; 99 were selected as participants based on the use of Slovin's formula for determining sample size with an acceptable margin of error of 5% and a confidence level of 95%.

Stratified random sampling was used to ensure equal representation across 8th-grade sections, minimizing sampling error. Only 8th-grade students who were officially enrolled and voluntarily agreed to participate in this survey were included. All students who did not complete the survey questionnaire were excluded from any further analysis.

2.3 Research Instrumentation and Validity

The data were gathered through a survey using two (2) instruments: an adapted version of the VARK and a learning style questionnaire created by The University of California at Merced's Student Advising & Learning Center.

Part I of the survey measured how students learn in the four areas of Visual, Auditory, Reading/Writing, and Kinesthetic, using 5 indicators for each area to determine how much, or whether, they prefer those styles of learning. The students answered questions using a 5-point Likert scale (1 = Strongly Disagree; 5 = Strongly Agree). The Likert Scale used for the students' Learning Styles is shown below.

Scale	Statistical Limits	Descriptive Equivalent	Extent of Learning Style
5	4.21–5.00	Strongly Agree	Very High
4	3.41–4.20	Agree	High
3	2.61–3.40	Neither/Nor Agree	Moderate
2	1.81–2.60	Disagree	Low
1	1.00–1.80	Strongly Disagree	Very Low

Part II of the survey measured the teaching styles used in Science during distance learning and how students perceived them using the same four styles: Visual, Auditory, Reading/Writing, and Kinesthetic. Teaching was evaluated using 5 indicators for each teaching style category, and responses were again measured on a 5-point rating scale (1 = Never; 5 = Always). Below is the Likert Scale of the Teaching Styles of the students' Science Teachers as perceived by the students.

Scale	Statistical Limits	Descriptive Equivalent	Extent of Teaching Style
5	4.21–5.00	Always	Very High
4	3.41–4.20	Often	High
3	2.61–3.40	Sometimes	Moderate
2	1.81–2.60	Rarely	Low
1	1.00–1.80	Never	Very Low

To establish content validity, the questionnaire underwent expert validation by three specialists in Science Education and educational research. The evaluators reviewed the clarity of each indicator, its relevance to the study's purpose, its appropriateness, and its alignment with the study's research objectives. The evaluators' comments and suggestions were considered when preparing the final version of the instrument. To determine the instrument's reliability, Cronbach's alpha was computed using the collected data. The instrument obtained an overall Cronbach's alpha coefficient of 0.985, indicating excellent internal consistency and a very high level of reliability. This result suggests that the questionnaire items consistently measured the constructs under investigation.

2.4 Data Gathering Procedure

Before starting data collection, the researcher obtained formal permission from the school administration via an official request letter endorsed by the research adviser. Once the school approved the researcher's request, the class advisors were contacted to assist in disseminating the survey questionnaire to the study participants.

Due to COVID-19 health and safety protocols, the validated questionnaire was administered via Google Forms to comply. In addition, all participants were provided with information about the study's objectives and given ample time to complete the

survey. All participants were given instructions on how to respond to ensure consistent responses to each question and as few errors as possible in the collected data.

After retrieving the completed questionnaires, the responses from all the participants were reviewed, organized, and tabulated for statistical analysis. All collected data were entered into both Microsoft Excel and the Statistical Package for the Social Sciences (SPSS).

2.5 Data Analysis and Statistical Treatment

Statistical analysis was conducted using appropriate descriptive and inferential statistical tools based on the objectives of the study. Weighted means and rankings were used to determine the extent of Grade 8 students' learning styles and the teaching styles employed by their Science teachers across the four VARK dimensions: Visual, Auditory, Reading/Writing, and Kinesthetic.

The computed weighted means were interpreted using predetermined descriptive rating scales ranging from Very High to Very Low. These descriptive statistics were used to identify the students' dominant learning styles and the most frequently employed teaching styles of their Science teachers during distance learning.

To determine whether there was a significant difference between students' learning styles and their teachers' teaching styles, a paired-samples t-test was used at the 0.05 level of significance. This statistical test enabled the researcher to compare the means of the two variables and determine whether the observed difference was statistically significant.

2.6 Ethical Considerations

Throughout the entire study, ethical principles were followed. The school administrator granted permission to conduct this research before collecting data. All respondents were voluntary participants and provided informed consent before receiving the survey questionnaire.

Respondents' identities were kept fully confidential and anonymous throughout the research. The collected data were used solely for educational and research purposes, and participants were not academically affected by their participation in this research.

3. Results

All 99 respondents were enrolled in four grade 8 sections at a private Catholic school in the Philippines during the School Year 2021–2022. The respondents to the survey had experienced distance-learning modalities introduced during the COVID-19 pandemic, making them ideal candidates for examining their preferred types of learning and teaching methods in Science education.

3.1 Learning Styles in Science during Distance Learning

Section one of this study focused on identifying the types of learning styles exhibited by grade 8 students through the Visual, Auditory, Reading/Writing and Kinesthetic (VARK) dimensions.

Table 1. Extent of visual learning style among Grade 8 students.

Items I learn better/best when…	**Mean**	**DE**	**Rank**
1. information is presented using tables, charts, or graphs.	4.10	Agree	2
2. visual aids are used during class discussion.	3.69	Agree	4
3. my teacher uses pictures and video clips in elaborating a certain topic.	4.58	Strongly Agree	1
4. I use highlighters when I review my notes.	3.87	Agree	3
5. I use flashcards, index cards, and/or sticky notes while studying	3.46	Agree	5
Weighted Mean	3.93	High	

The results indicate that students with visual learning styles exhibited the highest level of visual learning, with a weighted mean for visual learning of 3.93 (High). This suggests that learners tend to process and retain information more effectively when instructional materials are presented in visual formats.

Specifically, most students believe that they learn best "*3. when their teacher uses pictures and video clips in elaborating a certain topic,"* with a mean of 4.58 at rank 1. It can be noted that this is the only statement to garner an equivalent of Very High, suggesting that most students prefer seeing pictures or watching videos for better learning. The second rank was obtained by the indicator "*1. information are presented using tables, charts, or graphs,"* at a mean of 4.10. The statements "*4. I use highlighters when I review my notes*," and "*2. visual aids are used during class discussion*," ranked third and fourth, respectively.

Meanwhile, the statement "*5. I use flashcards, index cards, and/or sticky notes while studying"* ranked last, with a mean of 3.46 (High), suggesting that many respondents prefer other visual learning modes beyond flashcards, index cards, and sticky notes.

Table 2. Extent of auditory learning style among Grade 8 students.

Items I learn better/best when…	**Mean**	**DE**	**Rank**
1. I have a study buddy to review with.	3.01	Neither/ Nor Agree	4
2. instructions are given verbally.	4.18	Agree	2
3. I listen to podcasts about scientific discoveries and phenomena rather than reading science journals.	3.51	Agree	3
4. I listen to music while studying.	2.72	Neither/ Nor Agree	5
5. I love to participate in class discussions.	4.27	Strongly Agree	1
Weighted Mean	3.54	High	

The results indicate that Grade 8 students also exhibit a strong auditory learning preference, as reflected in a weighted mean of 3.54. This suggests that learners benefit from sound-based instructional approaches, particularly those that involve active listening and verbal interaction.

Specifically, the table shows that most respondents strongly agree that *"they love to participate during class discussion,"* as statement no. 5 ranked first with a mean of 4.27. Furthermore, the importance of giving instructions is reflected in their belief that they learn best if "instructions are given verbally," with statement no. 2 ranking second at 4.18.

Meanwhile, statement no. 3. "*I listen to podcasts about scientific discoveries and phenomena rather than reading science journals"* received a mean of 3.51 (Rank 3), indicating that most students find listening to Science podcasts more interactive and entertaining than simply reading science journals. The fourth rank was obtained by statement no. 1. "*I have a study buddy to review with,"* with a mean of 3.01, which may imply that the absence of face-to-face classes results in fewer opportunities for students to interact with one another, especially for learning or reviewing together. Lastly, statement no. 4, "I listen to music while studying," had the lowest mean of 2.72, indicating that most respondents prefer a silent or noise-free environment when reviewing.

Table 3. Extent of reading/writing learning style among Grade 8 students.

Items I learn better/best when…	**Mean**	**DE**	**Rank**
1. I write explanations about what was observed and why it happened.	3.90	Agree	3
2. I write interpretations of graphs, tables and charts.	3.73	Agree	4
3. I read scientific magazines, journals, and articles rather than listen to a lecture.	3.15	Neither/ Nor Agree	5
4. I read my notes repeatedly to increase my understanding and retention.	4.30	Strongly Agree	1
5. I rewrite ideas and principles based on my understanding using my own words.	3.97	Agree	2
Weighted Mean	3.81	High	

The findings reveal that Grade 8 students demonstrate a strong preference for reading/writing learning styles, as evidenced by a weighted mean of 3.81. This indicates that learners effectively process information through reading texts and express their understanding in writing.

Statement no.4 "*I read my notes repeatedly to increase my understanding and retention"* obtained the first rank at a mean of 4.30 (Very High). This data suggests that most students prefer reviewing their notes by rereading them. The second rank was obtained by statement no. 5. *"I rewrite ideas and principles based on my understanding using my own words"* at a mean of 3.97 (High), which suggests that most students jot down notes using their own words and understanding, which helps them comprehend their lessons more easily and last longer in their minds.

The study further emphasized that reviewing and structuring notes help learners process information more effectively and recall concepts more efficiently. This corroborates Statement No. 3, which indicates that students write explanations about what they observed and why it happened, obtaining a mean of 3.90 (High). Writing explanations enables learners to organize ideas, connect concepts, and construct meaning from the lessons they are studying.

Meanwhile, statement no. 2. "*I write interpretations of graphs, tables, and charts"* obtained the fourth rank at a mean of 3.73 (High), which also implies that most students also find it easier to understand the analysis of various diagrams like graphs, tables, and charts if they use words rather than sticking to their visual representation.

On the contrary, only statement no. 3, *"I read scientific magazines, journals, and articles rather than listen to a lecture,"* had a mean equivalent to Moderate at 3.15, suggesting that most students do not always find reading scientific print, such as magazines and journals, easy.

Table 4. Extent of kinesthetic learning style among Grade 8 students.

Items I learn better/best when…	**Mean**	**DE**	**Rank**
1. I do some physical activities while studying, such as tapping a pencil, moving from one place to another, etc.	3.54	Agree	4
2. I do hands-on activities such as experiments.	3.75	Agree	3
3. I demonstrate how things are done firsthand.	3.76	Agree	2
4. I am involved in doing projects and activities.	4.23	Strongly Agree	1
5. I design and create models of the things that I have learned.	3.35	Neither/ Nor Agree	5
Weighted Mean	3.73	High	

The results indicate that Grade 8 students exhibit a strong preference for kinesthetic learning, as reflected in a weighted mean of 3.73. This suggests that students learn more effectively when they are actively engaged in physical and experiential activities that allow them to apply concepts through direct participation.

Furthermore, Table 4 states that most students learn best when they are *4. involved in projects and activities, which ranked first at a mean of 4.23, the only statement to obtain* a rating of Very High. A similar result was revealed in statement no. *2. I demonstrate how things are done firsthand,* which ranked second at a mean of 3.76. Both statements 4 and 2 emphasize the importance of involving learners in the teaching-learning process through hands-on activities that help them learn better through experience and exposure. This was backed up by the results in statement no. *2. "I do hands-on activities such as experiments,"* which ranked third at a mean of 3.75 (High). Meanwhile, statement no. *1. "I do some physical activities while studying, such as tapping a pencil, moving from one place to another, etc."* obtained the fourth rank at a mean of 3.54. This suggests that a few students find physical routine activities helpful for remembering their lessons.

On the contrary, only statement no. *5. "I design and create models of the things that I have learned,"* obtained a mean equivalent to Moderate at 3.35. This implies that designing and/or creating such models is complex for some learners.

Table 5. Summary of VARK learning styles among Grade 8 students.

Learning Styles	Mean	DE	Rank
Visual	3.93	High	1
Auditory	3.54	High	4
Reading/Writing	3.81	High	2
Kinesthetic	3.73	High	3

The summary results reveal that Grade 8 students exhibit a strong preference across all four VARK learning styles, indicating that they use a variety of approaches to acquire and process information.

The table shows that the visual learning style ranked first, with a mean of 3.93. This indicates that most students understand and remember concepts better through visual representations and prefer using images, graphics, videos, charts, and other visual materials to communicate and process ideas.

Meanwhile, Reading/Writing learning style ranked second with a mean of 3.81. This suggests that students find reading, writing, note-taking, and reviewing written materials helpful in understanding and retaining information.

On the other hand, Kinesthetic learning style ranked third with a mean of 3.73, which is still interpreted as High. This indicates that many students learn effectively through hands-on experiences, experimentation, object manipulation, and physical involvement in learning activities. Recent studies on VARK learning preferences have emphasized that kinesthetic learners benefit from active participation, practical applications, and experiential learning opportunities, as these activities help them connect abstract concepts with real-life experiences. Such learning experiences promote deeper understanding and long-term retention of knowledge.

Lastly, Auditory learning style ranked fourth with a mean of 3.54, which is likewise interpreted as High. This suggests that some students learn more effectively through listening to discussions, lectures, verbal explanations, and classroom interactions. Although auditory learning ranked lowest among the four dimensions, its high rating indicates that verbal communication remains an important component of the learning process for many students.

In summary, the findings imply that while students may exhibit stronger preferences for certain learning styles, they utilize multiple learning modalities to support effective learning and academic success.

3.2 Teaching Styles in Science during Distance Learning as Perceived by Students

The second part of this study examined the extent of use of various Teaching styles in Science during Distance Learning, as perceived by respondents.

Table 6. Extent of visual teaching style in science used by teachers as perceived by students.

Items My Science Teacher...	**Mean**	**DE**	**Rank**
1. gives printed activities such as modules and worksheets.	4.10	Often	1
2. includes exercises where we create diagrams and illustrations.	3.70	Often	4
3. asks us to summarize the lesson through outlines, graphic organizers, and/or charts.	3.79	Often	3
4. allows us to convey complex concepts or processes visually.	2.77	Sometimes	5
5. asks us to create detailed notes after watching multimedia presentations.	4.01	Often	2
Weighted Mean	3.67	High	

The findings indicate that students perceived their Science teachers as using a high degree of visual teaching, as reflected in the overall weighted mean of 3.67. This suggests that teachers frequently employ visual instructional strategies to facilitate learning and enhance students' understanding of scientific concepts.

According to the respondents, their Science teachers frequently provide printed activities such as modules and worksheets, as evidenced by Statement No. 1, which ranked first with a mean of 4.10 (High). This finding is unsurprising, given that modules and worksheets served as the primary instructional materials during distance learning, enabling students to access lessons and learning activities despite the absence of face-to-face instruction.

The second-ranked statement, *"asks us to create detailed notes after watching multimedia presentations,"* obtained a mean of 4.01 (High). This finding highlights the importance of multimedia resources in facilitating learning, particularly in digital learning environments.

Meanwhile, Statement No. 3, *"asks us to summarize the lesson through outlines, graphic organizers, and/or charts,"* and Statement No. 2, *"includes exercises where we create diagrams and illustrations,"* ranked third and fourth with means of 3.79 and 3.70, respectively. These findings suggest that Science teachers frequently employ visual organizational tools to facilitate learning. Lastly, Statement No. 4, *"allows us to convey complex concepts or processes visually,"* obtained a mean of 2.77 (Moderate), the lowest among the indicators. This suggests that although visual materials are commonly integrated into Science instruction, students may not always be provided opportunities to express scientific concepts through their own visual representations. This finding implies that teachers may further enhance visual teaching practices by incorporating activities that encourage students to create diagrams, concept maps, infographics, and other visual outputs to demonstrate their understanding of scientific concepts.

Table 7. Extent of auditory teaching style in science used by teachers as perceived by students.

Items My Science Teacher...	**Mean**	**DE**	**Rank**
1. allows us to have debates in class about ideas, principles, or procedures about Science.	3.10	Sometimes	5
2. gives us time to prepare and present oral reports either individually or as a group.	4.18	Often	3
3. asks us to share our insights after watching a video clip.	4.27	Always	2
4. asks us to repeat ideas based on our understanding.	4.08	Often	4
5. encourages us to participate during class discussions by asking questions.	4.49	Always	1
Weighted Mean	4.02	High	

It can be gleaned from Table 7 that most students perceived their Science teachers to use a High extent of an auditory teaching style, as reflected in the weighted mean of 4.02. This suggests that teachers frequently employ verbal and interactive instructional strategies that promote listening, speaking, and active participation in the learning process.

Specifically, most respondents believed that they were always encouraged to participate during class discussions by asking questions, as indicated by Statement No. 5, which ranked first with a mean of 4.49. This finding highlights the importance of questioning strategies in promoting active student engagement.

The second-ranked statement, "*asks us to share our insights after watching a video clip,"* obtained a mean of 4.27. This suggests that teachers use instructional materials not only to deliver content but also to encourage students to express and discuss their ideas. Such practices support meaningful classroom discourse, which has been identified as a critical component of science learning because it enables learners to construct explanations, communicate evidence, and negotiate understanding with others.

Meanwhile, Statement No. 2, *"gives us time to prepare and present oral reports either individually or as a group,"* ranked third with a mean of 4.18 (High). This indicates that students are provided opportunities to communicate scientific concepts verbally. Classroom communication activities such as presentations, discussions, and oral reporting help learners articulate their understanding, exchange ideas, and develop confidence in expressing scientific knowledge.

Statement No. 4, "*asks us to repeat ideas based on our understanding,"* ranked fourth with a mean of 4.08 (High). This finding suggests that teachers encourage students to restate concepts in their own words to check understanding and reinforce learning. Verbalizing one's understanding allows students to process information actively and provides teachers with opportunities to identify misconceptions that require clarification.

Lastly, Statement No. 1, "*allows us to have debates in class about ideas, principles, or procedures in Science,"* obtained the lowest mean of 3.10 (Moderate). This suggests that debates are incorporated into Science instruction only occasionally. Although scientific argumentation and debate have been shown to foster critical

thinking, evidence-based reasoning, and communication skills, teachers may infrequently implement these activities due to time constraints and curriculum demands.

Table 8. Extent of reading/writing teaching style in science used by teachers as perceived by students.

Items My Science Teacher...	**Mean**	**DE**	**Rank**
1. asks us to read lessons in a textbook and other supplementary materials.	4.40	Always	3
2. encourages us to write and keep our own science journal/diary.	3.37	Sometimes	5
3. gives us advance reading assignments in preparation for class discussion and/or recitation.	4.43	Always	2
4. provides a copy of the summary of lessons for reviewing.	4.54	Always	1
5. asks us to make writing activities such as reflection, essays, critique papers, and others.	4.30	Often	4
Weighted Mean	4.21	Very High	

Table 8 reveals that most students perceive their Science teachers as using the Reading/Writing teaching style to a Very High extent, as reflected in the weighted mean of 4.21. This indicates that teachers consistently utilize text-based instructional strategies that encourage students to acquire, process, and demonstrate knowledge through reading and writing activities.

The highest rank was obtained by Statement No. 4, *"provides a copy of the summary of lessons for reviewing,"* with a mean of 4.54. This indicates that Science teachers frequently provide lesson summaries, handouts, and review materials to facilitate students' learning and preparation for assessments. Such instructional materials help learners organize information, revisit important concepts, and strengthen retention of lessons discussed in class.

The second-ranked statement, *"gives us advance reading assignments in preparation for class discussion and/or recitation,"* obtained a mean of 4.43. This suggests that Science teachers recognize the value of reading activities in preparing students for classroom instruction. Advance reading allows learners to develop background knowledge and familiarity with scientific concepts before classroom discussions, thereby improving comprehension and participation during learning activities.

Meanwhile, Statement No. 5, *"asks us to make writing activities such as reflections, essays, critique papers, and others,"* obtained a mean of 4.30. This finding implies that Science teachers frequently utilize writing activities to assess students' understanding and encourage reflection on learning experiences.

Lastly, it can be observed that Statement No. 2, *"encourages us to write and keep our own science journal/diary,"* was the only statement to receive a Moderate rating, with a mean of 3.37. This suggests that although reading and writing activities are commonly incorporated into Science instruction, maintaining science journals is not consistently required. This may be attributed to the additional time needed for

monitoring journal entries and providing feedback. Nevertheless, science journals remain valuable tools for reflection, self-expression, and documentation of learning experiences that support meaningful learning.

Table 9. Extent of kinesthetic teaching style in science used by teachers as perceived by students.

Items My Science Teacher...	**Mean**	**DE**	**Rank**
1. gives us practical applications of theories and scientific laws through problem-solving activities.	4.21	Always	2
2. divides the class into groups for us to work collaboratively for an activity.	2.96	Sometimes	5
3. allows us to perform guided experiments, investigations, and laboratory exercises.	2.97	Sometimes	4
4. asks us to create projects such as mock-ups, models, etc.	4.39	Always	1
5. gives activities that require actual demonstration	3.86	Often	3
Weighted Mean	3.68	High	

A High extent of Kinesthetic teaching style among Science teachers was perceived by students, as reflected by the weighted mean of 3.68, as shown in Table 13. This suggests that teachers frequently incorporate hands-on, experiential learning activities that allow students to engage with scientific concepts actively.

Statement No. 4, *"asks us to create projects such as mock-ups, models, and others,"* ranked first with a mean of 4.39. This finding suggests that Science teachers recognize the value of hands-on activities in helping students understand scientific concepts while developing creativity, problem-solving skills, and resourcefulness. Learning tasks that require students to construct models and create tangible outputs provide opportunities to actively engage with scientific concepts rather than simply receiving information passively.

Meanwhile, the second-ranked statement, "*gives us practical applications of theories and scientific laws through problem-solving activities,"* obtained a mean of 4.21. This indicates that Science teachers emphasize the application of scientific concepts to real-life situations rather than merely focusing on theoretical knowledge.

Statement No. 5, *"gives activities which require actual demonstration,"* ranked third with a mean of 3.86. This suggests that teachers frequently provide opportunities for students to demonstrate their skills and understanding through performance-based activities. Such activities promote active participation and experiential learning, allowing students to learn through direct engagement with tasks and processes.

Meanwhile, Statement No. 3, "*allows us to perform guided experiments, investigations, and laboratory exercises,"* and Statement No. 2, *"divides the class into groups for us to work collaboratively for an activity,"* ranked fourth and fifth, with means of 2.97 and 2.96, respectively. These findings are not surprising considering that the study was conducted during distance learning, when opportunities for laboratory work and face-to-face collaborative activities were limited.

Table 10. Summary of VARK teaching styles in science used by teachers as perceived by students.

Learning Styles	Mean	DE	Rank
Visual	3.67	High	4
Auditory	4.02	High	2
Reading/Writing	4.21	Very High	1
Kinesthetic	3.68	High	3

The summary results indicate that students perceived their Science teachers as employing all four VARK teaching styles to a high or very high extent. Among the instructional approaches, Reading/Writing obtained the highest mean (M = 4.21), interpreted as Very High, followed by Auditory (M = 4.02), Kinesthetic (M = 3.68), and Visual (M = 3.67), all interpreted as High. These findings suggest that Science teachers utilize a variety of teaching strategies to address diverse learner needs, with a stronger emphasis on reading and writing activities.

It can be noted that only the Reading/Writing teaching style obtained a mean equivalent to a Very High extent (4.21). This indicates that Science teachers consistently provide activities that require students to read scientific materials, write responses, complete written exercises, and engage in other literacy-based tasks to facilitate learning. Such practices are commonly observed in Science instruction, particularly during distance learning, where written outputs, modules, worksheets, and reading assignments serve as primary learning resources.

The second-ranked teaching style was Auditory, with a mean of 4.02 (High). This suggests that Science teachers frequently encourage students to participate in discussions, share ideas, present reports, and engage in listening and speaking activities to enhance their understanding of scientific concepts. Likewise, the kinesthetic teaching style ranked third with a mean of 3.68 (High), indicating that teachers also provide opportunities for hands-on learning through projects, demonstrations, practical applications, and other activities that require active participation.

Lastly, Visual teaching style obtained the fourth rank with a mean of 3.67, although it remained within the High extent category. This suggests that Science teachers use visual strategies such as diagrams, illustrations, graphic organizers, and other visual representations, but less frequently than reading/writing, auditory, and kinesthetic approaches. Interestingly, this finding contrasts with the results of the present study, which showed that Grade 8 students preferred the Visual learning style over the others. This discrepancy suggests that students' preferred learning styles may not always align with the teaching styles most commonly used in the classroom.

Table 11. Significant difference between the learning styles of Grade 8 students and the teaching styles employed by their science teachers during distance learning.

Mean Difference	SD Difference	t-value	df	p-value	Decision	Interpretation
-0.143	0.683	-2.084	98	0.040	Reject H_0	Significant

Table 11 presents the results of the paired-samples t-test conducted to determine whether there is a significant difference between the learning styles of Grade 8 students and the teaching styles used by their Science teachers during distance learning. The results revealed that the mean score for learning styles (M = 3.752, SD = 0.534) was lower than that for teaching styles (M = 3.895, SD = 0.505). The computed mean difference was -0.143 with a standard deviation of differences of 0.683. The paired-samples t-test yielded a t-value of -2.084 with 98 degrees of freedom and a p-value of 0.040.

Since the p-value is less than the 0.05 level of significance, the null hypothesis was rejected. Therefore, there is a significant difference between the learning styles of Grade 8 students and the teaching styles employed by their Science teachers during distance learning. This finding suggests that the instructional approaches used by teachers may not have fully aligned with students' learning preferences.

The study's descriptive findings further support the result. Visual learning style emerged as the most preferred learning style among the students, whereas Reading/Writing teaching style was perceived as the most frequently employed instructional approach among Science teachers. This indicates that students preferred learning through visual representations such as diagrams, charts, images, and videos, while teachers more commonly used written activities, modules, summaries, and worksheets during instruction.

The findings highlight the importance of incorporating multiple instructional strategies in Science education. By integrating visual, auditory, reading/writing, and kinesthetic learning experiences, teachers can better address students' diverse learning preferences and enhance engagement, understanding, and academic performance, particularly in distance-learning settings.

4. Discussion

The present study examined the learning styles of Grade 8 students and the teaching styles of Science teachers during distance learning at a private Catholic school in the Philippines. Results showed that students scored high across all VARK learning style categories, with Visual as the most preferred. Conversely, teachers mostly used a Reading/Writing teaching style. While both learning and teaching styles were generally rated high, the results suggest that the instructional approaches used during distance learning did not fully align with students' preferred learning modes.

The dominance of the visual learning style among students highlights the importance of visual stimuli in facilitating comprehension and retention of scientific concepts. The vast majority of students expressed a strong preference for the use of

images, charts/diagrams, videos, and multimedia in instructional materials. This supports the claim that visual representation improves an individual learner's understanding, particularly in Science, where much of the content is presented abstractly and therefore benefits more from concrete representations or demonstrations. These findings are also supported by Raiyn's (2016) study, which emphasized that visual learning enhances students' comprehension, retention, and higher-order thinking skills through the use of images, diagrams, videos, and other visual representations. Other research studies have also found that learners in flexible, technology-supported environments respond positively to multimedia and visually-based instruction.

Evidence also shows that a significant percentage of students reported a strong preference for a reading/writing learning style, indicating that they relied heavily on written materials, reading, and textual documents during distance learning. The prevalence of worksheets, modules, and asynchronous instruction during the pandemic may also contribute to this outcome. This finding is supported by the study of Salame et al. (2024), which revealed that note-taking positively influences learning, memory retrieval, and academic performance. Their findings showed that students perceive note-taking as an important strategy for organizing information, improving understanding, and strengthening memory retention. The study further emphasized that reviewing and structuring notes helps learners process information more effectively and recall concepts more efficiently. Furthermore, according to Salame, Tuba, and Nujhat (2024), note-taking and written processing strategies contribute positively to learning, memory retention, and academic performance by allowing students to organize information and reconstruct concepts using their own understanding. These practices encourage active engagement with learning materials and strengthen knowledge retention over time.

Among the remaining learning style dimensions, Auditory and Kinesthetic also obtained high ratings among Grade 8 students. In the Auditory dimension, students indicated that they learn effectively through class discussions, verbal instructions, and opportunities to express their ideas orally. This finding suggests that spoken communication remains an important avenue for knowledge acquisition and comprehension. Gangadharan et al. (2025) explained that auditory learners tend to acquire and retain information more effectively when concepts are communicated through spoken language, discussion, and oral explanations.

Similarly, the high rating for the Kinesthetic learning style indicates that students prefer active engagement in the learning process. Learners reported that they benefit from hands-on activities, projects, demonstrations, and other experiential tasks that allow them to apply concepts in practical contexts. This preference suggests that students learn more effectively when they are actively involved in constructing knowledge rather than merely receiving information. Even within a distance-learning environment, students continued to value opportunities for experiential learning and practical application of scientific concepts.

In summary, the findings indicate that Grade 8 students possess diverse learning preferences, with Visual learning emerging as the dominant style while Auditory and Kinesthetic approaches also playing significant roles in supporting meaningful learning experiences in Science.

Meanwhile, among the teaching styles employed by Science teachers, Reading/Writing was the only dimension with a mean indicating a Very High extent. This finding suggests that literacy-based instruction served as the predominant mode of teaching in Science. The strong emphasis on reading scientific texts, analyzing written information, completing worksheets, and producing written outputs may be attributed to the nature of Science education, which requires learners to comprehend technical concepts, interpret data, and communicate scientific ideas accurately. Moreover, the distance-learning environment likely reinforced the use of reading and writing activities, as modules, self-learning materials, and written assessments became essential tools for content delivery and evaluation.

The predominance of the Reading/Writing teaching style is further reflected in teachers' frequent use of modules, lesson summaries, advanced reading assignments, and written learning activities. During the Emergency Remote Teaching period, written instructional materials became one of the most practical and accessible means of delivering lessons, given the limited opportunities for face-to-face interaction between teachers and learners. As a result, literacy-based instructional approaches became central to maintaining continuity in teaching and learning.

This finding is consistent with the study of Dargo and Dimas (2021), who reported that modular distance learning provided students with structured learning experiences and served as an effective means of delivering instruction during the pandemic. Likewise, Graham et al. (2020) found that writing activities significantly enhance learning across content areas because they require students to organize ideas, explain concepts, analyze information, and construct meaning from what they have learned. Through these cognitive processes, writing promotes deeper understanding, strengthens knowledge retention, and enables learners to engage more critically with academic content. Taken together, these findings suggest that the strong emphasis on Reading/Writing instruction was not only a response to the demands of distance learning but also a pedagogically sound approach for supporting students' understanding of scientific concepts.

Among the remaining teaching style dimensions, Auditory and Kinesthetic teaching styles were also perceived as highly used by Science teachers. The prominence of auditory-oriented instruction reflects the communicative nature of Science teaching, in which explaining concepts, clarifying procedures, and facilitating scientific discourse are essential to student learning. Through discussions, questioning techniques, oral presentations, and verbal feedback, teachers provide opportunities for learners to articulate their ideas, clarify misconceptions, and construct scientific understanding. Supporting this finding, Chen et al. (2021) reported that teacher questioning encourages students to explain their thinking, justify their responses, and

actively participate in scientific discussions, thereby promoting deeper conceptual understanding and scientific reasoning.

Similarly, the substantial use of kinesthetic strategies suggests that teachers recognized the value of engaging students in active and authentic learning experiences. By incorporating projects, demonstrations, performance tasks, and practical applications, teachers enabled learners to connect theoretical knowledge with real-world situations and apply scientific concepts meaningfully. Such experiences are particularly important in Science education because they foster deeper understanding and increase student engagement. Kiemer et al. (2020) likewise found that learning activities requiring students to apply concepts to practical situations enhance motivation and improve conceptual understanding by making learning more relevant to their experiences.

Despite the challenges posed by distance learning, the findings indicate that teachers continued to integrate experiential activities into their instruction. This is noteworthy considering that many educational institutions faced difficulties in implementing laboratory-based experiments and collaborative learning activities during the COVID-19 pandemic. As noted by Daniel (2020), restrictions on remote instruction limited opportunities for traditional hands-on learning, prompting teachers to adopt alternative activities that students could complete independently at home. The continued use of kinesthetic strategies in the present study therefore, demonstrates teachers' efforts to maintain active student engagement and meaningful learning experiences despite the constraints of the learning environment.

On the other hand, Visual teaching style obtained the lowest rank among the four dimensions, although it remained within the High extent category. This suggests that while Science teachers incorporated visual strategies into their instruction, these approaches were utilized less frequently than reading/writing, auditory, and kinesthetic methods. One possible explanation is that visual materials served primarily as supplementary tools to reinforce learning rather than as the primary mode of content delivery. Furthermore, the demands of distance learning may have encouraged teachers to rely more heavily on text-based activities and verbal interactions, which were often more accessible and easier to implement and assess in remote settings.

Nevertheless, the continued use of visual strategies remains important in Science education because they help learners understand complex and abstract concepts through diagrams, illustrations, videos, graphic organizers, and other visual representations. Supporting this view, Castro and Tumibay (2021) found that instructional materials incorporating videos, presentations, and other multimedia resources enhanced student engagement, comprehension, and learning outcomes in online and distance learning environments. By presenting information through multiple formats, multimedia materials make lessons more accessible, meaningful, and easier for students to understand. Thus, although visual teaching was the least emphasized among the four teaching styles, it continues to play a significant role in facilitating effective Science instruction.

The lower ranking of Visual teaching does not necessarily imply limited use but rather suggests that it was less emphasized compared to the other teaching approaches.

Ultimately, the findings demonstrate that Science teachers adopted a multidimensional approach to instruction, with Reading/Writing serving as the dominant teaching style while Auditory, Kinesthetic, and Visual strategies complemented the learning process. Such diversity in instructional practices is beneficial in Science education because it provides learners with multiple avenues for understanding concepts, developing skills, and engaging meaningfully with the subject matter.

Among the remaining teaching style dimensions, Auditory and Kinesthetic teaching styles were also perceived as highly used by Science teachers. The high rating for Auditory teaching suggests that teachers frequently employed questioning techniques, oral presentations, discussions, and other verbal strategies to facilitate learning and encourage student participation. These approaches provide opportunities for learners to process information through listening and verbal interaction.

Likewise, the high rating for Kinesthetic teaching indicates that teachers incorporated practical applications, performance-based tasks, projects, and other activity-oriented strategies into Science instruction. Such approaches enable students to engage actively with scientific concepts and apply their knowledge in meaningful contexts. Although the study was conducted during distance learning, the findings suggest that teachers continued to integrate interactive and experiential activities to support student learning.

In summary, the results demonstrate that Science teachers employed a variety of teaching approaches, with Reading/Writing being the most prominent. At the same time, Auditory and Kinesthetic strategies also contributed substantially to Science instruction.

More importantly, the paired-samples t-test revealed a statistically significant difference between the learning styles of Grade 8 students and the teaching styles employed by their Science teachers during distance learning ($t = -2.084$, $p = 0.040$). This finding indicates that the instructional approaches most frequently used by teachers did not fully align with students' learning preferences. Specifically, students demonstrated a stronger preference for the Visual learning style, whereas teachers predominantly employed the Reading/Writing teaching style. In other words, students preferred learning through visual representations such as diagrams, illustrations, videos, and graphic organizers, while instruction was largely delivered through modules, worksheets, reading materials, and written activities.

This discrepancy may be attributed to the unique circumstances of Emergency Remote Teaching, which required teachers to adopt instructional approaches that were practical, accessible, and feasible within the constraints of distance learning. As a result, text-based and modular instruction became the dominant mode of content delivery. Bulusan et al. (2022) similarly observed that Emergency Remote Teaching limited teachers' instructional flexibility and influenced students' participation in learning activities. Although modular and text-based approaches ensured the

continuity of education during the pandemic, they may have reduced opportunities for visual and interactive learning experiences that are particularly beneficial in Science education.

The findings further highlight the diversity of learners and the challenges of addressing diverse learning preferences within a single instructional environment. Langelaan et al. (2024) emphasized that students respond differently to instructional approaches and that effective teaching requires educators to recognize learner diversity and employ a variety of strategies to support students' learning needs. The significant difference observed in the present study supports this view, suggesting that students' preferred learning styles may not always align with the instructional approaches most frequently used in Science instruction.

The mismatch between students' learning styles and teachers' teaching styles may have implications for the overall teaching-learning process. While teachers used multiple instructional strategies, the dominant instructional mode did not closely align with students' preferred learning approach. Such a disparity may have affected student engagement, motivation, and comprehension, particularly among learners who rely heavily on visual representations to understand scientific concepts. Given that Science often involves abstract ideas, processes, and relationships, visual materials can play a crucial role in facilitating understanding and knowledge retention.

Overall, the findings underscore the importance of adopting a more balanced and flexible instructional approach in Science education. Rather than relying predominantly on a single teaching style, educators should integrate visual, auditory, reading/writing, and kinesthetic learning experiences to accommodate diverse learner preferences. By doing so, teachers can create more inclusive and engaging learning environments that promote active participation, enhance conceptual understanding, and improve academic performance, particularly in distance-learning settings.

The results have important implications for instructional planning and teacher preparation. Science teachers should adopt more flexible and multimodal teaching approaches that integrate visual, auditory, reading/writing, and kinesthetic learning opportunities. The use of multimedia presentations, simulations, infographics, video demonstrations, virtual laboratories, and interactive digital resources may help bridge the gap between students' learning preferences and teachers' instructional practices. Through an integrated, inquiry-based, and learner-centered methodology, teachers are more likely to facilitate meaningful learning environments that take into account all learners' needs.

Educational institutions should likewise provide continuous professional development programs that equip teachers with the skills to design responsive, differentiated instructional materials. School administrators and policymakers should recognize the importance of instructional alignment in promoting student engagement, participation, and academic achievement, particularly in flexible and blended learning environments.

Despite its contributions, this study has several limitations. The sample was comprised of Grade 8 students from one private Catholic school, which may limit the

generalizability of the findings to other educational settings. Second, the assessment of teaching styles was based solely on students' perceptions of their teachers' instructional practices. While students can directly experience and observe these practices, their responses may still be influenced by perceptual and response biases. Consequently, the findings reflect students' perceptions of teaching styles rather than teachers' self-reported instructional approaches. However, the addition of inferential analysis strengthened this study's examination of the statistical evidence that students' learning styles differ from teachers' teaching styles.

Future studies can test these relationships, focusing on larger, more diverse samples of students and teachers. Researchers are also encouraged to collect data from both students and teachers and employ triangulation techniques to provide a more comprehensive assessment of instructional practices. Mixed-methods approaches may likewise be utilized to gain deeper insights into how instructional practices influence learning outcomes. Furthermore, intervention studies may be conducted to determine the effectiveness of multimodal instructional strategies in improving student learning and engagement in Science under distance, blended, and face-to-face learning modalities.

Ultimately, the findings underscore the importance of aligning instructional strategies with students' learning preferences. The significant difference between learning and teaching styles underscores the need for more adaptive, multimodal, and learner-centered approaches to Science instruction that effectively address the diverse learning needs of students in evolving educational environments.

5. Conclusion

This study investigated the learning styles of Grade 8 students and the teaching styles in Science employed during distance learning at a private Catholic school in the Philippines. Based on the findings, students had strong preferences for all four of the VARK learning styles, with the Visual learning style emerging as the dominant modality. On the other hand, teachers' preferred teaching style was the Reading/writing style. While teachers used multiple instructional strategies, this study highlighted a gap between Grade 8 students' preferred learning styles and the teaching styles used in Science. The objectives of the study were met by identifying and comparing Grade 8 students' learning styles and the instructional strategies of science teachers during the pandemic. The findings also confirmed a major difference between scholars' learning types and their classroom teacher type in Science distance learning. This finding suggests that the instructional approaches teachers used may not have aligned with how students prefer to learn. Specifically, while students demonstrated a stronger preference for visual learning experiences, teachers primarily relied on reading- and writing-oriented instructional strategies. The significant difference between learning and teaching styles suggests a degree of mismatch in the teaching-learning process, which may have contributed to student engagement and the overall quality of the distance learning experience. This study adds to the increasing body of

knowledge on learner-centered pedagogy and flexible instruction in science education. The findings also suggest that aligning instructional strategies with students' preferred learning styles will lead to greater student engagement, improved comprehension, and higher academic achievement. This study also identified the need for more multimodal and adaptive instructional strategies (i.e., the use of all four learning types) for audio and visual learning, reading/writing, and kinesthetic learning during distance/blended learning. The findings of this study further underscore the importance of adapting to different instructional settings to continue providing effective science instruction during educational disruptions and to guide science education in the changing educational landscape.

From a practical standpoint, this study provides valuable guidance to teachers, administrators, and curriculum designers in developing educational resources that reflect students' diverse learning preferences. Science teachers should incorporate more visual and interactive resources into their lessons as supplements to traditional text-based instruction. Examples of such resources can include multimedia presentations, graphics, simulations, and hands-on activities. Professional development programs for educational institutions should focus on helping teachers build their skills in flexible, learner-centered pedagogical practices and learning environments. Future research could expand the available data on the learning preferences of various student and teacher populations in an educational setting to support broader generalization of the findings. In future studies, researchers could use correlational or experimental designs to identify patterns among learning styles, instructional styles, and academic performance in science education. Additionally, researchers may conduct evaluative studies examining the effectiveness of various multimodal instructional approaches in increasing student learning outcomes and engagement in a flexible learning environment.

This study demonstrates the importance of instructional alignment in creating meaningful and effective learning experiences during distant education for students in a science content area. As educational environments continue to evolve beyond COVID-19, understanding learning styles and adapting teaching methods will be critical to providing inclusive, flexible, and effective science education.

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Conflict of Interest Statement

The authors declare no financial conflicts of interest related to the conduct, analysis, interpretation, or publication of this study. The authors further declare a non-financial conflict of interest, as they were former teachers at the participating private Catholic school where the study was conducted. The author did not handle or teach the Grade 8 student respondents involved in the study during her tenure in the institution.

To minimize potential bias, the Grade 8 student participants were all volunteers; their answers were confidential and anonymous, and the data were analyzed objectively based on their responses. The results and interpretations of the research presented in this manuscript were generated strictly from the data collected during the period of the research study.

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