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Examining Actual and Perceived VARK Learning Preferences Among Secondary Students in Malaysia

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Abstract

Aims/Purpose: The main objectives of this study were to assess whether students' perceptions of their learning preferences were aligned with their actual learning preferences and to evaluate the extent of their metacognitive awareness in this regard. The study aimed to evaluate secondary school students' awareness of their personal learning preferences as framed by the VARK model, which categorizes learning styles into four modalities: Visual, Aural, Read/Write, and Kinesthetic.

Methodology: A quantitative analysis was conducted to determine the correlations between students' perceived learning preferences and their actual preferences. Statistical methods, including Chi-Square tests, were applied to evaluate the strength and significance of these relationships. Data were collected from a convenience sample of secondary school students, with a slight overrepresentation of female and lower-secondary students drawn from a single educational institution in Malaysia.

Findings: The findings revealed a nuanced picture of metacognitive awareness among students. No significant correlations were found between perceived and actual learning preferences in the Read/Write and Kinesthetic modalities. This lack of association indicated a low alignment between students' preferred learning modes and their actual preferences in these two categories. Such matches between perceived and actual preferences for Read/Write and Kinesthetic modalities were likely due to chance rather than genuine metacognitive insight. Consequently, the null hypothesis—that there was no relationship between perceived and actual learning preferences—could not be rejected for these two modalities.

Significant positive relationships were observed for the Visual and Aural learning modes. Students exhibited a higher level of metacognitive awareness when recognizing their preferences for learning through visual and auditory means. Therefore, the null hypothesis was rejected for the Visual and Aural modalities, implying that students' self-perceptions in these domains were more accurate and reflected their learning preferences.

Gender differences emerged as an essential factor in metacognitive awareness. Female participants demonstrated a slightly higher level of cognitive insight, with significant correlations identified between perceived and actual learning preferences for the Visual and Aural modes. By contrast, male participants showed no statistically significant alignment for any learning modalities, suggesting comparatively lower metacognitive awareness among males in this sample.

Educational level also appeared to influence awareness. Only the Visual learning mode displayed a statistically significant relationship among lower secondary students between perceived and actual preferences. The Aural mode approached significance (p = .057) but did not reach conventional levels. No significant correlations were found among upper secondary students for any learning mode, indicating a possible decline or variability in metacognitive awareness as students progress through secondary education.

When examining the overall concordance between perceived and actual learning preferences across the entire sample, 75.7% of participants showed weak alignment. Only 13.6% of the

participants demonstrated complete alignment, and 10.7% of participants had no alignment. These findings highlighted a concerning portion of students who lack metacognitive awareness of their learning styles.

Contribution/Impact on Society: This study helps students become aware of their perceived and actual learning styles, promoting self-awareness and giving them a sense of control over their learning. Recognizing personal learning preferences—such as those identified in the VARK model—can also improve learning outcomes. Belief in their own abilities is a key to overcoming challenges and achieving academic success.

School personnel, such as administrators, educational policymakers, and teachers, may benefit from this study of students' learning styles. Its findings can inform the development of more effective curricula, teaching strategies, and programs that better support student success.

Additionally, parents or caregivers can use this information to guide their children's education. By understanding their children's unique learning styles, parents can provide more meaningful support and foster a home environment that complements their educational needs.

Research Limitations: While this study contributes valuable insights, it was subject to several limitations. The convenience sampling method and the focus on a single institution reduced the generalizability of the findings. The sample was skewed towards females and lower secondary students, which may have influenced the observed trends.

Recommendations: Students generally demonstrate limited awareness of their learning preferences, particularly male students, which may negatively impact their academic performance. Therefore, learning style frameworks should be used to encourage students to reflect critically on how they learn and to experiment with diverse strategies rather than pigeonholing them into fixed categories.

Teachers should use learning style models as starting points for discussions, encouraging students to explore and reflect on their learning processes and promote flexibility rather than fixed labeling. Regular professional development should be provided for educators on the practical, evidence-based use of learning styles to enhance metacognitive skills rather than simply categorizing learners.

Future Research: Future research should include more diverse and randomized samples across multiple educational contexts to validate and extend these findings. Given the gender disparities identified, further research is also warranted to examine the underlying causes of these differences, potentially involving psychological, social, or cultural factors.

Since metacognition is closely linked to self-regulation, understanding the factors contributing to lower metacognitive awareness is critical. Future investigations should explore how educational interventions can nurture and improve metacognitive skills, including applying learning style models like VARK.

The scope of future research should be broadened to investigate how learning preference awareness interacts with demographic factors such as age, gender, and cultural background. Longitudinal studies could provide valuable insights into how metacognitive awareness evolves with targeted interventions over time.

Keywords: *VARK, perceived learning preferences, secondary students, Malaysia*

Introduction

Learning styles, which Keefe (1979) defines as “characteristic cognitive, affective, and psychological behaviors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment,” have been a subject of interest among educators for a long time, especially over the last four decades (Felder, 2020). The usefulness of learning style models in education has been a point of contention among educators, with some experts going so far as to reject their use altogether (Benians & Brian, 2024; Chew, 2016; Felder, 2020). However, Felder (2020) argues that this rejection of various learning styles models is based on the flawed “meshing

hypothesis" of designing and matching instruction to the individual learning styles of specific students.

The VARK model in particular has often been the target of this ongoing debate (Benians & Brian, 2024; Chew, 2016; Fleming & Mills, 1992). However, the primary intent behind developing the VARK model was not to match instruction to individual learning preferences, but rather to encourage metacognitive thinking and self-regulation among students (Fleming & Mills, 1992; Fleming, 1995). Research into the potential usefulness of the VARK model in encouraging metacognition and self-regulation among students has been limited, and the research that has been done has largely focused on students from tertiary learning institutions (Barman et al., 2014). This study aimed to address this gap in the literature and investigate the hypothesis that there is no significant relationship between students' perceived and actual learning preferences.

The purpose of this study was to explore students' awareness of their personal learning preference. To investigate students' learning and perceived learning preferences, a quantitative method was employed using a survey. The survey instrument consisted of three questions related to demographic information, a brief explanation of the VARK model of learning preferences, a question for students to report their perceived learning preferences, and the VARK Questionnaire. There were three major questions to address this study's purpose:

1. How do students perceive their personal learning preference?
2. What is the actual learning preference of students?
3. What is the relationship between perceived and actual learning preferences?

The hypothesis (H_0): There is no relationship between perceived and actual learning preferences.

A total of 104 students participated in this study. Participants were selected through a convenience sampling method. Survey papers were distributed to available students over the course of one week. Participation was voluntary.

This is study was delimited to a single private secondary school in Malaysia. As such, this study sought to address this research gap by exploring VARK learning preferences within the context of a private secondary school in Malaysia.

Review of Literature

Learning Style

Learning styles refer to how individual learners, such as school students, receive and process new information. Fleming and Mills (1992) noted that students respond to various learning situations in different yet consistent ways. Felder views learning styles as "common patterns of student preferences for different approaches to instruction" (Felder, 2020, p. 3).

Various learning style models have been proposed to provide teachers with practical conceptual frameworks to plan instruction that addresses the needs of different learners in the classroom (Felder, 2020). One such model is the VARK model, which focuses on sensory modality preferences (Fleming & Mills, 1992). The following sections will provide a detailed discussion of the VARK model and its applications for teachers and students.

VARK Model of Learning Preferences

The VARK model of learning preferences, first described in 1992, was initially developed for students and teachers to understand individual learning preferences better and make necessary adjustments in learning and teaching behavior (Fleming & Mills, 1992). The model focuses on sensory modal preference, a subcomponent within a student's learning style. The acronym VARK represents four sensory modality preferences, or modal preferences, that individuals use to receive and process information: Visual (V), Aural (A), Read/Write (R), and Kinesthetic (K).

Fleming developed the VARK questionnaire to help students and teachers identify and reflect on their preferred learning styles, also known as their modal preferences. More recent studies support

the validity of the VARK questionnaire as a tool to gauge modal preferences among students (Fitkov-Norris & Yeghiazarian, 2015; Leite et al., 2010; Thepsatitporn & Pichitpornchai, 2016).

VARK as a Tool To Improve Learning and Teaching Effectiveness

The VARK model provides a framework for teachers to assess their own teaching methods (Fleming & Mills, 1992). Specific teaching strategies may target one learning preference above others (Amaniyan et al., 2020), so teachers must ensure that the teaching methods used in class appeal to a wide range of learning preferences (Wege & Keil, 2020). Teachers can use the VARK questionnaire to identify instructional strategies that effectively address a wide range of learners (Wright & Stokes, 2015).

The VARK model also allows teachers to train students to use effective study strategies that are aligned with their preferences. In a study by Barman et al. (2014), students who were trained to use effective study strategies based on their VARK learning preferences significantly increased their GPA scores. A similar study by Bhagat et al. (2015) found that after six training and discussion sessions based on the VARK model, students could effectively incorporate different study skills into their learning. This study also highlighted the importance of learning preference awareness for students. The following section discusses learning preference awareness among students and its potential link to self-efficacy and self-regulation.

Learning Preference Awareness Among Students

Awareness of individual learning preferences benefits students as it helps them to identify strengths and areas for improvement (Felder, 2020). Using a model such as VARK encourages students to reflect on their study habits and modify their behavior to improve learning (Fleming & Mills, 1992). In other words, VARK may promote self-regulation in the student.

Self-regulation has been defined as “the extent to which learners are aware of their strengths and weaknesses, the strategies they use to learn, can motivate themselves to engage in learning, and can develop strategies and tactics to enhance learning” (Muijs & Bokhove, 2020, p. 5). An essential component of self-regulation is metacognition, which is defined as "the ways learners can monitor and purposefully direct their learning" (Muijs & Bokhove, 2020, p. 5). The VARK model itself was initially conceived as a way to encourage metacognition among students, allowing them to take an active role in their learning (Fleming & Mills, 1992), and more recent studies have noted that VARK has been successful in doing so (Bhagat et al., 2015; Ojeh et al., 2023).

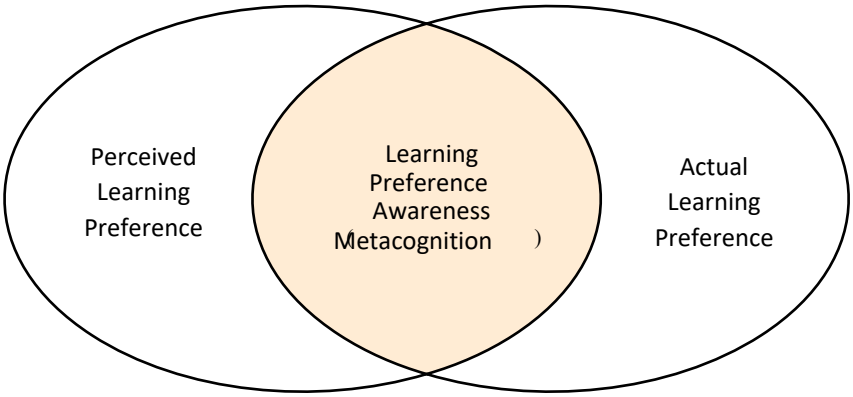
By enabling students to be more engaged in the learning process, awareness of learning preference also aids in developing student self-efficacy, as self-efficacy has been strongly linked to metacognition (Celik, 2022). Bandura (2010) defines self-efficacy as “beliefs in one’s capabilities to organize and execute the courses of action required to manage prospective situations”. Ojeh et al. (2023) linked learning style awareness to self-efficacy, and Onu et al. (2022) highlighted the potential of using the VARK model to develop self-efficacy in students.

Besides potential benefits related to self-regulation, metacognition, and self-efficacy, awareness of VARK modal preferences may lead to improvements in learning by encouraging students to explore different sensory modalities and learning strategies (Bhagat et al., 2015), as incorporating multiple modalities while studying may result in better retention of information (El-Saftawy et al., 2024).

Conceptual Framework

Figure 1 illustrates the conceptual framework used in the present study. Students’ perceived and actual VARK learning preferences were treated as two independent variables. Metacognitive awareness of learning preferences, or simple learning preference awareness, was conceptualized as the extent to which these two variables overlap. More overlap indicated a higher level of metacognitive awareness, and a lower degree of overlap indicated lower levels of awareness among students. This conceptual framework is aligned with Fleming and Mills’ (1992) original goal of “assisting students to know themselves and operate in a metacognitive fashion.”

Figure 1 *Conceptual Framework*



Significance of the Study

The purpose of this study was to explore students' level of awareness of their personal learning preference.

Research Questions and Hypothesis

1. How do students perceive their personal learning preference?
2. What is the actual learning preference of students?
3. What is the relationship between perceived learning preference and actual learning preference?

H_0: There is no relationship between perceived and actual learning preferences.

Methodology

Research Design

The present study used a cross-sectional correlational research design to investigate students' learning preferences and perceptions about them. The survey instrument consisted of three demographic questions, a brief explanation of the VARK model of learning preferences, a question for students to report their perceived learning preference, and the Malay version of the VARK Questionnaire (*Soalanselidik VARK dalam Bahasa Melayu*, n.d.). Validity of the VARK Questionnaire has been supported by previous studies (Fitkov-Norris & Yeghiazarian, 2015; Leite et al., 2010).

Population and Sampling

Most prior studies focused on students from a single university course (Awang et al., 2017; Bhagat et al., 2015; Mozaffari et al., 2020). This limitation means that these studies' results may be difficult to generalize, as certain university courses may naturally appeal to students with certain learning preferences. This study sought to address this research gap by exploring VARK learning preferences within the context of a private secondary school in Malaysia. Students at this school do not choose a particular course of study, so the sample used in this study may be more representative of a broader population.

The school student population consisted of 356 students, aged 12-17. A total of 104 students participated in the present study. Due to time constraints, participants were selected through a convenience sampling method. Data collection took place from November 25 to 29, 2024. Survey papers were distributed to students who volunteered to participate in the study. Participants were guided by one of the researchers, and surveys were immediately collected after completion. No compensation was offered. Permission and approval of the survey instrument were obtained from the school administration prior to the data collection period, and all participants gave informed consent.

Data Analysis

After the data collection period, the VARK scores of the participants were calculated using a key provided by the publisher. The raw scores were sent to an expert for analysis to determine the learning preference of each participant.

The data were then analyzed using descriptive and inferential statistics. Frequency distributions of gender, age, and learning preference were used to address research questions 1 and 2, while the Chi-Square test of independence was used to investigate the relationship between perceived and actual learning preference (research question 3). One survey was excluded from the results due to failure to complete the demographic questions.

Results

Table 1 reports the demographic distribution and learning preferences of the respondents in this study. The most common perceived learning preference was Visual (n = 73).

Table 1 *Demographic Distribution and Learning Preferences* (N = 103)

Characteristic	n	%
Gender		
Male	39	37.9
Female	64	62.1
Age Group		
Lower Secondary	62	60.2
Upper Secondary	41	39.8
Perceived Learning Preference		
Visual	73	70.9
Aural	63	61.2
Read/Write	64	62.1
Kinesthetic	65	63.1
Actual Learning Preference		
Visual	61	59.2
Aural	79	76.7
Read/Write	65	63.1
Kinesthetic	88	85.4
Overall Learning Preference		
Unimodal	26	25.2
Bimodal	16	15.5
Trimodal	9	8.7
Four-part	52	50.5

However, the most common actual learning preference was Kinesthetic (*n* = 88), and this result was consistent across genders and age groups. Nearly three-fourths (74.7%) of the respondents had a multimodal (at least two modes) learning preference (*n* = 77), with the four-part preference learning preference being the most common (*n* = 52).

Table 2 reports the result of a Chi-square test of independence between perceived and actual learning preferences. Significant relationships were found between respondents' perceived and actual learning preferences for the Visual ($\chi^2 = 6.48$, df = 1, $p = .011$) and Aural category ($\chi^2 = 5.01$, df = 1, $p = .025$). A total of 65.1% of respondents correctly identified their preference (*n* = 67) for both categories respectively, indicating that respondents were more likely to be aware of their Visual and Aural preferences. No significant relationship was found between Perceived and Actual learning preferences for the Read/Write and Kinesthetic preferences.

Table 2 *Perceived vs Actual Learning Preference* (Overall, N = 103)

Perceived	Actual						
	No	Yes	Total	χ^2	df	*p*	Cramer's V
Visual							
No	18 (17.5)	12 (11.7)	30 (29.1)	6.48	1	.011*	.251
Yes	24 (23.3)	49 (47.6)	73 (70.9)				
Total	42 (40.8)	61 (59.2)	103 (100.0)				
Aural							
No	14 (13.6)	26 (25.2)	40 (38.8)	5.01	1	.025*	.221
Yes	10 (9.7)	53 (51.5)	63 (61.2)				
Total	24 (23.3)	79 (76.7)	103 (100.0)				
Read/Write							
No	17 (16.5)	22 (21.4)	39 (37.9)	1.21	1	.272	.108
Yes	21 (20.4)	43 (41.7)	64 (62.1)				
Total	38 (36.9)	65 (63.1)	103 (100.0)				
Kinesthetic							
No	6 (5.8)	32 (31.1)	38 (36.9)	.073	1	.787	.027
Yes	9 (8.7)	56 (54.4)	65 (63.1)				
Total	15 (14.6)	88 (85.4)	103 (100.0)				

Tables 3 and 4 report the results of a Chi-square test of independence between perceived and actual learning preferences for male and female respondents. Among male respondents, no significant relationship was found between perceived and actual learning preferences for any of the categories. However, among female respondents, significant relationships were found for the Visual ($\chi^2 = 5.27$, df = 1, $p = .022$) and Aural ($\chi^2 = 10.7$, df = 1, $p = .001$) preferences, indicating a greater level of awareness regarding learning preferences for these two categories. A total of 68.7% ($n = 44$) of female respondents correctly identified their Visual preference, and 71.9% ($n = 46$) correctly identified their Aural preference.

Table 3 *Perceived vs Actual Learning Preference* (Male, N = 39))

Perceived	Actual						
	No	*Yes*	*Total*	χ^2	*df*	*p*	Cramer's V
Visual							
No	8 (20.5)	5 (12.8)	13 (33.3)	1.28	1	.257	.181
Yes	11 (28.2)	15 (38.5)	26 (66.7)				
Total	19 (48.7)	20 (51.3)	39				
Aural							
No	3 (7.7)	11 (28.2)	14 (35.9)	.203	1	.652	.072
Yes	7 (17.9)	18 (46.2)	25 (64.1)				
Total	10 (25.6)	29 (74.4)	39				
Read/Write							
No	6 (15.4)	6 (15.4)	12 (30.8)	.29	1	.59	.086
Yes	11 (28.2)	16 (41.0)	27 (69.2)				
Total	17 (43.6)	22 (56.4)	39				
Kinesthetic							
No	0 (.0)	12 (30.8)	12 (30.8)	2.55	1	.11	.256
Yes	5 (12.8)	22 (56.4)	27 (69.2)				
Total	5 (12.8)	34 (87.2)	39				

Note. *$p < .05$

Table 4 *Perceived vs Actual Learning Preference* (Female, N = 64)

Perceived	Actual						
	No	Yes	Total	χ^2	df	*p*	Cramer's V
Visual							
No	10 (15.6)	7 (10.9)	17 (26.6)	5.2	1	.022*	.287
Yes	13 (20.3)	34 (53.1)	47 (73.4)				
Total	23 (35.9)	41 (64.1)	64 (100.0)				
Aural							
No	11 (17.2)	15 (23.4)	26 (40.6)	1.0	1	.001*	.409
Yes	3 (4.7)	35 (54.7)	38 (59.4)				
Total	14 (21.9)	50 (78.1)	64 (100.0)				
Read/Write							
No	11 (17.2)	16 (25.0)	27 (42.2)	1.3	1	.249	.144
Yes	10 (15.6)	27 (42.2)	37 (57.8)				
Total	21 (32.8)	43 (67.2)	64 (100.0)				
Kinesthetic							
No	6 (9.4)	20 (31.3)	26 (40.6)	1.8	1	.174	.17
Yes	4 (6.3)	34 (53.1)	38 (59.4)				
Total	10 (15.6)	54 (84.4)	64 (100.0)				

Note. *$p < .05$

Tables 5 and 6 report a chi-square test of independence between perceived and actual learning preference for respondents in lower secondary and upper secondary age groups. In the lower secondary age group, a significant relationship between perceived and actual learning preference was found for the Visual ($\chi^2 = 7.2$, df = 1, p = .007) preference. 69.4% (n = 43) of respondents from this age group correctly identified their learning preference. No other significant relationships between perceived and actual learning preference were found in either age group.

Table 5 *Chi Square Test of Perceived vs Actual Learning Preference* (Lower Secondary, N = 62)

Perceived	Actual						
	No	Yes	Total	χ^2	df	*p*	Cramer's V
Visual							
No	13 (21.0)	8 (12.9)	21 (33.9)	7.2	1	.007*	.341
Yes	11 (17.7)	30 (48.4)	41 (66.1)				
Total	24 (38.7)	38 (61.3)	62 (100.0)				
Aural							
No	8 (12.9)	19 (30.6)	27 (43.5)	2.17	1	.141	.187
Yes	5 (8.1)	30 (48.4)	35 (56.5)				
Total	13 (21.0)	49 (79.0)	62 (100.0)				
Read/Write							
No	8 (12.9)	13 (21.0)	21 (33.9)	.253	1	.615	.064
Yes	13 (21.0)	28 (45.2)	41 (66.1)				
Total	21 (33.9)	41 (66.1)	62 (100.0)				
Kinesthetic							
No	4 (6.5)	19 (30.6)	23 (37.1)	.043	1	.836	.026
Yes	6 (9.7)	33 (53.2)	39 (62.9)				
Total	10 (16.1)	52 (83.9)	62 (100.0)				

Note. *$p < .05$

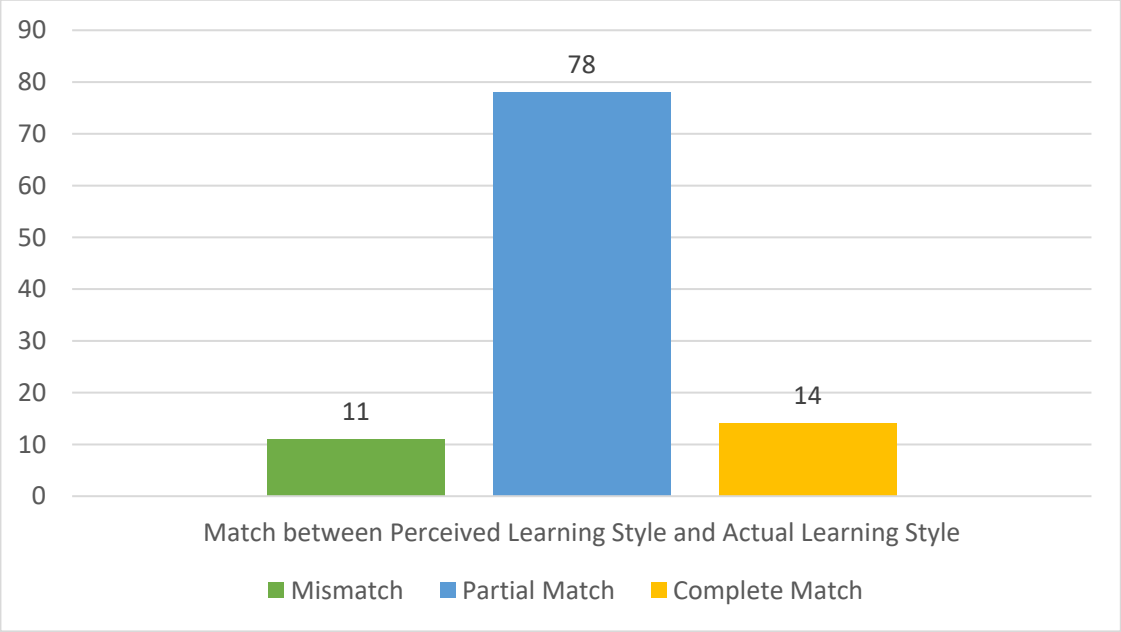
Table 6 *Chi Square Test of Perceived vs Actual Learning Preference* (Upper Secondary, N = 41)

Perceived	Actual		Total	χ^2	df	*p*	Cramer's V
	No	Yes					
Visual							
No	5 (12.2)	4 (9.8)	9 (22.0)	.636	1	.425	.125
Yes	13 (31.7)	19 (46.3)	32 (78.0)				
Total	18 (43.9)	23 (56.1)	41 (100.0)				
Aural							
No	6 (14.6)	7 (17.1)	13 (31.7)	3.62	1	.057	.297
Yes	5 (12.2)	23 (56.1)	28 (68.3)				
Total	11 (26.8)	30 (73.2)	41 (100.0)				
Read/Write							
No	9 (22.0)	9 (22.0)	18 (43.9)	.963	1	.326	.153
Yes	8 (19.5)	15 (36.6)	23 (56.1)				
Total	17 (41.5)	24 (58.5)	41 (100.0)				
Kinesthetic							
No	2 (4.9)	13 (31.7)	15 (36.6)	.029	1	.866	.026
Yes	3 (7.3)	23 (56.1)	26 (63.4)				
Total	5 (12.2)	36 (87.8)	41 (100.0)				

Note. *$p < .05$

Figure 2 shows the levels of alignment between overall perceived and actual learning preferences among participants. Most participants (75.7%) had a partial match (at least one match) between perceived and actual learning preferences. 13.6% of respondents had a complete match between perceived and actual learning preference, and 10.7% had a complete mismatch between perceived and actual learning preference.

Figure 2 *Alignment Level between Overall Perceived and Actual Learning Preference*



Note. Numbers indicate frequency.

Discussion

This study explored students' awareness of personal learning preferences based on the VARK model. The results from this study indicated that students' perceptions of their VARK learning preferences do not always match their actual learning preferences.

No significant relationships between perceived learning preference and actual learning preference were found for the Read/Write mode or the Kinesthetic mode, suggesting a low degree of alignment between perceived learning preferences and actual learning preferences for these two modalities. Any matches that did occur between a perceived learning preference and a actual learning preference were likely due to chance and cannot be attributed to the metacognitive awareness of the participant. Therefore, the null hypothesis was not rejected for the Read/Write and Kinesthetic modes.

On the other hand, significant relationships between perceived and actual learning preferences were found for the Visual (p = .011) and Aural (p = .025) modes, suggesting a higher level of cognitive awareness among the participants for these two modes. Therefore, the null hypothesis was rejected for the Visual and Aural Modes.

Female participants were found to have a slightly higher level of cognitive awareness. Significant relationships between perceived learning preferences were found for the Visual (p = .022) and Aural (p = .001) modes among female participants; however, no significant relationships were found for any of the modes among male participants.

Among lower secondary students, only the visual mode had a significant (p = .007) relationship between perceived and actual learning preferences. Among upper secondary students, no significant relationships were found for any modes, with Aural being the closest to statistical significance (p = .057).

Taking the learning preferences of participants as a whole, 89.3% of participants (n = 92) had at least partial alignment between perceived learning preference and actual learning preference, with only 13.6% (n = 14) having complete alignment. What was more concerning was the fact that over 10% (n = 11) of participants had no alignment whatsoever between perceived learning preference and actual learning preference, indicating low levels of metacognitive awareness among some participants. This result was similar to other studies (Breckler et al., 2009; Horton et al., 2012; Ortega-Torres et al., 2018; Rickard et al., 2023) that found low levels of alignment between perceived learning preferences and actual learning preferences.

Differences between gender were found in this study, indicating some differences in metacognitive awareness between male and female participants, with female participants likely to have a higher level of metacognitive awareness. This result aligned with a study by Breckler et al. (2009) which found that female participants were more likely to correctly identify their learning preferences when compared to male participants.

Study participants were selected based on convenience sampling. Due to the non-random nature of the sampling process, the sample was slightly skewed in favor of female and lower secondary students. In addition to the non-random sampling, the sample was only taken from a single institution. These limitations may have reduced the generalizability of the research results in different contexts.

This study found a low to medium metacognitive awareness among secondary school students. As metacognition is related to self-regulation, future research should investigate the factors that result in lower levels of metacognition in students, and ways to effectively improve and encourage metacognitive thinking and self-regulation among students by using models such as VARK.

As this study found some gender differences in metacognitive awareness, further research should also be conducted to investigate the possible factors contributing to these differences.

Conclusion and Recommendations

Although the use of learning styles has been controversial in the literature (Felder, 2020), it remains widespread. Therefore, learning style models should be utilized in a manner that provides the most significant benefit for both student and teacher.

This study offers insight into how theories of learning styles, such as the VARK learning preferences model, can be used to assess students' learning in terms of individual preferences, as well as from a metacognitive point of view.

This study found that students generally had a relatively low level of metacognitive awareness of their learning preferences, especially among male students. This lack of awareness towards one's learning preference may be a factor that hinders academic performance. The use of learning style models such as VARK should be employed to encourage metacognitive reflection and increase self-regulation among students. In doing so, teachers can encourage students to take ownership and control of their learning.

Based on the findings, several recommendations are proposed for school administrators, teachers, academic policymakers, and future researchers.

1. Teachers should use learning style frameworks as a starting point to help students reflect on their learning processes. Instead of rigidly grouping students by their preferred learning modality (visual, auditory, reading/writing, kinesthetic), instructors should guide students to explore how different learning strategies work for them in varying contexts.

2. Provide regular training for educators on the practical, research-informed use of learning styles as tools to promote deeper learning and metacognition—not as static labels.

3. Administrators should ensure that using learning style models does not reinforce stereotypes or lead to fixed mindset thinking. It is recommended to focus on flexible, growth-oriented tactics that encourage each student to try out various instructional styles.

4. More research studies should explore how academic performance and learning preference awareness are related to other demographics, such as age, gender, and cultural background. Longitudinal research could also show how metacognitive awareness evolves with targeted intervention.

5. Effectiveness of Integrating VARK with Other Learning Theories: Future research should examine how the VARK model can be combined with other frameworks (e.g., multiple intelligences, cognitive load theory, or self-determination theory) to provide a more holistic approach to student learning.

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