



A Study on The Learning Style Preferences of Undergraduate Quantity Surveying Students in The Malaysian University

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Abstract. The growing demand for Quantity Surveying (QS) professionals in Malaysia underscores the need for effective educational strategies to produce competent graduates. However, current mismatches between teaching methods and students' learning styles have led to dissatisfaction among employers. This research aims to identify the learning style preferences of undergraduate QS students at a private Malaysian university. A literature review identified the four learning styles of the VARK model (Visual, Auditory, Read/Write, Kinaesthetic) and their relevance across various fields of study, alongside factors influencing learning and key QS courses. An online questionnaire was distributed to 148 QS students to collect data on their learning style preferences. The results indicate that Visual learning is the most preferred style, with a mean rank of 5.74, followed by Kinaesthetic (mean rank of 5.69). Auditory and Read/Write styles are less favored and show more consistency across academic years. Statistically significant differences were found: Visual and Kinaesthetic preferences differed between academic years. The study explored how undergraduate Quantity Surveying (QS) students' learning styles impact their performance in Measurement of Building Works, Professional Practice and Procedure (PPP), and Estimating. Using Spearman's Rank Correlation Coefficient, positive correlations were found for all learning styles—Visual, Auditory, Read/Write, and Kinaesthetic. Kinaesthetic learning correlated most strongly with success in Measurement of Building Works and Estimating, due to the practical nature of these subjects. The Read/Write style showed the highest correlation with performance in PPP, emphasizing the role of textual materials. These results highlight the benefit of aligning teaching methods with students' learning preferences to improve academic outcomes. These findings suggest that aligning teaching methods with students' Visual and Kinaesthetic preferences can enhance academic performance. The study provides a reference for educators to tailor their strategies and for industry and government bodies to develop training programs that better align with students' learning styles. Future research should involve a larger sample and explore additional factors, such as parental education and cultural influences, to further refine educational approaches and support diverse learning needs.

Keywords: Learning Style, Quantity Surveying, Visual, Kinaesthetic

1 Introduction

1.1 Background

The field of Quantity Surveying (QS) is essential to the construction industry. A quantity surveyor manages and controls costs and contracts in construction projects (Noor, Tobi, & Radin-Salim, 2020). According to the Royal Institute of Chartered Surveyors (RICS, 2023a), a quantity surveyor acts as the financial guardian of a project, ensuring compliance with legal standards and maintaining quality throughout a facility's lifecycle, from initial feasibility studies to demolition (Olanrewaju & Anahve, 2015). Consequently, a skilled quantity surveyor must be well-versed in construction technology, project cost planning, and management (Yew, 2020).

Malaysian universities offer undergraduate QS programmes designed to prepare students for the profession. Core courses typically include Building Works Measurement, Construction Technology, Estimating, Construction Law, and Project Management. The rise of the Fourth Industrial Revolution (IR 4.0) and green building technology is transforming the construction industry, incorporating digital tools and robotics (Kamde et al., 2021). QS firms now use technologies like Building Information Modelling (BIM) to improve efficiency, altering the roles and required skills of QS professionals (Akinshipe, Ikuabe, & Aigbavboa, 2022). Therefore, QS professionals must continually update their knowledge and skills to stay current with industry trends (Malek et al., 2023).

To ensure the effectiveness of QS education and produce proficient graduates, it is crucial to understand students' preferred learning styles. This knowledge can help educators tailor their teaching methods, enhancing student engagement and performance. Research shows that students taught in their preferred learning styles achieve better test scores, knowledge retention, and overall satisfaction (Pallapu, 2007; Konadu-Yiadom, 2016). Educators benefit from this understanding by adapting their instructional approaches to meet diverse learner needs (Daud, Kashif, & Chaudhry, 2014).

Higher education institutions are leveraging insights into student learning preferences to improve teaching methods, academic achievements, and resource allocation (Williams, Brown, & Etherington, 2013). By identifying QS students' learning styles, institutions can enhance curriculum development and teaching methodologies, leading to better engagement and academic outcomes. This approach ensures students gain a comprehensive understanding of QS, preparing them to be competent professionals in the construction industry.

1.2 Problem Statement

Effective education of undergraduate Quantity Surveying (QS) students is crucial for producing competent professionals in Malaysia, as their academic performance may be influenced by their learning styles. Therefore, understanding the preferred learning styles of QS students is important.

The demand for professional quantity surveyors has prompted Malaysian universities to offer QS programs (Yap, Hew, & Skitmore, 2022). Traditional QS roles have expanded due to increased risks and challenges (Malek et al., 2023). A mismatch between university curricula and the competencies required by the industry is common and has been a concern for over 15 years, as highlighted by Perera, Pearson, & Dodds (2010). The failure of the education system to adapt to these evolving needs has resulted in ongoing dissatisfaction among both employers and graduates. This is not a new issue and requires serious attention to resolve. Employers have long expressed concerns about the standards and competencies of Quantity Surveying (QS) graduates, attributing these issues to inadequate university curricula since the early 2000s (Zakaria, Munaaim, & Khan, 2006). These concerns appear to persist, continuing to create confusion and challenges within the construction industry today.

A mismatch between teaching styles and students' preferred learning methods can significantly hinder academic success (Konadu-Yiadom, 2016). When students' learning preferences are not accommodated, they may struggle academically, lose motivation, and even consider leaving their programs (Jamani et al., 2018). Research shows that aligning teaching methods with students' preferred learning styles improves performance, yet many educators lack awareness of these preferences, impacting the effectiveness of teaching and student outcomes (Hanawi et al., 2022; Afrifa, Quartey, & Kwakye, 2022).

Although studies on QS education have explored curriculum content and necessary competencies (Yogeshwaran, Perera, & Ariyachandra, 2018; Yap et al., 2022), there is limited research on the learning style preferences of QS students, particularly in Malaysia. Understanding these preferences is essential for designing curricula and teaching strategies that improve learning outcomes.

This research focuses on private universities in Malaysia, where diverse student populations and flexible curricula offer a unique context for studying learning preferences. Investigating the learning styles of undergraduate QS students in private institutions will provide insights that can enhance teaching effectiveness and improve academic outcomes.

1.3 Research Objectives

1. To identify the learning style preferences of undergraduate Quantity Surveying students in a Malaysian private university.
2. To determine the relationship between learning style preferences and major subjects in the Quantity Surveying program.

2 Literature Review

2.1 Concept of Learning Style

The concept of learning styles, which emerged in the 1970s, is essential in education for enhancing teaching and learning processes. Defined by Cornett (1983) as a consistent pattern of behavior and by Reiff (1992) as factors, behaviors, and attitudes that enhance learning in specific situations, learning styles are diverse methods students prefer for perceiving and processing information (Williams, Brown, & Etherington, 2013; Moussa, 2014; Amin et al., 2021; Shaidullina et al., 2023). Understanding these styles benefits both students and educators by improving communication, promoting deeper learning, and increasing academic performance (Jamani et al., 2018; Afrifa, Quartey, & Kwakye, 2022). Students' self-awareness of their learning styles helps them develop effective study techniques and strategies that play to their strengths (Hawks-worth, 2015; Amin et al., 2021). This self-awareness also boosts motivation and engagement, as learning in preferred styles aligns with their interests (Sengodan & Iksan, 2012; Nazir, Al-Ansari, & Farooqi, 2018). For educators, recognizing these styles allows for the development of tailored teaching approaches that respect individual differences and enhance learning outcomes (Afrifa, Quartey, & Kwakye, 2022; Khan, 2023). Moreover, understanding learning styles aids in the optimal use of educational resources, ensuring a comprehensive and effective learning experience (Hidayati, 2019; Berková et al., 2020).

2.2 Type of Learning Styles

Learning style inventories identify students' preferred cognitive methods for processing information (Snelgrove, 2004). Various educationists, including Dunn and Dunn, Gardner, Gregorc, Felder-Silverman, Honey and Mumford, and Kolb, have developed these models.

VARK Model. Introduced by Neil D. Fleming in 1987, the VARK model categorizes learning styles into four types: visual, aural, read/write, and kinaesthetic. This model helps identify sensory modalities used during information processing (Berková et al., 2020). The VARK inventory includes a questionnaire to pinpoint individual preferences (Prithishkumar & Michael, 2014).

Visual Model. Visual learners prefer information through visual means such as maps, diagrams, charts, and flowcharts, using symbolic elements like arrows and hierarchies. This excludes realistic photos, videos, or PowerPoint presentations but includes designs and patterns for effective information conveyance.

Aural. Aural learners excel with auditory information. They benefit from lectures, discussions, radio, and verbal communication, even talking to themselves. They process ideas by speaking them out loud rather than internalizing them.

Read/ Write. Those with a read/write preference favor written information. They thrive on text-based input and output, engaging in reading and writing activities across various contexts like manuals, reports, and essays. They also frequently use PowerPoint, online resources, lists, and dictionaries.

Kinaesthetic Model. Kinaesthetic learners prefer hands-on experiences and practical application. They learn through demonstrations, simulations, and real-world activities like case studies and practical exercises. They value experiential learning and assignments involving detailed action plans and working examples.

2.3 Learning Style Preferences Across Disciplines

Many studies have looked into how undergraduate students prefer to learn in different programs.

For example, in Lahore, Pakistan, research on second- and third-year nursing students found that most preferred visual learning, followed by auditory and hands-on (kinaesthetic) methods (Hammayun et al., 2022). Similarly, a study of pharmacy students at a Malaysian university showed that most preferred learning by seeing and hearing (John et al., 2016).

However, different results have been seen elsewhere. Pharmacy students in Islamabad, Pakistan, preferred learning by listening (aural), followed by hands-on activities (Malik, Ahmad & Hussain, 2021). Dentistry students at Taibah University in Saudi Arabia preferred hands-on learning, with male students liking listening and female students preferring visual methods (Hashem, 2022). Medical students also preferred hands-on learning (Jamani et al., 2018; Teli et al., 2021).

In construction studies, a study at Michigan State University found that both educators and students preferred visual learning (Abdelhamid, 2003). For the Quantity Surveying (QS) program, research at Taylor's University showed that most students liked hands-on activities and interactive classes (Kamarazaly et al., 2020). Similarly, at the University of Technology Malaysia, QS students preferred hands-on learning, followed by visual and auditory methods, with reading and writing being the least preferred (Jaafar, 2018).

This study aims to explore learning styles for key subjects in the QS program to help educators better design and deliver teaching materials and methods.

3 Methodology

3.1 Research Design

This study employs a quantitative research methodology to efficiently analyze data and optimize resource use (Daniel, 2016). By utilizing statistical data and the Statistical

Package for the Social Sciences (SPSS) for analysis, the process of describing and interpreting results is streamlined. Quantitative research is valued for its objectivity and reliability, as it minimizes bias and ensures accurate measurements.

3.2 Justification

The primary goal of this research is to identify the learning style preferences of undergraduate quantity surveying (QS) students at a private university in Malaysia. To achieve this, a questionnaire survey was implemented, enabling data collection from a large sample of students and ensuring comprehensive and reliable results. Unlike qualitative research, which can be time-consuming and less generalizable, quantitative methods are better suited for describing and predicting patterns across a population.

3.3 Questionnaire Design

The questionnaire was designed to align with the research objectives and was divided into four sections.

Section A. Collects demographic information through multiple-choice questions.

1. Year of Study
2. Academic performance

Section B. Assesses preferred learning styles using a 5-point Likert scale.

Table 1. Questions in the Section B

Code	Statement	Learning Style Preference
A1	I prefer to learn through maps, diagrams, charts, graphs, and other visual aids.	Visual
A2	When studying, I often use visual aids like diagrams, mind maps, or illustrations to organize my thoughts and understand the material better.	
A3	I prefer to learn through listening to lectures, discussions, and spoken instructions.	Auditory
A4	I enjoy participating in group discussions, debates, and verbal exchanges to enhance my understanding of new concepts.	

A5	I prefer to learn by reading textbooks, articles, and written instructions	
A6	I enjoy taking notes, creating outlines, and writing summaries as a way to understand and memorize new information.	Read/ Write
A7	I find it easier to process information when I write it down and create written materials such as notes, essays, or reports compared to using visual aids or verbal explanations.	
A8	I prefer to learn through hands-on activities, experiments, and practical tasks.	
A9	I enjoy participating in interactive learning activities, such as role-playing, simulations, or experiments, to enhance my understanding of new concepts.	Kinaesthetic
A10	I can retain information better when I physically demonstrate or practice concepts rather than simply observing or reading about them.	

Section C. Correlation between students’ learning styles and Quantity Surveying major subjects.

- 1. Measurement of Building Works
- 2. Professional Practice and Procedure
- 3. Estimating

The questionnaire was distributed online with a formal statement outlining the research objectives. It was sent via email, Microsoft Teams, and social media. Respondents had four weeks to complete the survey, allowing sufficient time for accurate and thoughtful responses.

3.4 Sample Size

A sample of approximately 148 undergraduate QS students from Years 2, 3, and 4 at a private university in Malaysia was selected to estimate the characteristics of the entire population. This sample size ensures a 95% confidence level with an alpha level (α) of 0.05, providing a balance between reliability and practical considerations.

3.5 Pilot Test

Before distributing the questionnaire to QS students, a pilot test was conducted. Over two weeks, 20 responses were collected and analyzed using Cronbach’s Alpha Reliability Test to assess the questionnaire’s viability (Hassan, Schattner, & Mazza, 2006). Questionnaires were distributed via Google Forms, all of which were returned, achieving a 100% response rate.

The data from the pilot test were analyzed using SPSS, and the reliability coefficients (Cronbach’s Alpha values) for Sections B, and C were calculated. Section A, which collected demographic information, was excluded from this analysis. The results showed that Sections B and C had alpha values greater than 0.70, indicating acceptable internal consistency and reliability (Aliyu et al., 2022).

3.6 Data Analysis

After collecting the data, the responses were analyzed to ensure reliable and accurate results. SPSS software facilitated the statistical analysis, including charts and distribution plots. The following techniques were used:

- Cronbach’s Alpha Reliability Test
- Friedman Test
- Kruskal-Wallis Test and Mann-Whitney U Test

4 Findings and Discussion

This chapter presents and discusses the findings on the learning style preferences of Quantity Surveying students at a private university in the Klang Valley area. The results highlight the factors influencing learning and examine the relationship between learning style preferences and academic performance.

Table 2. Respondents Background

Demographic Characteristics	Frequency N	Percentage %
Gender		
Male	58	39.2
Female	90	60.8
Year of Study		
Year 2	31	20.9
Year 3	44	29.7
Year	73	49.3

Parent Level of Education

Primary Education	9	6.1
Secondar Education	69	46.6
Tertiary Education	70	47.3

Table 2 provides a summary of the demographic background of the 148 respondents who participated in the survey. The majority of respondents, 60.8%, are female. Nearly half of the respondents are Year 4 students enrolled in the Quantity Surveying (QS) program at a private university. Regarding parental education, 47.3% of the respondents' parents have completed tertiary education, 46.6% have completed secondary education, and only 6.1% have completed primary education.

4.1 Reliability Test

The reliability coefficients for the main study, measured in terms of Cronbach’s Alpha values, for Sections B and C. The results indicate that all alpha values are higher than 0.80, demonstrating good internal consistency and reliability of the questionnaire, as per the standards set by Aliyu et al. (2022). Specifically, Section B, which assesses learning style preferences, achieved an alpha value of 0.85, indicating strong reliability in capturing the diverse learning styles of students. Section C, which examines the relationship between learning styles and major Quantity Surveying subjects—Measurement for Building Works, Professional Practice and Procedure, and Estimating—reported an alpha value of 0.82. These high-reliability coefficients suggest that the questionnaire is a robust tool for investigating the relationship between learning styles and major subjects among Quantity Surveying students, ensuring that the collected data is consistent and dependable for further analysis.

4.2 Ranking for Learning Style Preferences

Table 3. Learning Style Preferences of Undergraduate Quantity Surveying Students in a Private University in Malaysia

Types of Learning Styles (Code) [Ⓐ]	Overall (N=14) [Ⓐ]			Year 2 (N=31) [Ⓐ]			Year 3 (N=44) [Ⓐ]			Year 4 (N=73) [Ⓐ]		
	Mean Rank [Ⓐ]	Rank [Ⓐ]	Sig. [Ⓐ]	Mean Rank [Ⓐ]	Rank [Ⓐ]	Sig. [Ⓐ]	Mean Rank [Ⓐ]	Rank [Ⓐ]	Sig. [Ⓐ]	Mean Rank [Ⓐ]	Rank [Ⓐ]	Sig. [Ⓐ]
Visual [Ⓐ] (A1-A2) [Ⓐ]	5.74 [Ⓐ]	1 [Ⓐ]		5.28 [Ⓐ]	4 [Ⓐ]		6.25 [Ⓐ]	1 [Ⓐ]		5.63 [Ⓐ]	2 [Ⓐ]	
Auditory [Ⓐ] (A3-A4) [Ⓐ]	5.36 [Ⓐ]	3 [Ⓐ]		5.33 [Ⓐ]	3 [Ⓐ]		5.37 [Ⓐ]	2 [Ⓐ]		5.37 [Ⓐ]	3 [Ⓐ]	
Read/Write [Ⓐ] (A5-A7) [Ⓐ]	5.24 [Ⓐ]	4 [Ⓐ]	<0.001 [Ⓐ]	5.43 [Ⓐ]	2 [Ⓐ]	0.005 [Ⓐ]	5.3 [Ⓐ]	3 [Ⓐ]	<0.001 [Ⓐ]	5.13 [Ⓐ]	4 [Ⓐ]	<0.001 [Ⓐ]
Kinaesthetic [Ⓐ] (A8-A10) [Ⓐ]	5.69 [Ⓐ]	2 [Ⓐ]		5.84 [Ⓐ]	1 [Ⓐ]		5.29 [Ⓐ]	4 [Ⓐ]		5.87 [Ⓐ]	1 [Ⓐ]	
	[Ⓐ]	[Ⓐ]	[Ⓐ]	[Ⓐ]	[Ⓐ]	[Ⓐ]	[Ⓐ]	[Ⓐ]	[Ⓐ]	[Ⓐ]	[Ⓐ]	[Ⓐ]

The Table 3 provides valuable insights into the learning style preferences of undergraduate Quantity Surveying students enrolled in a private university in Malaysia, segmented by different academic years. The data showcases the mean ranks and statistical significance of various learning style categories, shedding light on the students' preferred modes of learning. Visual learning style (A1-A2) emerged as the predominant choice overall, with a high mean rank of 5.74 and statistically significant variations observed across all year groups. This indicates a clear preference for visual stimuli such as diagrams, charts, and images among the students. Following closely behind is the Kinaesthetic learning style (A8-A10), with a mean rank of 5.69, showcasing a strong inclination towards hands-on and experiential learning methods. Notably, this preference varied significantly between different year groups, suggesting potential shifts in learning preferences as students progress through their academic journey. In contrast, the Auditory and Read/Write learning styles demonstrated relatively consistent mean ranks across the years, implying a more stable preference for auditory and reading/writing-based learning approaches.

In the second year cohort (Year 2), Visual learning style (A1-A2) holds the top rank with a mean of 5.28, closely followed by Kinaesthetic learning style (A8-A10) with a mean of 5.84. This suggests a strong inclination towards visual and hands-on learning methods among Year 2 students. In the third year group (Year 3), Visual learning style continues to dominate with a mean rank of 6.25, indicating a sustained preference for visual stimuli in the learning process. However, there is a notable shift in the fourth year cohort (Year 4), where Kinaesthetic learning style takes the lead with a mean rank of 5.87, surpassing Visual learning style.

4.3 Discussion about the ranking of learning style preferences

Among the four learning styles analyzed—Visual, Auditory, Read/Write, and Kinaesthetic—the visual learning style stands out as the top choice among Quantity Surveying (QS) students at a private university in Malaysia. Year 3 students particularly favor this style, finding visual aids like mind maps, diagrams, and charts most effective for learning (Ibrahim and Hussein, 2016). This preference is understandable given the mathematical nature of many QS courses, such as Measurement of Building Works and Esti-

ming. Kinaesthetic learning style ranks second overall, with Year 2 and Year 4 students showing a strong preference for hands-on experiences, linking lectures with field-work for practical learning (Masela and Subekti, 2021). Practical classes like Measurement for infrastructure and building works cater to Year 2 students, while Year 4 students seek to apply theoretical knowledge in real-world scenarios in preparation for internships and future careers.

In contrast, the auditory learning style ranks third overall, with Year 2 and Year 4 students placing it as their second-lowest preference. This aligns with findings from Ibrahim and Hussein (2016) on nursing students, indicating a preference for hands-on activities over auditory learning methods. Finally, the read/write learning style ranks lowest among QS students, especially among Year 4 students. Alkooheji and Al-Hattami (2018) noted a general disinterest in reading and writing as learning styles, attributing it to the prioritization of construction knowledge in QS programs, which often require practical applications and visualization rather than extensive reading. This study's findings differ from previous research, highlighting a shift in learning style preferences among QS students towards kinaesthetic and visual methods over auditory and read/write styles (Kamarazaly et al., 2020; Jaafar, 2018).

4.4 Relationship between Learning Style with Quantity Surveying Major Subjects

This subsection examines the relationship between students' learning styles and their major subjects in three key courses: Measurement of Building Works, Professional Practice and Procedure, and Estimating. Understanding how different learning styles impact academic performance can provide insights into effective teaching strategies and improve educational outcomes for QS students.

Table 4. Relationship between learning styles with Quantity Surveying major subjects

Learning Style Prefer- ences (Code)		Major Subjects		
		Measure- ment of Build- ing Works	Professional Practice and Procedure	Estimating
Visual (A1-A2)	Spearman Correlation	.180*	.294*	.173*
	Sig. tailed) (2	0.028	0.000	0.035
Auditory	Spearman Correlation	.181*	.275**	.283**

(A3-A4)	Sig. tailed)	(2	0.028	0.001	0.000
Read/Write	Spearman Correlation		.212*	.333**	.213**
(A5-A7)	Sig. tailed)	(2	0.01	0.000	0.009
Kinaes- thetic	Spearman Correlation		.332**	.293**	.336**
(A8-A10)	Sig. tailed)	(2	0.000	0.000	0.000

Table 4 presents the correlation between students' learning styles and their academic performance in three courses: Measurement of Building Works, Professional Practice and Procedure, and Estimating, using Spearman's Rank Correlation Coefficient test.

Measurement of Building Works. The study revealed positive correlations between all four learning styles and academic performance in the Measurement of Building Works:

Visual: Correlation of 0.180 ($p=0.028$)

Auditory: Correlation of 0.181 ($p=0.028$)

Read/Write: Correlation of 0.212 ($p=0.010$)

Kinaesthetic: Correlation of 0.332 ($p=0.000$)

Among these, the kinaesthetic learning style showed the highest positive correlation. This suggests that students who frequently use kinaesthetic learning styles tend to perform better in this subject. The correlation was statistically significant ($p<0.01$).

Professional Practice and Procedure. Positive correlations were also observed in this course:

Visual: Correlation of 0.294 ($p=0.000$)

Auditory: Correlation of 0.275 ($p=0.001$)

Read/Write: Correlation of 0.333 ($p=0.000$)

Kinaesthetic: Correlation of 0.293 ($p=0.000$)

The Read/Write learning style had the strongest correlation, indicating its significant impact on academic performance in this course.

Estimating. The correlations in Estimating are as follows:

Visual: Correlation of 0.173 ($p=0.035$)

Auditory: Correlation of 0.283 ($p=0.000$)

Read/Write: Correlation of 0.213 ($p=0.009$)

Kinaesthetic: Correlation of 0.336 ($p=0.000$)

Again, the kinaesthetic learning style exhibited the highest positive correlation, underscoring its importance for better academic performance.

4.5 Discussion between Learning Style with Quantity Surveying Major Subjects

The study explored the correlation between students' learning styles and their academic performance in three subjects: Measurement of Building Works, Professional Practice and Procedure (PPP), and Estimating. The analysis used Spearman's Rank Correlation Coefficient test and revealed positive correlations for all four learning styles—Visual, Auditory, Read/Write, and Kinaesthetic—across these subjects.

Measurement of Building Works. The kinaesthetic learning style showed the highest positive correlation with academic performance in Measurement of Building Works, suggesting that students who frequently use kinaesthetic learning styles tend to perform better in this subject. This strong correlation ($r = 0.332$, $p < 0.01$) is likely due to the course's emphasis on mathematical skills and practical applications, rather than discussion-based problem-solving (Muzafar, Hafir, & Mohamad, 2022). Practice is essential for learning mathematics (Lehtinen et al., 2017), and students must study various drawings, as each construction project is unique.

This finding is supported by Muzafar, Hafir, and Mohamad (2022), who reported a significant positive correlation ($r = 0.305$, $p = 0.00$) between intrinsic motivation for Building Works Measurement and the kinaesthetic learning style. The other three learning styles (Visual, Auditory, and Read/Write) also contribute positively to academic performance, as students need to integrate various styles to grasp fundamental concepts, such as studying drawings, understanding measurement rules, and writing descriptions in the Bill of Quantities (BQs), before proceeding to measure the drawings based on the Standard Method of Measurement (SMM).

Professional Practice and Procedure (PPP). The study revealed positive correlations between all four learning styles and academic performance in PPP. Notably, the read/write learning style exhibited the highest positive correlation with academic performance in this subject, suggesting that students who frequently use read/write learning styles tend to perform better ($r = 0.333$, $p < 0.01$).

This outcome is likely due to the nature of the PPP course, which resembles law studies and requires learning legal knowledge, particularly concerning contractual documents essential at various stages of construction projects. Consequently, the course heavily relies on written materials. In such courses, reading is often perceived as the most effective learning style for students (Jacobson, 2002). In law school, written materials are the primary source of information, supplemented by lectures and discussions, and most law students absorb information best through written text (Jacobson, 2001). Similarly, in PPP classes, text is the primary medium used by lecturers to convey information, and students primarily learn through reading and writing.

The other three learning styles (Visual, Auditory, and Kinaesthetic) also showed significantly positive correlations with academic performance in PPP, with Visual ($r = 0.294$), Auditory ($r = 0.275$), and Kinaesthetic ($r = 0.293$) all contributing. This outcome is likely due to PPP requiring English language skills, given its significant amount of paperwork. According to Karthigeyan and Nirmala (2013), the visual learning style is

avored among English language learners. Additionally, undergraduate students in English education programs prefer visual learning (Ariastuti & Wahyudin, 2022). Moreover, a study by Mohamad, Md Salleh, and Abu Hassan (2019) found that visual learning was the most preferred style among first-year law students. Listening to lectures in the PPP course enables students to acquire fundamental knowledge, including understanding the content of contract documents and the administrative procedures of construction projects. Participation in internships allows students to engage in kinaesthetic learning, which familiarizes them with documentation and procedures in real-world projects.

Estimating. The findings indicate that all learning styles have a positive correlation with academic performance in Estimating. Among the four learning styles, the kinaesthetic learning style shows the highest positive correlation ($r = 0.336$), suggesting that students who frequently use kinaesthetic learning styles tend to perform better in this subject. The correlation is statistically significant.

This outcome is likely due to the nature of the Estimating course, which involves practical tasks such as measuring and calculating unit rates for various items like labor, materials, and equipment. These practical aspects align well with the kinaesthetic learning style, which emphasizes hands-on learning and practical exercises.

The remaining three learning styles (Visual, Auditory, and Read/Write) also show significantly positive correlations with academic performance in Estimating. Auditory ($r = 0.283$) and Read/Write ($r = 0.213$) have similar levels of influence on students' performance, while Visual learning shows a lower but still significant correlation ($r = 0.173$). The necessity for instructors to provide comprehensive explanations of basic theories and formulas, along with supplementary visual aids, likely contributes to these correlations. Visual aids help clarify instructors' explanations, making it easier for students to understand complex concepts in estimating courses.

5 Conclusion

The analysis of learning style preferences among undergraduate Quantity Surveying (QS) students at a private university in Malaysia reveals a clear trend towards visual and kinaesthetic learning styles. The predominant preference for visual learning, supported by high mean ranks across all academic years, underscores the effectiveness of visual aids such as diagrams, charts, and images in the QS curriculum. The kinaesthetic learning style, particularly favored in the second and fourth years, highlights the importance of hands-on and experiential learning methods, which align with the practical nature of QS courses.

Statistical correlations further illustrate the impact of these learning styles on academic performance. In subjects such as Measurement of Building Works and Estimating, the kinaesthetic learning style shows a particularly strong positive correlation, suggesting that practical, hands-on activities significantly enhance students' understanding

and performance. Conversely, the Read/Write learning style demonstrates its importance in Professional Practice and Procedure, where the reliance on textual materials aligns with students' performance in these courses.

Overall, the study emphasizes the value of integrating multiple learning styles into the educational process. By aligning teaching methods with students' learning preferences, particularly through visual and kinaesthetic approaches, educators can enhance academic performance and better support QS students in their academic and professional development. This approach not only caters to diverse learning needs but also fosters a more effective and engaging learning environment.

5.1 Research Implication

The findings of this research offer valuable implications for academic institutions, the construction industry, and government bodies.

For academic institutions, understanding the learning style preferences of undergraduate Quantity Surveying (QS) students provides a critical opportunity to tailor teaching strategies to enhance student engagement and comprehension. Educators can leverage this knowledge to design course materials, assignments, and assessments that align with students' preferred learning styles, leading to improved academic performance and overall satisfaction. Incorporating learning style assessments into curriculum planning can foster a more effective learning environment and increase student participation. This approach not only enhances learning outcomes but also attracts students' attention and encourages greater involvement in their studies.

In the context of the construction industry, there is potential for collaboration between academic institutions and construction firms to develop training programs that reflect students' learning style preferences. Such partnerships can bridge the gap between academic knowledge and practical skills, thereby better preparing graduates for the workforce. By aligning training programs with the learning styles of new employees, construction firms can enhance the effectiveness of their training efforts and improve workforce readiness.

For government bodies, particularly those involved in educational policy and training, such as the Construction Industry Development Board (CIDB), there is an opportunity to influence curriculum development and educational reforms. By supporting policies that promote differentiated instruction and student-centered learning approaches, government bodies can help create educational environments that accommodate diverse learning styles. Highlighting the importance of recognizing and addressing various learning preferences can contribute to equitable opportunities for all students, ultimately fostering academic and professional success across different learning styles.

5.2 Research Limitations

This study involved 148 undergraduate QS students from Universiti Tunku Abdul Rahman (UTAR), limiting the generalizability of the findings to a broader population of

QS students across Malaysian universities. The reliance on self-reported data may also introduce recall errors, affecting the accuracy of the results. Additionally, data on respondents' parental education levels was not collected, which restricts analysis of how parental education influences learning style preferences. Finally, students' learning style preferences may vary over time, which should be considered.

5.3 Research Recommendations

Future research should expand the sample size and include students from multiple universities to improve generalizability. Additionally, examining a broader range of parental education levels could provide insights into its impact on learning style preferences. Future studies could also explore other influencing factors, such as economic background and cultural differences. Using questionnaires to assess learning style preferences at various stages throughout students' education can help track changes and offer a deeper understanding of how these preferences evolve.

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