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Demographics and learning styles of adult learners: insights from Kolb's model

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ABSTRACT

Adult learners have their own learning styles to acquire information and skills. Therefore, this survey study was carried out to determine adult learners' preferred learning styles based on Kolb's model and how learner learning style and demographic profile are related. The sample of this study consisted of 39 Indonesian and 32 Malaysian adult learners aged 20 to 54 years old. The instrument used was Kolb's learning style questionnaire. The questionnaire answers aimed to ascertain which quadrant the students belong to. Meanwhile, the chi-square test for independence was used to determine the relationship between adult learning styles and their demographics. More than half of the participants in this study were found to be reflectors, followed by pragmatists, theorists, and activists. Adult learning styles were also significantly correlated with nationality and educational attainment. However, gender and current employment had no significant relationship with adult learning styles. Expectantly, the results of this present study can be a reference for educators to make learning equally enjoyable and effective for those four types of adult learners.

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1. INTRODUCTION

In the present education landscape, understanding the diverse learning styles of adult learners is paramount to creating effective and inclusive learning environments. Adult learners bring knowledge, experience, and individual preferences that significantly influence how they engage with and absorb new information. Unlike conventional students, adults often pursue education while juggling professional commitments, family responsibilities, and personal pursuits. Therefore, recognizing and addressing the factors that contribute to the learning styles of adult learners is essential for instructors to tailor their approaches to provide a more meaningful learning experience. By identifying and accommodating different learning styles, educators can enhance the learning experience, improve retention of information, and increase overall engagement and motivation among learners. However, it is essential to note that the concept of learning styles has been debated among researchers. Some studies suggest that matching instruction to a student's preferred learning style may not necessarily lead to improved learning outcomes [1]. Therefore, while considering learning styles can be beneficial, it is also important to incorporate various teaching methods [2] to cater to diverse learning preferences and promote holistic learning experiences. Beside the coherent integration of

different learning methods, teachers' guidance and constructive feedback are crucial to maximize the learning outcomes [3].

The question also arises as to whether adult learning styles are related to the learners' demographics such as gender, education level, employment and nationality. Some studies believe that personal, environmental, and educational factors influence adult learners' learning styles. Understanding these factors is crucial for educators to create effective learning environments and materials. Kolb [4] identified life experiences as a key factor in contributing to the learning styles of adult learners. An adult learner's diverse life experiences can shape his or her learning preferences and approaches. Rodrigo *et al.* [5] further signified that motivation is key for adult learners, as it is a more personal matter and influences their learning experiences. To motivate more, it is important to design the learning activities to be relevant to the task, such as by obtaining certification and training [6]. Adult learners usually have unique needs and expectations that differ from younger students [7]. Other researchers have found that cognitive and emotional factors are also significant contributors, as individual cognitive and emotional characteristics play a vital role in determining learning styles [8]. While personal, social, and contextual factors are other important factors [9], the environment is crucial as well [10]. It is also important for adult learners to develop peer relationships and managing social interactions with peers and instructors [11].

In sum, studies have shown that it is necessary to understand the different learning styles of learners. Most studies have focused on students' learning styles. The present study, however, intends to investigate adult learning styles and their relation to their demographics with insights from Kolb's model of learning styles. The purpose is to determine adult learners' preferred learning styles based on Kolb's model as well as to investigate whether learner style and demographic profile are related. This study aims to explore adult learning styles and how they relate to demographic factors, using Kolb's learning style model. The goal is to identify preferred learning styles among adult learners and examine whether learning styles are linked to demographic characteristics.

The novelty of this study lies in its comparative analysis of learning styles among Indonesian and Malaysian adult learners, an area that has received limited attention in previous research. While Kolb's learning style questionnaire has been widely used, this study uniquely examines how nationality and educational background influence learning preferences in a Southeast Asian context. Unlike most studies that focus on Western populations, this research provides new insights into cultural and educational factors shaping adult learning styles in Indonesia and Malaysia. Additionally, the study employs Pearson's chi-square test with Phi and Cramer's V coefficients to measure the strength of associations, ensuring a more robust statistical analysis. The findings offer practical implications for educators, helping them design tailored learning approaches based on the backgrounds of the student. This study contributes to the field by bridging cultural perspectives in learning style research and expanding the applicability of Kolb's model.

2. LITERATURE REVIEW

2.1. Adult learners

Adult learners are often limited to those aged 25 and over, after leaving compulsory schooling, they participate in a variety of official, informal, and non-formal education [12]. According to Knowles *et al.* [13], adult learners are self-directed learners with a wealth of knowledge and experience that influence their learning. They are motivated to learn when they perceive the relevance of applying the knowledge and skills they acquire. In other words, they become responsive to the practical implications of their learning. Adult learners are generally more self-directed, independent, and motivated than traditional learners [14]. They may typically have family and work responsibilities that impact their learning experience. They may also be known by the terms "mature learners" or "non-traditional learners". Adult learners have diverse learning preferences and styles including visual, auditory, reading/writing, and kinesthetic modes of learning [15]. Adult learners may have a preference for one or more of these modalities when it comes to acquiring and processing information.

Educators must recognize that adult learners learn in diverse ways. As adult learners, they have to manage their time and study pace while balancing other responsibilities [16]. By recognizing and accommodating these preferences, educators can create a more inclusive and effective learning environment that caters to the diverse needs of adult learners. This approach can enhance engagement, comprehension, and retention of information, leading to a more successful learning experience for adult learners in various educational settings. In addition, educators need to design learning activities that facilitate application to real-world contexts [17].

2.2. Adult learning styles

Adult learners have various learning styles, influencing how they receive and process information. According to Amponsah [18], adult learners in higher education have three dominant learning styles:

pragmatist, reflector, and theorist. As identified by Amponsah [18], the pragmatist learning style refers to individuals who prefer to focus on the practical application of concepts and theories. Pragmatist learners are oriented toward problem-solving and seeking learning experiences directly related to real-world applications. This learning style, therefore, connects learner experiences to practical outcomes. A preference for reflective observation and meticulous data analysis characterizes the reflector learning style. Reflectors weigh their options, observe, listen, and act when they know themselves. They are thoughtful, process-oriented, and often seek evidence to validate their conclusions. In other words, they are motivated by reflective activities to gather and analyze information before making decisions or taking action [19].

One of the most established learning style models is Kolb's learning cycle, introduced by David Kolb in 1984. Kolb's learning cycle is a theory that describes how individuals learn and process information. The theory describes learning as a cyclical process that involves four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation. Learners normally have a preferred learning style based on their choice of these 4 learning modes [20]. Understanding Kolb's learning styles is crucial for enhancing teaching effectiveness, improving learner engagement and outcomes, and fostering a more inclusive and adaptive learning environment [21].

There are four learning styles based on Kolb's learning style cycle: diverging, assimilating, converging, and accommodating, as shown in Figure 1. The diverging style involves feeling and watching. The assimilating style involves watching and thinking. The converging style involves doing and thinking. The accommodating style involves doing and feeling. These learning styles are assessed by the Kolb learning style inventory (LSI), which classifies learners into one of the four learning styles based on their relative preference for the 4 learning modes. From this, nine distinct learning style patterns have been observed: experiencing, diverging, reflecting, assimilating, thinking, converging, acting, accommodating, and balancing [22], [23].

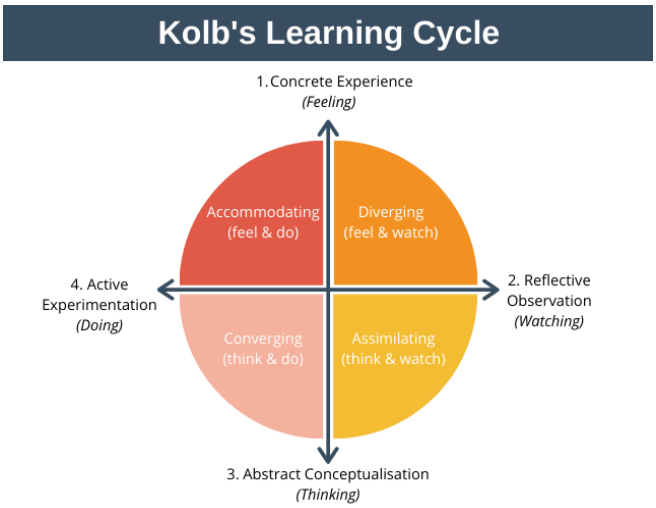

Figure 1. Kolb's learning style theory (adapted from [24])

The 9 learning styles depicted in Figure 2 are based on individuals' relative preferences for the 4 modes of the learning cycle in experiential learning theory: concrete experience, reflective observation, abstract conceptualization, and active experimentation [20]. These learning styles represent different preferences and approaches individuals may have toward learning and processing information. The impact of learning styles on learners' outcomes can vary based on individual preferences and the learning environment.

The impact of learning styles on learners' outcomes is significant and varied. Individuals with different learning styles, such as experiencing, reflecting, thinking, acting, diverging, assimilating, converging, accommodating, and balancing, exhibit unique preferences and tendencies in the learning process. For example, learners with an experiencing style excel in hands-on activities but may struggle with organization, while those with a reflecting style possess a deep understanding of concepts but may face challenges in translating plans into action. Similarly, individuals with a thinking style are skilled at developing conceptual models but may prefer working alone, whereas those with an acting style excel in practical tasks but may have difficulties in reflection. Understanding and accommodating these diverse learning styles can help individuals leverage their strengths and address potential challenges, ultimately influencing their learning outcomes [20]. Therefore, assessing students' learning styles is crucial to optimize teaching strategies and improve educational

outcomes. Overall, acknowledging and incorporating learning styles into educational practices can lead to a more inclusive and effective learning experience for students [25], [26], leading to positive learning outcomes for both students and instructors [27].

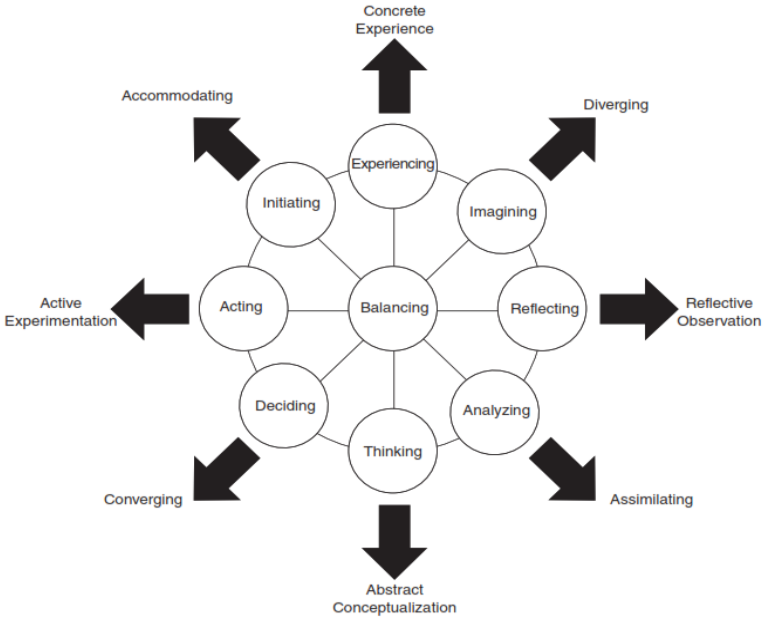

Figure 2. The 9 learning styles and the 4 dialectics of the learning cycle (adapted from Kolb [4])

2.3. Adult learners' learning style preferences

Several studies have been found on the importance of adult learning style preference. Golightly [28] studied the importance of learning style preferences for preservice geography teachers in self-directed learning (SDL). The study suggested that geography educators should understand and accommodate diverse learning styles to support preservice teachers in developing effective SDL skills. By implementing inclusive teaching strategies and promoting SDL opportunities, geography lecturers can enhance the learning experiences of preservice geography teachers. Amponsah [18] investigated adult learners in a diploma program and found that the levels of education, gender, or ethnicity did not influence adult learning styles. Padmalatha *et al.* [29] examined the influence of learning styles on the learning outcomes of first-year medical students, and found that there were possible relations between learning styles and learning outcomes. Lee and Desjardins [30] highlighted the relationship between social origins and adult learning and education (ALE) participation, shedding light on the disparities and advantages that exist in ALE across different countries and social contexts. In effect, practical application of Kolb's experiential learning theory has led to significantly higher course evaluation scores compared to traditional training methods [31]. The study on clinical nurses suggests that incorporating Kolb's experiential learning theory can enhance students' theoretical knowledge, operational skills, and subjective initiative, ultimately improving the overall effectiveness of the training program.

Toyama and Yamazaki [32] explored how the alignment of learning and teaching styles can impact student proficiency and motivation in learning English as a foreign language. The study emphasized the importance of teachers' instructional strategies and students' learning preferences to improve student outcomes in EFL courses. Using Kolb's theory of experiential learning, Srivastava and Shah [33] explored students' learning styles in the context of business education. They found that instructors can establish a more inclusive and effective learning environment that meets the varied requirements of students by matching pedagogical tools with learning styles. This alignment enhances engagement, and personalization, and ultimately led to improved learning effectiveness in business education. Kolb stated that adult learners, benefit from learning approaches that combine work and study, theory and practice, as they offer a more comfortable and effective learning environment [4].

2.4. Factors that contribute to learning styles

Many factors can contribute to adult learning styles and influence their learning process. Physical, emotional, social, and environmental factors may significantly affect a learner's learning style [34], [35]. Kolb listed factors such as personality type and habit, which evolve with time and experience [4], [36].

Abante *et al.* [37] categorized the factors into 2 specific factors: internal and external factors. Internal factors include physical and psychological factors. Physical factors include health defects and body senses that can compromise learning. Psychological factors, on the other hand, include maturity, readiness, interest, intelligence, attention, and motivation. External factors deal with family and the environment outside the individual learner [38]. Family support is very important in influencing a person's learning style. Family relationships, household atmosphere, financial status, and responsibilities can affect learning styles. Besides that, environmental factors can also contribute to a person's learning style. These include the community, the mass media, social friends, and work situations.

Furthermore, individuals' learning styles are also influenced by a variety of factors, including cognitive abilities, personality traits, prior knowledge and experiences, cultural background, motivation and interests, sensory preferences, and instructional methods [39]. They come from a diverse range of backgrounds, learning styles, motivations, needs, interests, and goals, making them more heterogeneous compared to younger learners [40]. Cognitive abilities, such as memory and attention, play a role in how individuals prefer to process information, while personality traits like openness and conscientiousness can impact learning approaches. Previous experiences and background shape learning preferences [41], and motivation and interests can affect engagement with educational material. Sensory preferences, such as visual or auditory, also influence how individuals best retain information. Additionally, the instructional methods used by educators can impact students' learning styles, highlighting the importance of considering diverse factors to create inclusive learning environments that cater to varied preferences and optimize learning outcomes for all individuals.

3. METHOD

This study employs convenience sampling, a non-probability sampling method where participants are selected based on their easy accessibility to the researcher. Specifically, participants were chosen from a group readily available and willing to participate, rather than through a random selection process. This method is advantageous due to its cost effectiveness, allowing for data collection within a constrained time frame and budget. However, it is important to acknowledge that convenience sampling may introduce biases, as the sample may not fully represent the population, which could affect the generalizability of the study's findings. The sample of 71 consisted of 39 Indonesian and 32 Malaysian adult learners from various educational levels, employment, and gender. According to Roscoe's thumb rule, a sample size between 30 to 500 is generally considered appropriate for most research studies [42]. He suggested that in studies involving subgroup comparisons, such as in this study, comparison between Malaysian and Indonesian learners, a minimum of 30 respondents per group is advisable. This recommendation is based on the central limit theorem (CLT), which states that the distribution of sample means tends toward normality as sample size increases. Although the sample size of 71 in this study meets Roscoe's minimum adequacy threshold, it is relatively modest and may limit the identification of complex relationships across demographic variables [42]. A smaller sample size reduces statistical power and limits the generalizability of the findings. Therefore, the findings of this study should be interpreted as relevant solely to the sample involved. Future research should aim to include larger and more diverse samples to improve the reliability and external validity of the findings.

The primary data used for this study was collected online among adult learners. The research instrument used was Kolb's learning style questionnaire, introduced in the 1970s by David Kolb [43]. There are 4 types of learners: activists, theorist, reflectors, and pragmatists. The study included 80 questions, with the predominant answer determining the learners' quadrant [44]. Educators could use this to evaluate the learning provision typically available to students and to develop more appropriate learning opportunities.

A frequency table was used to emphasize the preliminary analysis of the demographic profile of adult learners. Next, the chi-square test for independence, also called Pearson's chi-square test, is used to discover if there is a relationship between 2 categorical variables. The 2 variables must include 2 or more categorical, independent categories and be measured at an ordinal or nominal level. The specific aim of this study is to determine how learner style and demographic profile are related. This statistical method is suitable for determining the presence of a relationship between 2 categorical variables, which aligns with the study's objective [45].

4. RESULTS AND DISCUSSION

The sample consists of a higher percentage of female participants (60.6%) compared to male participants (39.4%). This distribution shows that females are the majority in this study. The majority of participants have either a bachelor's degree (40.8%) or a master's degree (38.0%), indicating a relatively high educational attainment within the sample. Only a small percentage have lower levels of education, such as primary or secondary education. A significant majority of participants are currently employed (66.2%), while a smaller portion are students (33.8%). This reflects the sample's predominant professional status. The sample

is slightly more diverse with a higher proportion of Indonesian participants (54.9%) compared to Malaysian participants (45.1%). This indicates that the study includes a slightly higher number of individuals from Indonesia, respectively as indicated in Table 1.

Table 1. Demographic profile of adult learners

Demographic	Category	Frequency	Percentage (%)
Gender	Male	28	39.4
	Female	43	60.6
Education level	Primary	1	1.4
	Secondary	1	1.4
	Diploma	4	5.6
	Bachelor degree	29	40.8
	Master degree	27	38.0
	PhD	9	12.7
Current employment	Employed	47	66.2
	Student	24	33.8
Nationality	Malaysian	32	45.1
	Indonesian	39	54.9

Table 2 indicates the findings of the dominant learning style of adult learners in this study. This study found that activists, who are characterized by a preference for learning through action and hands-on experience, are very minimal in this sample, with only 1 participant out of the total. Pragmatists, who prefer learning through practical application and solving problems in real-world scenarios, make up a moderate portion of the sample. At 16.9%, they are the second most common learning style in this dataset. Reflectors, who tend to learn best by observing, thinking, and reflecting on their experiences, represent the largest group in the sample, accounting for 69% of participants. This dominant presence indicates that a majority of the sample prefers to observe and reflect on their experiences of learning. Theorists, who like to learn by understanding theories, concepts, and abstract ideas, are represented by 12.7% of the sample. This is a relatively small proportion compared to reflectors but larger than activists.

Pearson's chi-square test was employed to explore the relationships between learning styles and several demographic factors. The categorical variables analyzed include learning styles that are classified into categories such as activists, pragmatists, reflectors, and theorists and demographic profiles such as nationality, education level, gender, and current employment status. Specifically, the test examines whether the distribution of different learning styles is significantly associated across different nationalities, educational attainment, gender-based and their current employment influence their learning preferences. The following subsections provide a detailed explanation of Table 3, outlining the results and interpretations.

Table 2. Dominant learning styles of adult learners

Category	Frequency	Percentage (%)
Activists	1	1.4
Pragmatists	12	16.9
Reflectors	49	69.0
Theorist	9	12.7

Table 3. Pearson's chi-square, phi, and Cramer's V test between learning styles and demographic factors

Demographic	Pearson's chi-square			Symmetric measures		
	Value	Df	p	Test	Value	p
Nationality	9.019	3	0.029	Phi	0.356	0.029
				Cramer's V	0.356	0.029
Education level	26.588	15	0.032	Phi	0.612	0.032
				Cramer's V	0.353	0.032
Gender	0.972	3	0.808	Phi	0.117	0.808
				Cramer's V	0.117	0.808
Current employment	1.399	3	0.706	Phi	0.140	0.706
				Cramer's V	0.140	0.706

4.1. The relationship between nationality and learning styles

Referring Table 3, this study found a statistically significant association exists between nationality and learning styles (X^2=9.019, p=0.029<0.05). Given that the p-value is less than the 0.05 significance level,

this means that there is a statistically significant relationship between these two variables. To further understand the strength of the association between nationality and learning styles, this study uses two additional measures of Phi and Cramer's V. Phi and Cramer's V ranges from 0 to 1, where values closer to 1 indicate a stronger relationship. A value of 0.356 indicates a moderate effect size, meaning there is a meaningful, though not very strong association between the variables. To aid in interpreting these results, a cluster bar chart is used, as shown in Figure 3. This visualization provides a clear depiction of how learning styles are distributed across different nationalities.

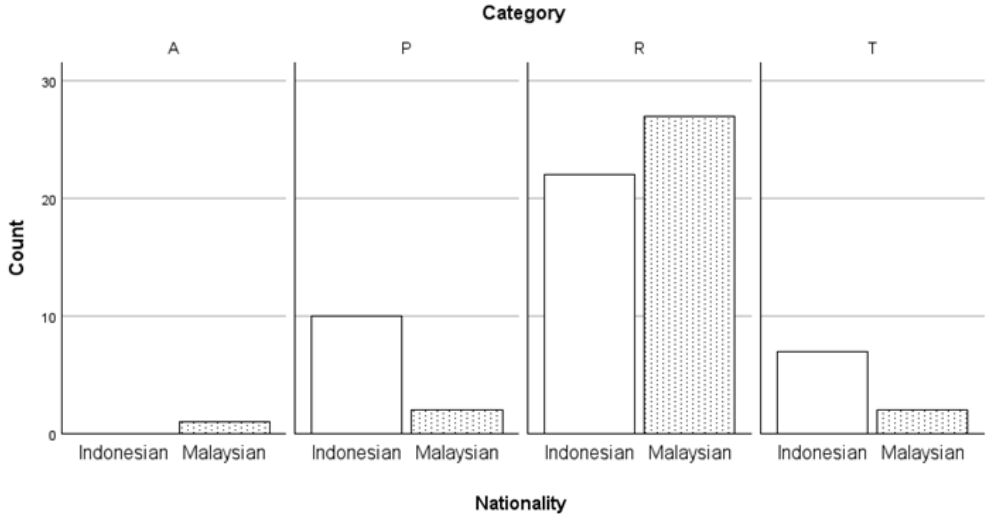

Figure 3. Cluster bar chart of nationality and learning styles

None of the Indonesian adult learners in this study identified as activists, as in Figure 3. The absence of activists among Indonesian respondents suggests that these learners generally do not favor learning through active challenges or direct engagement [7]. In contrast, there are a few Malaysian adult learners who do identify as activists. Although the number is small, the presence of activists among Malaysian respondents' highlights that a subset of this group enjoys and seeks out challenges in their learning experiences.

However, the reflector learning style is prevalent among adult learners from both Indonesia and Malaysia. This shared preference suggests that a substantial portion of the study population values a reflective and deliberate approach to learning. Educators and researchers should consider these insights when developing and delivering educational materials, ensuring that they align with more analytical pace preferred by reflectors. By tailoring educational practices to these preferences, it is possible to enhance learning effectiveness and engagement for these learners [18].

4.2. The relationship between education level and learning styles

Table 3 indicates a statistically significant association between education level and learning styles, with a chi-square statistic of X^2=26.588, p=0.032<0.05. Since the p-value is less than the 0.05 significance level, reject the null hypothesis which therefore suggests that there is no relationship between education level and learning styles. This confirms that different educational levels are associated with variations of individuals learning styles. To understand the strength of the relationship between education level and learning styles, this study uses 2 measures of Phi and Cramer's V. A Phi coefficient of 0.612 is relatively high and Cramer's V value of 0.353 reinforces the idea of a moderate association, both supporting the conclusion that educational attainment influences learning style preferences. The significant association between education level and learning styles suggests that educational attainment plays a role in shaping learning preferences. For instance, individuals with higher levels of education might show different learning preferences compared to those with lower educational backgrounds. Figure 4 visually represents the distribution of learning styles across various education levels. The cluster bar chart allows for an easy comparison of how different learning styles are distributed among individuals with different educational qualifications.

Figure 4 indicates that the majority of adult learners identify with the reflector learning style. Reflectors are characterized by their preference for a thoughtful and observational approach to learning. The high prevalence of the reflector learning style among adult learners underscores the importance of incorporating reflective practices into educational settings.

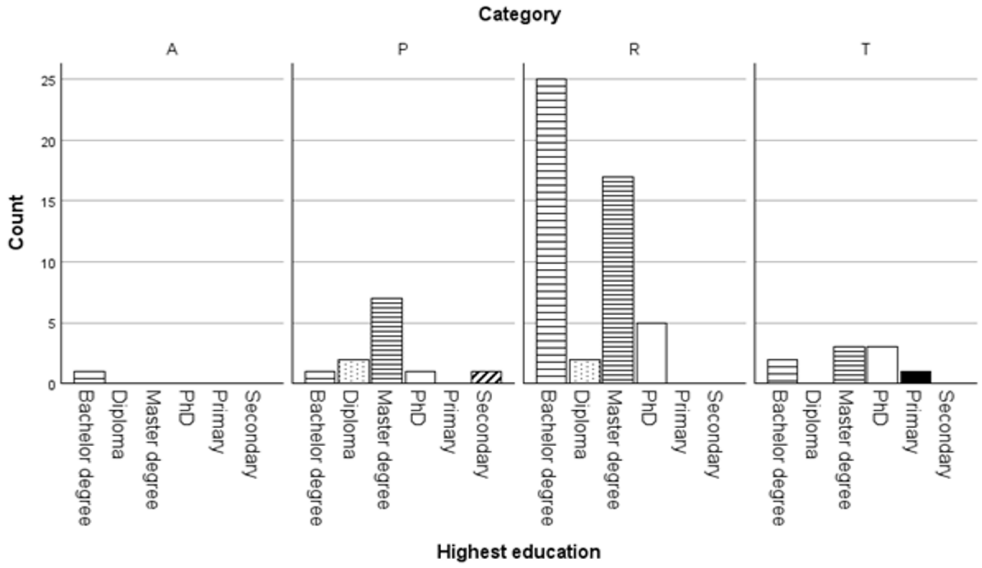

Figure 4. Cluster bar chart of education level and learning styles

The activist learning style is observed among adult learners who hold a bachelor's degree. This finding suggests that among the adult learners with a bachelor's degree, there is a subset that prefers an activist learning style. Although the number of these learners identifying as activists is relatively small, their presence is noteworthy. Activists often experience boredom with the same implementation or routine, preferring instead a more dynamic and varied approach to learning. This learning style is characterized by a lower tolerance for repetitive or monotonous tasks [7].

The data reveals that adult learners holding a master's degree predominantly identify with the pragmatist learning style. Pragmatists are characterized by their preference for practical, hands-on approaches to learning, where these students actively engage with and apply concepts to real-world situations. However, these students will do nothing when no guidelines are available [46]. A key trait of pragmatist learners is their need for clear guidelines and structured models. The data also shows that adult learners with a PhD and master degree align with the theorist learning style. Theorists are characterized by their preference for structured, theoretical approaches to learning and problem-solving. The preference for the theorist learning style among adult learners with a PhD highlights their focus on understanding and applying theoretical principles. These learners prefer structured, theory-based approaches to learning and problem-solving, often approaching tasks in a systematic and step-by-step manner.

4.3. The relationship between gender and learning styles

From Table 3, Pearson's chi-square test was used to investigate the association between gender and learning styles, showing a chi-square statistic of X^2=0.972, p=0.808>0.05. This result indicates that gender does not significantly associate learning style preferences among the sample studied. Based on this data, men and women exhibit similar patterns in their preferred learning styles. Both the Phi coefficient and Cramer's V have resulted in a value of 0.117. This value is relatively low on the 0 to 1 scale. It indicates a weak correlation between the variables.

4.4. The relationship between current employment and learning styles

From Table 3, the Pearson's chi-square test was used to examine the relationship between current employment status whether individuals are employed or students and their learning styles. The test indicates a chi-square statistic of X^2=1.399, p=0.706>0.05. The p-value of 0.706 is greater than the conventional significance level of 0.05. This indicates that the result is not significantly associate. In other words, there is no substantial evidence to suggest that current employment status has an effect on learning style preferences. The Phi coefficient showed a value of 0.140. This low value indicates a very weak correlation between current employment status and learning styles. A Phi value close to 0 suggests that there is minimal to no association between the variables. The value of Cramer's V in this case is also 0.140, reinforcing the conclusion from the Phi coefficient. A Cramer's V value of 0.140 confirms that the relationship between current employment status and learning styles is very weak.

5. CONCLUSION

This study found a significant relationship between nationality and adult learning styles, suggesting that cultural, educational, and contextual factors influence learning preferences. Different cultures may emphasize distinct learning approaches, affecting how individuals engage with educational content. Additionally, education level was also significantly associated with learning styles, indicating that individuals with higher academic attainment tend to favor theoretical approaches, while those with lower educational backgrounds may prefer practical, hands-on learning. However, no significant relationship was found between gender or employment status and learning styles, implying that these factors do not substantially influence how individuals learn. Given these findings, educators should tailor teaching methods based on learners' national and educational backgrounds to enhance adult learning experiences. Future studies should explore the applicability of these results across diverse cultural contexts, utilize larger samples for greater validity, and conduct longitudinal research to assess whether learning style preferences remain consistent over time.

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AUTHOR CONTRIBUTIONS STATEMENT

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C : **C**onceptualization
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R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

The authors declare no known competing financial interests, personal relationships, or professional affiliations that could have influenced the work reported in this paper. Furthermore, no non-financial competing interests, such as academic, intellectual, or personal influences, have affected the integrity of this research. Authors state no conflict of interest.

INFORMED CONSENT

This study obtained informed consent from all respondents involved. Participation was voluntary, and respondents were fully informed about the purpose of the research, their rights, and the confidentiality of their responses. No sensitive or medical data were collected, as this research is strictly social in nature.

ETHICAL APPROVAL

This social research followed all relevant national regulations and institutional policies. It was approved by the appropriate review board and conducted in accordance with ethical guidelines.

DATA AVAILABILITY

The data that supports the findings of this study are available from the corresponding author, [SM], upon reasonable request.

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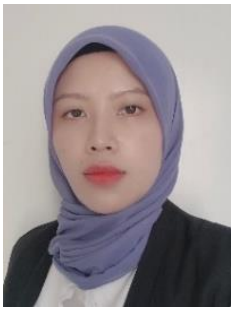

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