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The Preferences of Student's Learning Method Based on Course, Gender and Age: Visual, Audio, Reading & Kinesthetic (VARK)

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Abstract: Different students have different preferences for learning methods. Some of the students might prefer visual or audio reading or kinesthetic learning. It is believed that the student's preferences of learning methods might help the students understand more about the subject and hence contribute to their academic performance. Therefore, this study investigates whether the students' preferences for learning methods are influenced by the courses they registered for and the gender, and age of the students. A sample of 341 students from different backgrounds was selected in this study comprised of students from the Faculty of Business and Management, Faculty of Accountancy, Faculty of Graphic Design, and Faculty of Nursing in Universiti Teknologi MARA (UiTM) Puncak Alam. The findings show that course and gender play an important role in student's preferences for learning methods while age is not the significant variable. There is a very high positive correlation between courses and preferences of learning methods, while age and gender have a high positive correlation toward preferences of learning methods. This study might help educators in tailoring their lectures to the students' preferences of learning methods, thus contributing to the academic performance of the students.

Keywords: *Learning method, Courses, Age, Gender, VARK, Academic Performance*

1. Introduction and Background

Each student's learning method might vary greatly depending on the sort of learning approach that is most comfortable for them to study effectively and efficiently (Benitez, 2023). Varied students have varied skills and passions when it comes to catching up on particular topics that must be covered in a specific amount of time. Some students may need to concentrate on the class while writing in their notebooks, but others may simply need to listen to lectures or cannot focus in class and study using their own way during their free time. The best approach that meets their preferences might be used as a strategy to plan their path to achievement.

Some students may be unaware of their learning method or the correct word for their learning approach. Some students may have varied origins, courses, genders, ages, experiences, and interests. Individual variations in cognitive, sensory, and emotional processing can impact how pupils approach learning (Grand Canyon University, 2020). The research on this issue will equip educators with knowledge that will allow them to modify their teaching approaches to suit the requirements of different students better. Some students might not maximize the contents of the subjects if the preferences of learning method are not suitable with them which results in bad grades for the subjects. Enhancing and acknowledging different types of learning methods in class might help the students gain interest in the subject.

The VARK model (Visual, Auditory, Reading/Writing, Kinesthetic), Kolb's Experiential Learning Theory, and Gardner's Multiple Intelligences are several learning methods theories. However, in this research, it will concentrate on the VARK model. Neil Fleming created the VARK model, which is frequently implemented in educational contexts to categorize learning preferences. The VARK model provides a comprehensive framework for examining individual variations in learning preferences, revealing how individuals receive and retain knowledge (Hussain, 2019).

Educators can design instructional tactics that correspond with varied preferences by recognizing the prevailing learning methods within a student group, enabling a more inclusive and engaging learning environment. This study adds to the continuing conversation about personalized education by attempting to bridge the gap between teaching approaches and individual learning methods, therefore optimizing educational results for students. Students are classified into four major learning methods according to the VARK model: visual, auditory, reading/writing, and kinesthetic. Understanding these preferences can have a big influence on instructional design and learning results. It emphasizes the link between learning methods and student involvement. When instructional approaches fit with students' chosen learning mode, they are more likely to engage in the learning process. Recognizing and adapting these various learning methods in the classroom promotes a more inclusive and productive learning environment.

Teachers can use a combination of these strategies to meet the diverse demands of their students and provide a well-rounded learning experience. Visual learners benefit from visual aids like charts, graphs, and diagrams. They like visually engaging information, such as photographs and movies. Presentations, mind maps, and multimedia resources are examples of educational techniques for visual learners. Auditory learners, on the other hand, learn best by listening and speaking. Not just that, they also gain from discussions, lectures, and audio-based materials, among other things. For auditory-oriented learners, discussions in groups, spoken explanations, and podcasts might improve their learning experience. Furthermore, they thrive with written words and text-based tools for reading learners.

For example, they prefer textbooks, written instructions, and note-taking. Reading tasks, written summaries, and encouraging written reflections cater to the interests of reading/writing students. Finally, kinesthetic learners benefit the most from hands-on experiences and physical exercises. Interactive activities, experiments, and real-world applications help them. Incorporating role-playing, simulations, and hands-on tasks can engage and encourage kinesthetic-oriented kids' learning processes. Thus, this study is essential to enhance the capability of the students to utilize different types of learning methods to ensure that the students readily understand and are more focused during the class.

2. Literature Review

Preferences of VARK Learning Style among Students: Each student's learning process is unique based on their personality, learning methods, techniques, and learning concepts. Learning methods may be effective in assisting students in understanding how to improve the way they study. There are four learning methods in VARK which are visual (V), auditory (A), reading/writing (R), and kinesthetic (K) (Awang et al., 2017).

According to VARK, each letter symbolizes different learning methods. Students with visual learning methods like to learn through the presentation of graphs, charts, diagrams, lecture notes, slides, and other visual representations (Magulod, 2019). These students benefit from seeing information to absorb and recall it efficiently, whereas auditory students prefer to obtain information by listening, such as spoken instructions, discussions, and verbal explanations. They frequently benefit from lectures, group discussions, podcasts, and other auditory ways of learning (Haryana, 2020). On the other hand, students prefer to absorb all information through written words. These students prefer to read and write to gain and retain knowledge, whereas kinesthetic learners prefer hands-on experiences and physical activity to learn and understand concepts (Cabual, 2021). These students benefit from interactive and exciting learning activities such as labs, fieldwork, and other movement-based activities.

Individual learning methods can considerably help students by positively influencing their academic achievement. Understanding their unique learning methods can have an important influence on their academic performance. When students are aware of their preferred learning methods, they can select methods of study that are more beneficial for them. This can lead to higher engagement, better comprehension, and improved information retention. As a result, students who engage in how they study with their learning methods often perform better academically.

Preferences of Learning Styles among Students by Their Courses: Most students have their own learning methods and preferences when it comes to academic performance. The learning methods preference describes the complex procedure/process by which students attempt to perceive, process, store, and retrieve information in an effective way (Melo et al., 2022). Learning methods vary between each student and although each student has a unique learning method, there are generally four types of learning methods that can be found among the students which are Visual (V), Auditory (A), Reading/Writing (R) and Kinesthetic (K) (Kamal et al., 2021). Students' learning method preferences are essential as they need to achieve an outstanding examination outcome. By knowing which learning method is the best, it will enhance the quality of learning obtained by students (Tong et al., 2022).

Several studies have shown that students from different fields of study have different learning method preferences (Hu et al., 2021). Past studies on students' learning preferences have demonstrated that these preferences vary across several streams and courses, including engineering, science, humanities, architecture, pharmacy, and health sciences (Hu et al., 2021). According to research conducted by Kamal in 2021, he found that most healthcare science students choose unimodal learning methods which is 86.8% of students over multimodal learning methods which is 13.2% of students. Among the unimodal learning methods, 32% of students preferred visual methods, 26% of students preferred reading/writing methods, 10% of students preferred auditory methods and 20% of students preferred kinesthetic learning methods. As a result, visual learning methods received the most preferred learning method as the students can understand better with that method.

Next is a study conducted by Fahim et al., (2021) surveying 1,473 undergraduate students from medical and dental colleges in Pakistan. The survey found that 39.37% of students chose a unimodal learning method, while 60.62% of students chose a multimodal method. It was found that Kinesthetic was the most preferred unimodal learning technique, followed by Visual, Auditory, and Reading. Furthermore, a finding by Noor in 2019 found that 433 undergraduate students from four faculties at a private university in Selangor preferred Kinesthetic learning methods which were recorded by 30.3% of students, followed by Visual which is 28.4%, Auditory which is 27.9%, and reading which is 27.9%. As a result, students from different courses have different learning methods.
H1: *There is a relationship between course and preferences of learning methods*

The Influence of Gender on Learning Preferences: Gender, both male and female, is one of the elements that can influence learning method preferences. The gender difference affects learning methods. Gender is an unavoidable fact, and differences are reflected in various social contexts. When the learning methods preferences of male and female students were investigated, it was discovered that female students preferred learning methods that differed from those of male students (Alkooheji & Al-Hattami, 2018).

However, gender is highly associated with learning methods preference, especially when it comes to sensory learning methods. However, some students prefer only one feature of learning methods, while others struggle to use more than one. Students are divided into two categories: multimodal methods and single methods. Students in the multimodal methods category used more than one method to study, whereas students in the single methods category relied solely on one method. He also classified students into four learning methods: visual, kinesthetic, auditory, and read/write (Hamidon, 2015). Male students favored a multimodal combination learning approach, whilst female students chose unimodal learning. Female students preferred a single mode of information presentation, either visual, auditory, read-write, or kinesthetic, whereas male students did not prefer read-write as a learning method option, which could be attributed to males' carefree nature compared to females, who are more hardworking conscientious (Barman et al., 2014).
H2: *There is a relationship between gender and preferences in learning methods*

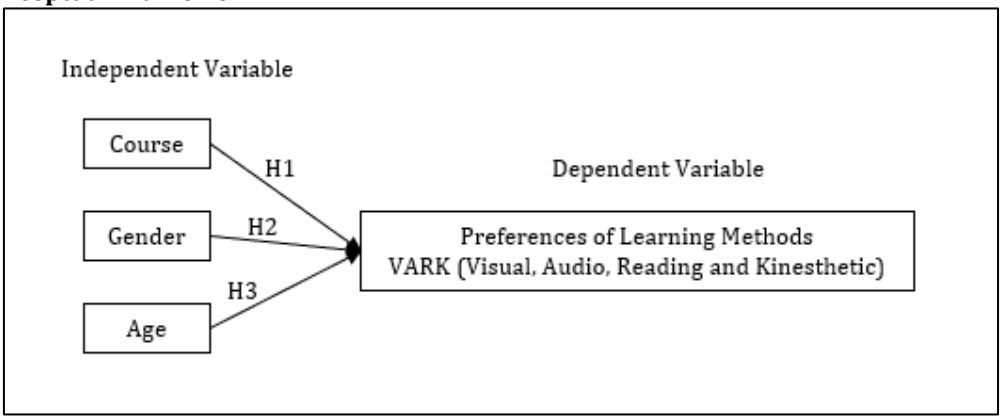
The Influence Of Age Toward Preference Learning Method: The learning methods that university students prefer to use are often determined by their age, which is a result of their previous education as well as the changing levels of mental capacity that come with each stage of life. The range of life experiences that senior university students may bring to the table could support self-driven learning and the practical application of knowledge.

Younger undergraduates, who are recently graduating from high school, maybe more used to structured learning environments, but they may also show a preference for Visual and kinesthetic learning methods (Liew et al., 2015). These preferences are impacted by age, which emphasizes the value of providing a wide range of teaching methods to meet the different needs and challenges of university students in every age group. In our research report, the students can be categorized into three groups for deeper study. The first group is categorized for ages below 20, while the second group is categorized by a wide range of 21 -25 and the third group is above 26. Overall, they all had preferences that were primarily visual and kinesthetic, with very little preference differences between the two in all age groups (Alkooheji & Al-Hattami, 2018).
H3: *There is a relation between students' age on preferences of learning methods.*

Conceptual Framework

Figure 1 shows the conceptual framework of the study. Three independent variables involved in the study are the student's course, gender, and age, while the dependent variable is preferences of the student's learning methods in terms of VARK (Visual, Audio, Reading, and Kinesthetic).

Figure 1: Conceptual Framework



3. Research Methodology

Research Design: This study employed quantitative research and adopted correlational types of investigation. A correlational relationship indicates that at least two concepts or variables move simultaneously. This study intends to look at the relationship between course, gender, and age toward preferences of learning methods of VARK (Visual, Audio, Reading, and Kinesthetic). This study has minimal interference from the researcher in a non-contrived setting since it is conducted in a normal environment and did not change any situation. The unit of analysis in this study is the individuals, which are students from the Faculty of Business and Management, Faculty of Accountancy, Faculty of Graphic Design, and Faculty of Nursing.

Sampling: Quota sampling was chosen in this study. Quota sampling is a method of non-probability sampling in which the samples are selected based on the probability proportionate to the distribution of a variable in the population (Rukmana, 2014). In this study, the respondents were divided into 4 groups based on the faculty which are the Faculty of Business and Management, Faculty of Accountancy, Faculty of Graphic Design, and Faculty of Nursing. The reason quota sampling was chosen is that the researcher would like to investigate the courses, gender and age influence the preferences of learning methods. A total of 341 respondents were chosen as a sample in the study. The total size of the population for the overall course is 3,000 students.

4. Results

This section presents the result from the analysis comprised of reliability analysis, frequency distribution of the demographic profiles, descriptive statistics, cross-tabulation, regression, and correlation analysis. The findings from this section will conclude whether there is a relationship between course, gender, and age toward preferences of learning methods.

Reliability Analysis: Table 1 shows Cronbach's alpha value for independent and dependent variables. Reliability analysis assesses the internal consistency of the variable answered by the respondents. Salkind (2015) indicated that Cronbach's alpha value of more than 0.8 is considered good internal consistency. From the table, it can be concluded that all the variables involved in the study have good internal consistency.

Table 1: Cronbach's Alpha Value

Variable	Cronbach's Alpha
Course (Independent Variable)	0.862
Gender (Independent Variable)	0.853
Age (Independent Variable)	0.870
Preferences of Learning Method (Dependent Variable)	0.815

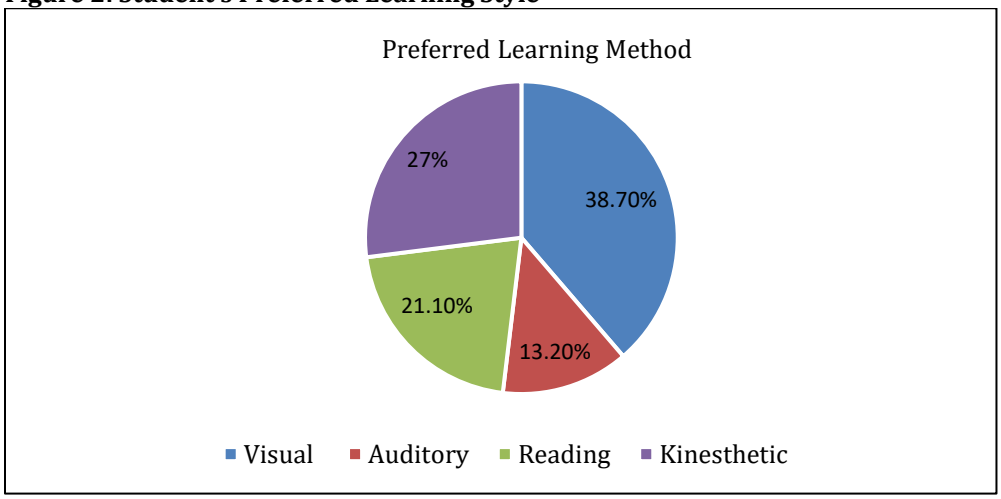
Profile of Respondents: Table 1 displays the demographic profiles of the respondents. Most of the respondents are male with 60.7% and are between 21- 25 years old (75.4%). Among the four groups of courses, the Faculty of Accountancy had the highest number of respondents with 30.8% followed by the Faculty of Business and Management with 29.9%. The lowest percentage comes from the Faculty of Graphic Design with 26.4% followed by the Faculty of Nursing with 12.9%. The majority (37.8%) of the respondents are students from Semester 5 while the lowest (3.2%) is from Semester 1.

Table 2: Demographic Profiles of the Respondents

Classification		Frequency	Percentage (%)
Gender	Male	207	60.7
	Female	134	39.3
Age	Below 20 years old	50	14.7
	21-25 years old	257	75.4
	Above 25 years old	34	10.0
Course	BA241 (Faculty of Business and Management)	102	29.9
	AC220 (Faculty of Accountancy_	105	30.8
	CAAD241 (Faculty of Graphic Design)	90	26.4
	HS240 (Faculty of Nursing)	44	12.9
Semester	1	11	3.2
	2	49	14.4
	3	46	13.5
	4	106	31.1
	5	129	37.8

Preferred Learning Style: Figure 2 shows the most preferred learning method from the respondents. Most (38.7%) of the students agree that Visual is their preferred learning method followed by Kinesthetic with 27%, Reading with 21.1%, and Auditory with 13.2%. The reason why Audio is the least preferred learning method is the courses involved in this study are more hands-on activities and lectures.

Figure 2: Student's Preferred Learning Style



Descriptive Statistics: This section portrays the descriptive statistics on the level of agreement between course, age, and gender towards preference of learning method. The mean is ranked based on highest to lowest to determine which statement has the highest level of agreement and vice versa.

Influence of course and learning methods: Table 3 shows the mean and ranking on the relationship between course and preferences of learning methods. Most of the respondents agree that graphic design students prefer to use visual learning methods followed by the statement that students noticed an improvement in academic performance at the second ranking. However, the least agreed statement is that certain learning methods are more enjoyable and less stressful. Overall, all respondents agree with most of the statements.

Table 3: Mean and Ranking on the Statement of Course and Learning Methods

No.	Statement	Mean	Ranking
1.	I think graphic design students more to use visual learning methods.	4.48	1
2.	Have you noticed any improvements in your academic performance as a result of choosing a specific learning style?	4.32	2
3.	Do you believe your learning styles influence your choice of learning method?	4.19	3
4.	Do you believe your understanding of learning style will help you to improve your study performance?	4.04	4
5.	Do you agree it is important for students to be aware of their learning preferences at an early age?	4.01	5
6.	Do certain learning methods make learning more enjoyable and less stressful?	3.88	6

Influence of age and learning methods: The mean and ranking on the statement of age and learning methods are shown in Table 4. Ranking number 1 most of the respondents agree with the statement that students should be aware of their suitable learning method at an early stage. It was followed by the statement increasing the chosen learning methods increase as age grows older. However, the least agreement is age affects the motivations for learning. It means that most of the respondents agree that motivation for learning is not affected by the age of the students,

Table 4: Mean and Ranking on the Statement of Age and Learning Methods

No.	Statement	Mean	Ranking
1.	Do you think it matters that student be aware of their suitable learning method at an early stage?	4.30	1
2.	Does your understanding of your chosen learning method increase as you grow older?	4.09	2

3.	Do you think age can influence one's exposure to various educational methods and environments?	4.06	3
4.	Do you agree educators should consider age when tailoring learning methods to students?	3.94	4
5.	Do you believe age affects your openness to trying new learning methods?	3.91	5
6.	Does your age affect your motivations for learning?	3.79	6

Influence of gender and learning methods: Table 5 shows the mean and ranking on the statement of gender and learning methods. The majority of the respondents agree that environment can influence the development of gender learning style. It was followed by the statement that gender is a factor that educational institutions should consider when designing curriculum content. The least agreement is on the statement of adopting learning methods based on gender. It indicated that gender was not the main factor that influenced the preferences for learning methods.

Table 5: Mean and Ranking on the Statement of Gender and Learning Methods

No.	Statement	Mean	Ranking
1.	Do you think environmental factors can influence the development of gender learning styles?	4.26	1
2.	Gender is a factor that educational institutions should consider when designing curriculum content	4.20	2
3.	Females tend to lean toward more verbal learning styles, while males might prefer more kinesthetic methods	4.19	3
4.	Do you think some gender-related stereotypes or expectations influence the choice of learning methods, particularly in education settings?	4.04	4
5.	Do you think that educational institutions should consider gender differences when designing and delivering learning materials and methods?	3.95	5
6.	I am more likely to seek out and adopt learning methods based on my gender	3.69	6

Cross Tabulation: The purpose of cross-tabulation is to compare two categories whether there are the same or different opinions. In this study, cross-tabulation was used to compare gender, age, and course based on their preferences in learning methods.

Table 6 compares the opinions between courses and their preferences for learning methods. It can be seen that Most of the courses prefer the visual learning method except the Faculty of Accountancy which prefers the Reading learning method. The Faculty of Graphic Design has almost equal numbers on Visual and Kinesthetic. It was understood that the Faculty of Graphic Design utilizes more hands-on activities like drawing and sketching. BA241 refers to Bachelor of Business Administrative Insurance, AC220 is Bachelor of Accountancy, CAAD241 is Bachelor of Graphic Design and HS240 is Bachelor of Nursing.

Table 6: Cross-Tabulation of Course and Preferences of Learning Method

Count

		What is your preferred learning style?				
		VISUAL	AUDITORY	READING	KINESTHETIC	Total
Course	BA241	41	36	14	11	102
	AC220	10	6	53	36	105
	CAAD241	45	2	1	42	90
	HS240	36	1	4	3	44
Total		132	45	72	92	341

The comparison between age and preferences of learning method is shown in Table 7. It shows different types of ages prefer different types of learning methods. Respondents aged below 20 prefer Reading, respondents between 21 and 25 years old prefer visual, and respondents above 26 years old prefer kinesthetic.

Table 7: Cross-Tabulation of Age and Preferences of Learning Method

Count

		What is your preferred learning style?				
		VISUAL	**AUDITORY**	**READING**	**KINESTHETIC**	**Total**
Age	BELOW 20	21	1	27	1	50
	21-25	106	43	42	66	257
	ABOVE 26	5	1	3	25	34
Total		132	45	72	92	341

The gender was tested whether they have different preferences for learning methods as shown in Table 8. Based on the table, it can be indicated that there are no differences between the genders in the preferences for learning methods. The majority of the respondents regardless the gender prefer the Visual learning method.

Table 8: Cross-Tabulation of Gender and Preferences of Learning Method

		What is your preferred learning style?				
		VISUAL	**AUDITORY**	**READING**	**KINESTHETIC**	Total
Gender	MALE	80	40	13	74	207
	FEMALE	52	5	59	18	134
Total		132	45	72	92	341

Regression Analysis: The purpose of regression analysis is to describe the relation between the variables. In this study, the researcher would like to know the relationship between course, gender, and age toward preferences of learning methods.

Table 9 shows the model summary which consists of an R square. It can be indicated that 88.1% of the variance in preferences of learning style is influenced by the course, age, and gender, while another 12.9% was influenced by other factors not included in this study.

Table 9: Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.939[a]	.881	.880	1.270

a. Predictors: (Constant), Learning_Style_Age, Learning_Style_Course, Learning_Style_Gender

Table 10 shows the ANOVA table which indicates that the sig value of 0.000 is less than the significance value of 0.05 and proves that the overall model is valid.

Table 10: Analysis of Variance (ANOVA)

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	4038.409	3	1346.136	833.999	.000[b]
	Residual	543.943	337	1.614		
	Total	4582.352	340			

a. Dependent Variable: Preferences_Learning_Style

b. Predictors: (Constant), Learning_Style_Age, Learning_Style_Course, Learning_Style_Gender

Table 11 is the coefficient of the independent variable towards the dependent variable. Overall, course and gender are significant variables since the sig value is 0.000 less than a significant value of 0.05. Meanwhile, age is not significant since the sig. value is 0.945 more than the significant value of 0.05. The standardized coefficients show that the course has the highest influence on the preferences of learning method followed by gender and age.

Table 11: Coefficients of the Variable

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.330	.438		-.754	.451
	Learning_Style_Course	.384	.025	.689	15.134	.000
	Learning_Style_Gender	.210	.036	.269	5.886	.000
	Learning_Style_Age	.002	.031	.003	.070	.945

a. Dependent Variable: Preferences_Learning_Style

Correlation Analysis: The correlation table shows the linear relationship between the variables. According to Hair (2010), the indication of a correlation coefficient value of more than 0.90 is a very high positive/negative correlation, while a value between 0.70 and 0.90 indicates a high positive/negative correlation. From Table 12, it can be indicated that there is a very high positive correlation between course and preferences of learning methods. Meanwhile, gender and age have a high positive correlation toward preferences for learning methods.

Table 12: Correlations of the Variable

		Preferences_Learning_Style	Learning_Style_Course	Learning_Style_Gender	Learning_Style_Age
Preferences_Learning_Style	Pearson Correlation	1	.931**	.886**	.825**
	Sig. (2-tailed)		.000	.000	.000
	N	341	341	341	341
Learning_Style_Course	Pearson Correlation	.931**	1	.894**	.859**
	Sig. (2-tailed)	.000		.000	.000
	N	341	341	341	341
Learning_Style_Gender	Pearson Correlation	.886**	.894**	1	.859**
	Sig. (2-tailed)	.000	.000		.000
	N	341	341	341	341
Learning_Style_Age	Pearson Correlation	.825**	.859**	.859**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	341	341	341	341

Discussion

The objective of this study is to investigate the relationship between course, age, and gender towards preferences of learning methods. The findings have revealed that Course and gender are significant variables in the preferences of learning methods, while age is not a significant variable. It is supported by Mahmud et al., (2019) that gender has different preferences for learning methods. Mkonto (2015) also mentions that different learning methods depend on the nature of the disciplines in which the students registered. Morin (2019) findings suggest that the ability to acquire knowledge incidentally about configural response relationships is largely unaffected by cognitive aging. This statement supported that age does not influence the preferences of learning methods. Thus, for the hypotheses, H1 and H2 are accepted while H3 is rejected (see Table 13). The

H3 is rejected due to the insignificant value between student's age and preferences of learning methods. Overall, the model is valid and significant, and there is a very high positive correlation between course and preferences of learning methods, while gender and age have a high positive correlation toward preferences of learning methods. It can be concluded that the course has the highest influence on preferences for learning methods as compared to other variables (age and gender).

Table 13: Hypothesis and Decision

Hypothesis	Decision
H1: There is a relationship between course and preferences in learning methods	Accepted
H2: There is a relationship between gender and preferences in learning methods	Accepted
H3: There is a relation between students' age on preferences of learning methods.	Rejected

5. Managerial Implications and Recommendations

Knowing individuals' preferences for learning methods could enhance the students' understanding of the subjects and therefore improve their academic performance overall. Educators shall also tailor the lecture based on the preferences of learning methods based on their courses and gender. For future recommendations, it is essential to have technology integration during the era of Artificial Intelligence in education. It should be followed simultaneously with the preferences of learning methods for each student. Chen (2023) in the writing has mentioned that Artificial Intelligence (AI) will transform teaching and learning. It can be done through simulating the students, real-time feedback and suggestions, post-teaching feedback, and refreshing expertise.

Conclusion

The objective of this paper was to investigate the relationship between course, age, and gender towards their preferences of learning methods. The learning methods are based on the VARK model, which is Visual, Audio, Reading, and Kinesthetic. Overall, the objective of the study is achieved and there is proven statistical evidence to show the relationship between the variables. In conclusion, each of the students has their preferred learning methods and it is mainly based on the courses they take and gender. It also can be indicated that age does not influence student preferences for learning methods.

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