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Impact of Learning Styles on Students' Retention of Information

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Abstract: This study investigates the impact of Visual, Auditory, and Kinesthetic (VAK) teaching methods on student retention within the context of China's evolving educational landscape. Acknowledging the country's significant strides in educational reforms and technological integration, the research aims to empirically determine the effectiveness of these teaching methodologies have on enhancing student engagement and information retention. The study is of critical importance as it seeks to inform educational practices and policies, with the goal of improving instructional strategies to align with diverse learning preferences. The research fills a notable gap in the empirical literature regarding the comparative impact of VAK methods on student retention in China, where traditional lecture-based methods are still predominantly employed. Findings from this study could influence teacher training programs and contribute to the development of a more inclusive educational system that caters to the varied learning styles of students. Through a synthesis of existing literature and the researcher's observations of differing engagement and retention rates with traditional versus varied teaching methods, the study provides valuable insights into the potential benefits of integrating visual, auditory, and kinesthetic elements into teaching practice. The research aligns with a body of studies that have demonstrated the effectiveness of VAK methods in enhancing learning outcomes, although it acknowledges the variability in outcomes based on context, subject matter, and individual learner differences. This paper also recognizes the importance of ongoing assessment and customization of teaching strategies to meet the specific needs of students in diverse educational settings.

Keywords: VAK Methods; Teacher Training Programs; Student Engagement.

1. Introduction

In recent years, the educational landscape in China has undergone significant transformation. Technological advancements, educational reforms, and a growing emphasis on student-centered learning approaches have driven this change. As part of this evolution, there has been a marked increase in the adoption of diverse teaching methodologies aimed at catering to the varied learning preferences of students. Among these methodologies, Visual, Auditory, and Kinesthetic (VAK) teaching methods have gained prominence for their potential to enhance student engagement and information retention. Understanding the impact of these teaching methods on student retention is crucial for educators who aim to optimize learning outcomes and tailor instruction to meet the needs of diverse learners.

This study is of paramount importance as it seeks to provide empirical evidence on the effectiveness of different teaching methods in enhancing student retention. The insights gained from this research can significantly inform educational practices and policies, leading to improved instructional strategies that are more aligned with students' learning preferences. In a rapidly changing educational environment, where the goal is to equip students with the skills and knowledge necessary for future success, understanding how different teaching methods affect retention can lead to more effective teaching and learning experiences.

Moreover, the findings of this study have the potential to influence teacher training programs, helping educators to develop a repertoire of teaching strategies that cater to visual, auditory, and kinesthetic learners. This is particularly relevant in the context of China's ongoing educational reforms, which emphasize the need for innovative teaching practices that can enhance student engagement and achievement. By identifying the most effective teaching methods for student retention, this study can contribute to the development of a more inclusive and effective educational system.

Despite the increasing interest in diversified teaching methods, there remains a notable gap in empirical research focused on the comparative impact of visual, auditory, and kinesthetic teaching methods on student retention in China. The researcher's observations and experiences indicate that many educators still predominantly rely on traditional lecture-based teaching methods. This reliance may limit students' engagement and retention of the material, as it does not fully cater to the diverse learning preferences of students.

The researcher observed a significant discrepancy in student engagement and retention rates during classroom teaching sessions. In a particular instance, while teaching a complex scientific concept through traditional lecture methods, it became evident that many students struggled to retain the information. Observing their disengagement and poor recall during assessments highlighted the limitations of a one-size-fits-all teaching approach.

In contrast, during a later session where the same concept was taught using a combination of visual aids such as diagrams and videos, auditory tools like recorded explanations, and kinesthetic activities involving hands-on experiments, there was a noticeable improvement in student engagement and retention. Students were more actively involved in the learning process, and their performance in subsequent assessments was significantly better.

This observation led the researcher to question the effectiveness of traditional teaching methods and sparked an interest in systematically investigating the impact of visual, auditory, and kinesthetic teaching methods on student

retention. The apparent benefits observed through the use of varied teaching methods underscored the need for empirical research to determine which methods are most effective in enhancing student retention.

This study aims to fill the existing research gap by systematically investigating the impact of visual, auditory, and kinesthetic teaching methods on student retention. By doing so, it seeks to provide valuable insights that can inform educational practices and policies, ultimately leading to improved learning outcomes for students across China.

Teaching methods play a crucial role in student retention, which is the ability of students to retain and recall information over time. Among various pedagogical approaches, visual, auditory, and kinesthetic (VAK) methods cater to different learning styles, enhancing engagement and retention by aligning teaching strategies with students' preferred modes of learning.

2. Statement of the Problem

This study aims to answer the following questions:

(1)What is the profile of the student respondents in terms of:

1)Age

2)Sex

3)Grade/ Year Level?

(2)What is the assessment of student respondents on their learning styles in terms of in terms of:

1)visual learning styles

2)auditory learning styles

3)kinesthetic learning styles

(3)Is there a significant difference in the assessment of student respondents on their learning styles when their profile is taken as a test factor?

(4)What is the assessment of student respondents on their retention in terms of:

1)short-term memory

2)long-term memory

(5)Is there a significant difference in the assessment of student respondents on their retention when their profile is taken as a test factor?

(6)Is there a significant relationship between learning styles and student retention?

(7)Do visual, auditory and kinesthetic teaching styles impact or influence singly or in combination student retention?

(8)According to the results of the study, what Multi-Sensory Learning Enhancement can be proposed?

3. Research Design

This study adopts a descriptive comparative correlational quantitative research design to explore the effectiveness of visual, auditory, and kinesthetic teaching methods on student retention.

The descriptive approach aims to provide a detailed account of how these teaching methods are used in educational settings. By systematically documenting their application, clarity, frequency, interaction, and relevance, the study can establish a comprehensive understanding of their implementation in classrooms. This approach helps highlight patterns and trends, offering valuable insights into the use of multi-sensory teaching methods.

The comparative aspect involves examining differences in student retention outcomes across the three teaching methods. By comparing visual, auditory, and kinesthetic methods, the study seeks to identify which teaching strategy is most effective in enhancing student retention. This approach is essential to determine the relative strengths and weaknesses of each method, helping educators choose the best strategies for their students.

The correlational component examines the relationship between the use of these teaching methods and various student retention outcomes, such as memory recall, long-term retention, understanding and application, engagement and interest, and academic performance. This approach helps identify the strength and direction of these relationships, providing a deeper understanding of how different teaching methods influence learning outcomes.

4. Results and Discussion

Table 1. Demographic Profile of the Teacher-Respondents

Demographic Profile	Categories	Frequency	Percentage
Age	12-13 years old	100	26.2%
	14-15 years old	106	27.8%
	16 years old and above	175	45.9%
	Total	381	100.0%
Sex	Male	194	50.9%
	Female	187	49.1%
	Total	381	100.0%
Grade Level	7th Grade	72	18.9%
	8th Grade	88	23.1%
	9th Grade	51	13.4%
	10th Grade	49	12.9%
	11th Grade	61	16.0%
	12th Grade	60	15.7%
	Total	381	100.0%

Table 1 presents a detailed demographic profile of the teacher-respondents, illustrating their distribution across different age groups, sex, and grade levels. The table first categorizes respondents by age, with the largest group, representing 45.9%, being 16 years old and above (175 respondents). The next largest age group is 14-15 years, comprising 27.8% (106 respondents), followed by the youngest group, aged 12-13 years, which accounts for 26.2% (100 respondents). This distribution indicates a notable concentration of older respondents, aged 16 and above.

In terms of sex distribution, the respondents are nearly balanced, with males slightly outnumbering females. Males constitute 50.9% of the sample (194 respondents), while females make up 49.1% (187 respondents), reflecting an almost even split in gender representation among the respondents.

The grade level of respondents spans from 7th to 12th grade, showing a broad range across secondary education. The 8th grade has the highest representation with 23.1% (88 respondents), followed by 7th grade with 18.9% (72 respondents). Other grade levels are fairly evenly distributed, with 11th grade and 12th grade representing 16.0% (61 respondents) and 15.7% (60 respondents), respectively. The lowest representation is found in 9th grade with 13.4% (51 respondents) and 10th grade with 12.9% (49 respondents). This grade-level distribution suggests a diverse sample across different stages of secondary education, although the highest concentrations are found in the middle grades (8th and 7th).

Overall, the table provides a comprehensive demographic snapshot of the teacher-respondents, highlighting variations in age, sex, and grade level across a total sample size of 381

individuals.

Table 2. Assessment of Learning Styles – Visual Learning Styles

Indicators	Mean	SD	Interpretation	Rank
I know the use of diagrams and charts helps me understand the lessons better.	2.86	1.04	Highly Evident	1
I like visual aids, such as pictures and videos, clarify complex ideas.	2.80	1.06	Highly Evident	3
I like when diagrams and visual presentations are used in class.	2.79	1.04	Highly Evident	4
I often interact with visual aids, like drawing or labeling diagrams, during lessons.	2.77	1.13	Highly Evident	5
I understand information using different aids such as patterns and shapes.	2.82	1.12	Highly Evident	2
Visual Learning Styles	2.81	0.87	Highly Evident	1

Scale: 1-1.50: Not at All Evident; 1.51-2.50: Not Quite Evident; 2.51-3.50: Highly Evident 3.51-4.00: Very Highly Evident.

Table 2 presents an assessment of learning styles focused on visual learning preferences among respondents. The indicators in this table evaluate various aspects of visual learning, including the effectiveness of diagrams, charts, and visual aids in enhancing comprehension and engagement with the material.

The highest-ranked indicator, with a mean of 2.86 and a standard deviation of 1.04, suggests that the respondents strongly believe that diagrams and charts facilitate a better understanding of lessons. This is closely followed by their preference for using various aids, such as patterns and shapes, to understand information, which has a mean of 2.82 and a standard deviation of 1.12, placing it second in the ranking.

Another significant preference is for visual aids, like pictures and videos, to clarify complex ideas, with a mean score of 2.80 and a standard deviation of 1.06, ranking third. This is slightly above the respondents' appreciation for diagrams and visual presentations used in class, which scored a mean of 2.79 and a standard deviation of 1.04, ranking fourth. Finally, the indicator about interacting with visual aids, such as drawing or labeling diagrams during lessons, ranked fifth, with a mean of 2.77 and a standard deviation of 1.13, indicating a consistent but slightly lesser engagement in interactive visual activities.

The overall mean score for visual learning styles is 2.81, with a standard deviation of 0.87, interpreted as "Highly Evident." This suggests a clear inclination among respondents towards visual learning, as they find these tools beneficial for understanding and engaging with the educational material. The consistent high ranking of all indicators underscores the importance of incorporating visual aids in the learning environment to accommodate the preferences of these students.

Table 3. Assessment of Learning Styles – Auditory Learning Styles

Indicators	Mean	SD	Interpretation	Rank
I like audio recordings can enhance my comprehension of the topics.	2.79	1.05	Highly Evident	5
I prefer when the teacher explanations during lectures are easy to understand.	2.96	0.98	Highly Evident	1
I enjoy lessons consistently include a variety of sensory methods especially using sounds.	2.81	1.08	Highly Evident	4
I know classroom discussions and verbal interactions enhance my learning.	2.86	1.05	Highly Evident	2
I prefer listening to the teacher giving information.	2.82	1.09	Highly Evident	3
I understand the lesson well when I talk it out with my classmates.	2.79	1.05	Highly Evident	6
I prefer listening to a lecture.	2.77	1.04	Highly Evident	7
Auditory Learning Styles	2.83	0.81	Highly Evident	-

Scale: 1-1.50: Not at All Evident; 1.51-2.50: Not Quite Evident; 2.51-3.50: Highly Evident 3.51-4.00: Very Highly Evident.

Table 3 provides an assessment of learning styles with a focus on auditory learning preferences among respondents. The indicators evaluate various aspects of auditory learning, such as the effectiveness of audio recordings, teacher explanations, and verbal interactions in enhancing comprehension and engagement.

The highest-ranked indicator, with a mean score of 2.96 and a standard deviation of 0.98, reveals that respondents highly value clear teacher explanations during lectures, suggesting that comprehensible verbal instruction is critical to their learning experience. This is followed by an appreciation for classroom discussions and verbal interactions, which respondents believe enhance their learning, with a mean score of 2.86 and a standard deviation of 1.05, ranking second in importance.

Another significant preference includes listening to the teacher for information, which ranks third with a mean of 2.82 and a standard deviation of 1.09. This is closely followed by an interest in lessons that incorporate a variety of sensory methods, especially those using sounds, with a mean of 2.81 and a standard deviation of 1.08, ranking fourth. Audio recordings, which enhance comprehension of topics, have a mean score of 2.79 and a standard deviation of 1.05, placing them fifth in the ranking.

The indicators further reveal that respondents benefit from talking out lessons with classmates, which also scored a mean of 2.79 (SD=1.05), ranking sixth. The lowest-ranked preference is listening to a lecture, with a mean of 2.77 and a standard deviation of 1.04, suggesting that while students favor auditory engagement, passive listening might be slightly less impactful than other auditory methods.

Overall, the auditory learning styles mean score is 2.83, with a standard deviation of 0.81, which is interpreted as "Highly Evident." This high overall score indicates a strong preference among respondents for auditory learning methods, emphasizing the importance of verbal clarity, interactive discussions, and sensory engagement in supporting their learning. The consistent high ranking of these indicators underscores the need for incorporating varied auditory tools and methods to align with these learners' preferences.

Table 4. Assessment of Learning Styles – Kinesthetic Learning Style

Indicators	Mean	SD	Interpretation	Rank
I like hands-on activities, like experiments and projects, make learning more engaging.	2.82	1.08	Highly Evident	2
I like interactive activities, including discussions and physical tasks, improve my understanding.	2.86	1.08	Highly Evident	1
I like when hands-on materials and tools provided in class.	2.78	1.11	Highly Evident	6
I like hands-on activities in lessons.	2.76	1.08	Highly Evident	7
I know physical activities and experiments make lessons more engaging.	2.75	1.12	Highly Evident	8
I prefer interactive lessons, and it keeps more me interested.	2.79	1.06	Highly Evident	5
I prefer explaining a scientific process, using a flow chart.	2.68	1.10	Highly Evident	9
I like learning by doing.	2.81	1.09	Highly Evident	4
I take notes in order to interact with and process information.	2.82	1.06	Highly Evident	3
Kinesthetic Learning Style	2.79	0.84	Highly Evident	-

Scale: 1-1.50: Not at All Evident; 1.51-2.50: Not Quite Evident; 2.51-3.50: Highly Evident 3.51-4.00: Very Highly Evident.

Table 4 presents an assessment of learning styles, specifically focused on kinesthetic preferences among respondents. The indicators measure various aspects of kinesthetic learning, including the preference for hands-on activities, interactive tasks, and physical engagement in the learning process.

The highest-ranked indicator, with a mean score of 2.86 and a standard deviation of 1.08, indicates that respondents strongly favor interactive activities, including discussions and physical tasks, as these enhance their understanding of the subject matter. Following closely is the preference for engaging in hands-on activities, such as experiments and projects, with a mean of 2.82 and a standard deviation of 1.08, ranking second. This suggests that respondents find such activities particularly engaging.

Respondents also show a preference for taking notes as a way to interact with and process information, which is ranked third with a mean score of 2.82 and a standard deviation of 1.06. Learning by doing, with a mean of 2.81 and a standard deviation of 1.09, ranks fourth, underscoring the value of experiential learning methods. The indicator related to maintaining interest through interactive lessons has a mean of 2.79 and a standard deviation of 1.06, ranking fifth, reflecting the importance of lesson interactivity.

Other indicators reveal that respondents appreciate when hands-on materials and tools are provided in class (mean of 2.78, SD=1.11, ranked sixth) and enjoy hands-on activities embedded in lessons (mean of 2.76, SD=1.08, ranked seventh). Additionally, physical activities and experiments that make lessons more engaging have a mean of 2.75 and a standard deviation of 1.12, placing them in the eighth position. The lowest-ranked indicator is the preference for explaining scientific processes through flow charts, with a mean of 2.68 and a standard deviation of 1.10, which suggests a lesser but still evident interest in structured, diagrammatic explanations within a kinesthetic learning context.

The overall mean score for kinesthetic learning style is 2.79, with a standard deviation of 0.84, interpreted as "Highly Evident." This result highlights a clear preference for kinesthetic learning among respondents, indicating that they thrive in environments that incorporate physical engagement, hands-on activities, and interactive lessons. The consistent high ranking of indicators related to physical involvement reinforces the need for incorporating kinesthetic learning strategies to enhance students' learning experiences.

Table 5. Summary of Assessed Learning Styles

Indicators	Mean	SD	Interpretation	Rank
Visual Learning Styles	2.81	0.87	Highly Evident	2.5
Auditory Learning Styles	2.83	0.81	Highly Evident	1
Kinesthetic Learning Style	2.79	0.84	Highly Evident	4
Learning Styles	2.81	0.81	Highly Evident	2.5

Scale: 1-1.50: Not at All Evident; 1.51-2.50: Not Quite Evident; 2.51-3.50: Highly Evident 3.51-4.00: Very Highly Evident.

Table 5 provides a summary of the assessed learning styles among respondents, including visual, auditory, and kinesthetic preferences. The table organizes each learning style by mean scores, standard deviations, interpretations, and ranks based on the extent to which each style is evident among respondents.

Auditory learning styles top the list with the highest mean score of 2.83 and a standard deviation of 0.81, interpreted as "Highly Evident." This indicates a strong preference for auditory methods among the respondents, such as listening to explanations, engaging in discussions, and using audio aids to enhance comprehension. The high rank of auditory learning style underscores the importance of verbal and auditory engagement in supporting students' learning experiences.

Visual and kinesthetic learning styles follow closely with mean scores of 2.81 and 2.79, respectively. Visual learning, with a standard deviation of 0.87, is also interpreted as "Highly Evident" and ranks in shared second place with the general learning styles category. This reflects a substantial preference for visual aids like diagrams, charts, and images that facilitate understanding and engagement. Kinesthetic learning styles, with a standard deviation of 0.84, also receive a "Highly Evident" interpretation but are ranked fourth. This finding highlights that, while important, kinesthetic preferences are slightly less dominant compared to auditory and visual styles. The kinesthetic style's emphasis on hands-on activities, physical interaction, and experiential learning still remains essential to accommodate varied learning preferences.

The overall mean score for learning styles is also 2.81 with a standard deviation of 0.81, suggesting that students exhibit a "Highly Evident" preference for all learning styles combined, but with slight variations in priority. This balanced approach indicates the value of a multimodal teaching strategy that incorporates auditory, visual, and kinesthetic elements to address the diverse learning preferences of

students. The ranking further emphasizes that auditory methods might be particularly effective, but all styles are vital to create a comprehensive and engaging learning environment.

5. Conclusion

(1) Profile of the Student Respondents:

The student respondents in this study were distributed across various age groups, with a significant concentration of older students. The sample was almost equally divided between males and females, providing a balanced gender representation. Grade levels ranged from 7th to 12th grade, covering a broad spectrum of educational stages and with a notable representation in middle-grade levels.

(2) Assessment of Student Respondents on Their Learning Styles:

Visual learning styles were found to be highly evident among students, indicating a clear preference for visual aids such as diagrams, charts, and illustrations, which enhance comprehension and engagement. Auditory learning was the most preferred style overall, reflecting students' appreciation for clear verbal explanations, discussions, and interactions that support their learning. Kinesthetic learning also emerged as highly evident, underscoring the value students place on hands-on activities, interactive tasks, and physical engagement in fostering understanding and retention.

Significant Differences in Learning Styles Based on Profile: Learning style preferences did not vary significantly across age groups, suggesting that preferences for visual, auditory, and kinesthetic methods remain consistent regardless of age. However, a notable difference was observed between males and females, with males showing a stronger inclination towards all three learning styles, suggesting that gender may influence learning preferences. No significant differences in preferences were found based on grade level, indicating stability in learning style preferences across educational stages.

(3) Assessment of Student Respondents on Their Retention:

Students demonstrated strong short-term memory retention, with an evident ability to retain and recall information shortly after learning. Long-term memory retention was also solid, as students expressed confidence in their ability to remember and recall information over extended periods.

Significant Differences in Retention Based on Profile: Retention abilities did not vary significantly with age, indicating consistent retention skills across age groups. No significant differences in retention were found between males and females, suggesting comparable retention capabilities across genders. Similarly, no notable variations in retention abilities were observed across grade levels, indicating that retention skills are stable across educational stages.

(4) Relationship Between Learning Styles and Student Retention:

Moderate, positive correlations were observed between all learning styles (visual, auditory, and kinesthetic) and both short-term and long-term memory retention, indicating that each learning style positively influences retention. These results suggest that a multi-sensory approach incorporating visual, auditory, and kinesthetic methods can enhance overall retention, contributing to a more effective learning experience.

(5) Impact of Visual, Auditory, and Kinesthetic Teaching Styles on Student Retention:

Each teaching style-visual, auditory, and kinesthetic-demonstrated a significant positive impact on student retention, both individually and when combined. This underscores the importance of incorporating diverse sensory approaches in teaching, as multi-sensory strategies are shown to foster improved short-term and long-term retention, ultimately leading to more effective learning outcomes.

6. Recommendations

(1) Enhance Engagement with Multi-Sensory Teaching Approaches: Since all three learning styles-visual, auditory, and kinesthetic-were shown to positively impact student retention, educators are encouraged to adopt a balanced, multi-sensory approach in their teaching practices. By integrating visual aids, auditory explanations, and hands-on activities, teachers can address the varied preferences of students, thereby improving both short-term and long-term retention. Schools could provide training for teachers on incorporating multi-sensory techniques effectively, ensuring that all students have access to an engaging and inclusive learning environment.

(2) Increase Focus on Kinesthetic Learning Activities: Although kinesthetic learning was rated as highly evident, it was the least preferred among the three styles. To enhance engagement in kinesthetic activities, schools could invest in resources that support interactive learning, such as laboratory equipment, manipulatives, and technology for virtual simulations. Teachers could also incorporate more physical engagement in lessons, such as experiments, role-plays, or interactive group activities, especially for concepts that can benefit from experiential learning.

(3) Address Gender-Based Differences in Learning Preferences: The data indicated that males showed a stronger preference for all three learning styles compared to females. This suggests a need to examine the teaching methods further to ensure that both genders find the learning environment engaging. Educators might consider conducting classroom assessments or surveys to identify specific strategies that resonate with both male and female students. Developing gender-sensitive teaching practices can help create a more inclusive learning experience that meets the needs of all students.

(4) Design and Structure Lessons to Support Long-Term Retention: While students generally exhibited confidence in their long-term memory retention, further improvement is possible. Lesson structures could be designed to reinforce long-term retention by incorporating spaced repetition, regular reviews of previous material, and cumulative assessments. Teachers could also use activities that connect new material to previously learned concepts, aiding in the consolidation of knowledge over time.

(5) Encourage Collaboration and Classroom Discussion for Auditory Learners: Auditory learning styles received the highest preference among respondents, emphasizing the value of verbal instruction and discussions. Teachers are encouraged to incorporate more collaborative group work, classroom discussions, and Q&A sessions, which can enhance auditory learners' engagement. Training teachers to use questioning techniques and active listening strategies can further support auditory learners and foster a more interactive classroom environment.

(6) Implement Age-Appropriate Learning Tools and Resources: Although learning preferences were stable across age groups, teachers should consider the developmental stages of their students when selecting teaching tools and materials. Younger students may benefit from more interactive and engaging visual aids, while older students

could benefit from materials that facilitate critical thinking and practical application. Tailoring resources to developmental levels can maximize the effectiveness of each learning style for different age groups.

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