

RELATIONSHIP BETWEEN AUDIO LEARNING STYLE, KINESTHETIC LEARNING STYLE AND ACADEMIC ACHIEVEMENT OF SECONDARY SCHOOL STUDENTS IN KAMWENGE DISTRICT, UGANDA. A CROSS-SECTIONAL STUDY.

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ABSTRACT

Background

The qualities, actions, and preferred methods by which people receive and process information are referred to as learning styles. The study aims to assess the relationship between audio learning style, kinesthetic learning style, and academic achievement of secondary school students in Kamwenge district, Uganda.

Methodology

This study employed a descriptive, correlational, and cross-sectional survey design. The quantitative technique provided a detailed numerical analysis of the research problem and investigated the relationship between the research variables. Respondents comprised of 265 students (s4), 58 teachers, 04 head teachers, and 05 Education administrators within Kamwenge District.

Results

The correlation between audio learning styles and academic achievements was 0.411. While this correlation is not as strong as that observed for accommodating learning styles, it is still statistically significant ($p < 0.05$). The correlation between kinesthetic learning styles and academic achievements among secondary students in Kamwenge District coefficient was 0.671. The coefficient for audio learning style (B1) is 0.214, indicating a smaller effect compared to accommodating learning style. The R Square value of 0.13 suggests that approximately 13% of the variance in academic achievements can be explained by the audio learning style in this model. The coefficient for kinesthetic learning style (B1) is 0.313, indicating a substantial effect on academic achievements. The R Square value of 0.781 suggests that approximately 78.1% of the variance in academic achievements can be explained by kinesthetic learning style in this model.

Conclusion

kinesthetic learning style appears to have the most substantial impact on academic achievements, followed by accommodating learning style and then audio learning style.

Recommendations

Teachers should provide professional development opportunities for teachers to enhance their understanding of different learning styles and strategies for accommodating them in the classroom.

Keywords: Audio learning style, Kinesthetic learning style, Academic Achievement, Secondary school students Kamwenge district

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BACKGROUND

Different teaching techniques have also become an issue in students' learning. Students get bored in some subjects, they think it is more on memorizing dates and names; they lack knowing what the real essence of the subject is (Nurhayati & Penna, 2023). Students' academic success is influenced by their learning styles, choosing the right learning styles that are used in the subject can help to improve student

performance (Wanjala, Wambugu, Orora, & -, 2023). The qualities, actions, and preferred methods by which people receive and process information are referred to as learning styles. Students in secondary schools have free-will learning styles that can help them achieve the best learning outcomes (Johnson, 2014). Therefore, the learning styles in secondary influence the academic achievements of secondary schools. Humanism theory suggests that students have different learning styles, such as auditory, visual, kinesthetic, or a

combination of these, and they learn best when the teaching methods and materials align with their style (Purswell, 2019). For example, an auditory learner may benefit from listening to lectures or participating in discussions, while a visual learner may prefer to see diagrams, charts, or PowerPoint presentations, and a kinesthetic learner may learn effectively through hands-on activities or experiential learning (Javadi & Tahmasbi, 2020). Students feel empowered and valued By considering and accommodating their learning styles, which enhances their self-esteem and confidence (Juita & Yusmaridi, 2021). This positive psychological state enables them to embrace challenges, take risks, and persist in their academic pursuits, ultimately contributing to their success and achievements. The study aims to assess the relationship between audio learning style, kinesthetic learning style, and academic achievement of secondary school students in Kamwenge district, Uganda.

METHODOLOGY

Research design

This study employed a descriptive, correlational, and cross-sectional survey design. The quantitative technique provided a detailed numerical analysis of the research problem. It investigated the relationship between the research variables.

STUDY POPULATION

The target population of the study was 332 participants. These comprised 265 students (s4), 58 teachers, 04 head teachers, and 05 Education administrators within Kamwenge District (DEO, DIS) (Kamwenge Education Department, 2022).

Geographical scope

The study was conducted in the Kamwenge district. Kamwenge District is bordered by Kyenjojo District to the north, Kyegegwa District and Kiruhura District to the northeast, Ibanda District to the east and southeast, Kitagwenda District to the south, Kasese District to the west Bunyangabu District and Kabarole District to the northwest. The study specifically collected data from St Peter Claver SS, Kaberebere, Rwamwanja SS, Bwizi Seed School, and Kabambiro SS. These schools were selected due to low grades in the Uganda Certificate of Education.

Time scope

The study used related information for the past 5 years from 2020 to 2024. Further, the researcher collected information for one month and the study generally took 8 months.

Sample Size

A sample size of 178 was selected from the population of 332 participants using Kreijcie & Morgan's (1970) table of determining sample size as shown in Table 1

Table 1: Sample size, Sampling techniques & target population

Participants	Population Target	Sample Size	Selection Technique
District Education Administrators	05	05	Purposive sampling
Headteachers	04	04	Purposive sampling
Teachers	58	48	Simple random sampling
Students(s4)	265	121	Simple random sampling
Total	332	178	

Source: Kamwenge District Education Department (2022)

Sampling Techniques Procedure

The study used a purposive sampling technique and a simple random sampling technique to arrive at the sample size. Simple random sampling was used to select teachers and senior four students who participated in this study. The method was used to eliminate bias. Purposive Sampling was used to select head teachers and District Education Administrators as key respondents which will help in identifying teachers and students to participate in the study and ensure that only the useful (teachers and students) are selected and it also saves time.

Data Sources

Data was selected from both primary and secondary sources. Primary data was obtained by use of questionnaires and scheduled interviews to look for information about the study directly from the field by the Researcher. Secondary data was collected from academic reports of the selected secondary schools, library, internet research, newspapers, and written literature by earlier scholars on the study topic.

Data Collection Instruments

Three research instruments were used in conducting the study. The instruments were questionnaires, an interview guide, and a documentary review checklist.

The questionnaire was the main instrument and the interview guide was used to gain an in-depth understanding of the subject and the interface with the respondents. Documentary review checklists were intended to obtain a framework for the interpretation of the findings to arrive at realistic conclusions and recommendations.

Questionnaires

Questionnaires were sent to respondents to obtain primary data. This made it more convenient and easier to collect data from respondents with busy schedules ie teachers and students as they answered the questions at leisure while consulting documents, the instrument also ensured a high response rate and elicited the required information on a wide range of issues on the study topic. Closed-ended questions using Likert scales were used to enhance the simplicity of straightforward questions.

Interview guides

An interview method was used to secure in-depth of information from the interviewees by the researcher. A probe with additional questions and gathering supplemental information enabled the researcher to cross-check the accuracy of the data collected as recommended by Sekaran (2004). The interviews were conducted for about 10 minutes on average among the head teachers and administrators within the district. They were mainly conducted using face-to-face techniques but when respondents were busy; the researcher used telephone calls to obtain clarity on certain issues.

Documentary checklist

The study was conducted on a wide documentary review to help the researcher avoid unnecessary and unintentional duplication of studies and provide a framework within which the research findings were interpreted as stated by (Mugenda and Mugenda, 2003). Data gathered using this method was secondary data from a critical examination of public and private recorded information related to the issue under investigation. The documentary evidence method was used to get dependable data as it was permanent and reliable information. The researcher reviewed reports, plans, newspaper articles, and literature from the library together with other relevant written material on the study.

Data quality control

These were the steps and measures taken to ensure that the instruments used were good and clear enough to give the right findings of the study. To control the quality of the data, the researcher carried out validity and reliability tests of the instrument as reflected below.

Validity of instruments

According to Amin (2005), the validity of an instrument is when it measures what it is supposed to measure; that the data is collected honestly and accurately represents the respondents' opinions. The internal validity of the instrument was measured based Content Validity Index and a score above 0.70 was accepted. The validity of the questionnaire was determined by pre-testing the questions on a group of ten respondents who had expertise in the field of research but were out of the intended sample. They were required to fill out the questionnaires and comment on the clarity of the questions.

Structured interviews were used to overcome biases and the researcher pledged confidentiality of the information given by respondents. Content Validity was calculated using the formula below:

$$\text{Content Validity Index} = \frac{\text{Number of relevant questions}}{\text{Total number of items}} \quad (\text{Jachi \& Mandongwe})$$

Reliability of instruments

Reliability is the measure of the degree to which a research instrument yields consistent results if administered on different occasions. According to Amin (2005), reliability is dependability, trustworthiness, or the degree to which an instrument yields consistent results after repeated trials. The researcher administered the questionnaire to only target groups and was used for selective data which will only be relevant to the research objectives to minimize the errors and increase its reliability. A pretest was done whereby the research instruments used were tested with ten respondents to find out their accuracy and relevance to the research topic. Using Cronbach's Alpha (1951), as a measure of the reliability of the variables the following model

$$\text{will be utilized; } \alpha = K \left[\frac{\sum \sigma^2 k}{\sigma^2} \right]$$

Where;

α = Reliability, Alpha Coefficient (Cronbach)

K = Number of items in the instrument

$\sum \sigma^2 k$ = Variance of individual items

σ^2 = Variance of the total instrument

Data collection procedures

After obtaining an introductory letter, permission was sought from the relevant parties within the Kamwenge Education sector before starting to collect data collection. The researcher physically delivered questionnaires at respective secondary schools. Follow-ups on the respondents were made and the questionnaires.

Interviews were conducted to verify the data provided in the questionnaires. For procedures of obtaining secondary data, inquiries were made about access and availability of the information. A critical analysis of documents was made to squeeze out the required data.

Measurements of variables

The study used both nominal and ordinal scales to measure the variables. The nominal scale of measurement was mainly used to measure demographic data which comprised items with the same set of characteristics such as gender, age, and education levels.

The rest of the items in the questionnaire were measured using the ordinal scale in which the five-point Likert scale ranging from 5-strongly agree, 4-agree, 3-no sure, 2-disagree, and 1-strongly disagree were used to measure both the independent and dependent variables against each other.

Data Analysis

Data collected from the field was edited, coded, and later analyzed using the Statistical Package for Social Scientists (SPSS) version 17 computer program. Quantitative data was analyzed using tables, correlation analysis to show the relationships, and regression analysis to show the influence

of learning styles on the academic achievements of secondary school students.

Pearson's correlation coefficients (r) and level of significance (p) were used to test the hypotheses at 95 confidence levels in the correlation analysis. This involved running a correlation analysis allowing it to find any significant relationship at 2-tailed. The adjusted R^2 , t -value, β , and significance values were used to measure the influence of the independent variables on the dependent variable in the regression analysis.

Ethical considerations

An introductory letter from the School of Graduate Studies and Research of Team University that intended to introduce the researcher to the concerned authorities in the District was sought

Permission was solicited through a written request to the concerned officials in the selected secondary schools and the Kamwenge District Education Department.

Respondents were requested to sign the *Consent Form* if they were to participate in the study

Previous authors whose work was quoted in this study through citations and referencing were acknowledged

Confidentiality and anonymity of the information collected was held and the information given was used for academic purposes.

RESULTS

Response rate

The researcher issued 169 questionnaires and requested interviews from 9 participants for this study

Table 2: A response rate of the study

Participants	Issued questionnaires and requested interviews	Received questionnaires and conducted interviews	Response rate
District Education Administrators	05	4	80%
Headteachers	04	4	100%
Teachers	48	45	93.8%
Students(s4)	139	117	84.2%
Total	178	170	95.5%

Source: *Primary data (2024)*

Table 2, out of the 5 administrators who were requested for interviews, 4 responded, yielding an 80% response rate. This indicates a relatively good level of engagement from this group.

All 4 head teachers who were issued questionnaires and requested interviews responded, resulting in a 100%

response rate. This suggests a high level of cooperation and willingness to participate in this group.

Out of the 48 teachers who were issued questionnaires and requested interviews, 45 responded, yielding a response rate of 93.8%. This indicates a good overall response rate from the teachers, reflecting their engagement with the study.

Among the 139 students issued questionnaires and requested interviews, 117 responded, resulting in a response rate of 84.2%. While this is the lowest response rate among the participant groups, it still represents a substantial number of student responses.

Page | 5 The total response rate for the study was calculated to be 95.5%, which indicates that the majority of the participants engaged with the study by completing the questionnaires and interviews.

In conclusion, the findings of the study on learning styles and academic achievements of secondary students in

Kamwenge District suggest a high level of participation and engagement from the various participant groups, with particularly strong responses from head teachers and teachers. The response rates indicate a generally positive attitude towards the research topic and a willingness to contribute to the study's objectives. This level of participation will likely lead to a more comprehensive and reliable analysis of learning styles and academic achievements among secondary students in the district

Demographic characteristics of respondents

Table 3 Demographic characteristics of the respondents

Category of respondent	Frequency	Percentage
Gender		
Male	94	55.3%
Female	76	44.7%
Total	170	100%
Age Group		
15– 24 years (students)	117	68.8%
25-35 years (teachers & Administrators)	35	20.6%
36-50 years (head teachers and senior teachers)	16	9.4%
51 & above years (head teacher, District Education officer)	2	1.2%
Total	170	100%
Education level		
Secondary	117	68.8%
Diploma	28	16.8%
Degree	22	12.9%
Masters	3	1.8%
Total	170	100%
Preferred learning styles (students only)		
Accommodating learning style	38	32.5%
Audio learning style	25	21.4%
Kinesthetic learning style	54	46.1%
Total	117	100%

Source: Field data, 2024

Table 3, on the demographic characteristics of the respondents on gender distribution, the following were observed.

The study surveyed a total of 170 respondents, with 55.3% being male and 44.7% female. This indicates a relatively balanced gender distribution among the participants. Findings on age showed that the majority of respondents fall within the 15-24 years age group, comprising 68.8% of the total. This suggests that the study primarily focused on students at the secondary education level. Teachers and administrators in the 25-35 years age group made up 20.6% of the respondents, while head teachers and senior teachers

in the 36-50 years age group account for 9.4%. Those aged 51 and above represent a small percentage of 1.2%.

Further, findings on the education level showed that the majority of the respondents, comprising 68.8%, are currently in secondary education. This indicates that the study primarily focused on students at the secondary school level within Kamwenge District. A notable proportion of the respondents, accounting for 16.8%, have obtained a diploma qualification. This suggests that there is a significant representation of individuals with a diploma background within the study cohort.

Approximately 12.9% of the respondents hold a bachelor's degree. This indicates that there is a subset of participants who have completed undergraduate studies and could potentially include educators, administrators, or individuals with higher educational qualifications. A small percentage, specifically 1.8% of the respondents, has attained a master's degree. This suggests that there are a few individuals with postgraduate qualifications within the sample population.

Overall, the study findings reveal a mix of respondents with varying levels of education, with a significant focus on secondary education students. Understanding the educational backgrounds of the participants is essential for interpreting the study results and implications for educational practices and interventions in Kamwenge District. Further analysis could explore how the education level of respondents may influence their preferred learning styles and academic achievements, providing deeper insights into the educational landscape of the district. Findings on preferred learning styles were conducted on students only and findings indicated that

kinesthetic learning style was the most preferred (46.1%), followed by accommodating learning style (32.5%) and audio learning style (21.4%). This implies that a significant portion of students in Kamwenge District prefer a hands-on, tactile approach to learning, indicating a potential need for educators to incorporate more interactive and practical teaching methods.

In conclusion, the study focused on understanding the learning styles and preferences of secondary students in Kamwenge District. The findings suggest a diverse range of preferred learning styles among students, with a notable emphasis on kinesthetic learning. Educators and policymakers in the district could utilize this information to tailor teaching strategies and curriculum design to better accommodate the learning preferences of students, potentially leading to improved academic achievements.

Audio learning style and academic achievements of secondary students in Kamwenge District

Table 4: Audio learning style and academic achievements of secondary students in Kamwenge District

Statement	Mean	Std. Deviation
Students prefer verbal explanations, lectures, and discussions.	1.8	0.9
Students have strong listening skills and are attentive during lectures	4.1	0.8
Learners benefit from the repetition of verbal information	4.2	0.4
Learners prefer discussing topics or asking questions aloud.	4.5	0.9
Learners prefer explanations provided verbally	4.2	0.4
Students find it easier to absorb information through auditory channels.	4.8	0.2
Learners enjoy participating in group discussions	3.8	0.7
Learners prefer oral presentations	4.1	0.3
Learners study at their convenience time	2.4	0.2
Teachers capture learners' attention and maintain their interest in the subject matter.	3.8	0.4
The method allows learners to develop strong oral communication skills	4.6	0.2
Audio learning accommodates various learning environments	2.7	0.6

In Table 4, on the statement “Students prefer verbal explanations, lectures, and discussions”, the mean response was 1.8 with a standard deviation of 0.9. Therefore, students strongly disagree (1.8) that they prefer verbal explanations, lectures, and discussions. The high standard deviation indicates a significant variability in responses, suggesting that preferences vary among students. Contrary to expectations, students in Kamwenge District do not prefer verbal explanations, lectures, or discussions as a primary learning method.

On the statement “Students have strong listening skills and are attentive during lectures”, the mean response was 4.1 with a standard deviation of 0.8. Students strongly agree (4.1) that they have strong listening skills and are attentive during lectures. The standard deviation suggests relatively consistent agreement among students. Students in the district possess strong listening skills and are attentive during lectures, which is conducive to audio learning.

The statement “Learners benefit from repetition of verbal information” had a mean score of 4.2 with a standard deviation of 0.4. Students strongly agree (4.2) that they benefit from the repetition of verbal information. The low standard deviation indicates consistent agreement among students.

Repetition of verbal information is highly beneficial for learners in Kamwenge District, contributing to their academic achievements.

The statement “Learners prefer discussing topics or asking questions aloud” had a mean score of 4.5 with a standard deviation of 0.9. Students strongly agree (4.5) that they prefer discussing topics or asking questions aloud. The high standard deviation suggests some variability in preferences among students. Most students prefer active verbal engagement through discussions and asking questions aloud, indicating a preference for interactive learning.

The statement “Learners prefer explanations provided verbally” had a mean response of 4.2 and a standard deviation of 0.4. Students strongly agree (4.2) that they prefer explanations provided verbally. The low standard deviation suggests consistent agreement among students. Verbal explanations are preferred by learners in Kamwenge District, indicating a strong inclination towards auditory learning methods.

The statement “Students find it easier to absorb information through auditory channels” had a mean response of 4.8 and a deviation of 0.2. Students strongly agree (4.8) that they find it easier to absorb information through auditory channels. The low standard deviation indicates consistent agreement among students. Absorbing information through auditory channels is highly effective for students in the district, suggesting a strong preference for audio learning.

The statement “Learners enjoy participating in group discussions” had a mean score of 3.8 and a standard deviation of 0.7. Students tend to agree (3.8) that they enjoy participating in group discussions. The high standard deviation suggests variability in enjoyment levels among students. While there is general enjoyment in participating in group discussions, preferences vary among students in Kamwenge District.

The statement “Learners prefer oral presentations” had a mean score of 4.1 and a standard deviation of 0.3. Students strongly agree (4.1) that they prefer oral presentations. The low standard deviation suggests consistent agreement among students. Oral presentations are preferred by learners, indicating a preference for auditory learning methods that involve verbal communication.

The statement “Learners study at their convenient time” had a mean score of 2.4 and a standard deviation of 0.2. Students tend to disagree (2.4) that they study at their convenient time. The low standard deviation suggests consistent disagreement among students. Students in the district do not perceive studying at their convenience as a prevalent practice, indicating potential challenges in time management or access to resources.

The statement “Teachers capture learners' attention and maintain their interest in the subject matter” had a mean score of 3.8 and a standard deviation of 0.4. Students tend to agree (3.8) that teachers capture their attention and maintain their interest in the subject matter. The moderate standard deviation suggests some variability in perceptions. While most students feel that teachers effectively maintain their interest, there is some variability in the effectiveness of teacher strategies.

The statement “The method allows learners to develop strong oral communication skills” had a mean score of 4.6 and a standard deviation of 0.2. Students strongly agree (4.6) that audio learning allows them to develop strong oral communication skills. The low standard deviation indicates consistent agreement among students. Audio learning is perceived as highly effective for developing strong oral communication skills among students in Kamwenge District.

The statement “Audio learning accommodates various learning environments” had a mean score of 2.7 and a standard deviation of 0.6. Students tend to disagree (2.7) that audio learning accommodates various learning environments. The moderate standard deviation suggests some variability in perceptions. While audio learning is valued, there is some disagreement among students regarding its adaptability to different learning environments. In summary, the findings suggest a strong preference for auditory learning methods among students in Kamwenge District, with notable agreement on the effectiveness of verbal explanations, repetition of verbal information, participation in group discussions, and preference for oral presentations. However, there are variations in perceptions regarding studying at convenient times and the adaptability of audio learning to different environments. These findings can inform educational strategies to capitalize on students' preferences and promote academic achievements in the district.

Kinesthetic learning style and academic achievements of secondary students in Kamwenge District

Table 5: Kinesthetic learning style and academic achievements of secondary students in Kamwenge District

Statement	Mean	Std. Deviation
Learners prefer hands-on activities where they physically interact with materials	4.2	0.2
Students thrive due to active participation in the classroom	4.3	0.1
Learners enjoy movement and exploration as part of the learning experience.	4.7	0.1
Students prefer to jump into tasks and learn through trial and error	2.7	0.2
Students rely on physical sensations to understand and remember information	4.0	0.6
Students find it challenging to sit in class for long periods during lessons	4.9	0.2
Students benefit from demonstration examples	4.4	0.6
Students are expressive and energetic in their approach to learning.	2.3	0.2

Table 5, findings on the statement “Learners prefer hands-on activities where they physically interact with materials” showed a mean response of 4.2 and a standard deviation of 0.2. Therefore, students agree (4.2) that they prefer hands-on activities where they physically interact with materials. The low standard deviation indicates a high level of agreement among students. There is a strong preference for hands-on activities among students in Kamwenge District, suggesting that kinesthetic learning methods are highly valued and effective.

The statement “Students thrive due to active participation in the classroom” had a mean score of 4.3 and a standard deviation of 0.1. Therefore, students agree (4.3) that they thrive due to active participation in the classroom. The low standard deviation indicates a high level of agreement among students. Active participation in the classroom is perceived as beneficial for student success, indicating that kinesthetic learners thrive in environments that encourage engagement and involvement.

The statement “Learners enjoy movement and exploration as part of the learning experience” had a mean response of 4.7 and a standard deviation of 0.1. Therefore, students strongly agree (4.7) that they enjoy movement and exploration as part of the learning experience. The low standard deviation indicates a high level of agreement among students. Movement and exploration are highly enjoyable for students in Kamwenge District, indicating a strong preference for kinesthetic learning experiences that involve physical activity.

The statement “Students prefer to jump into tasks and learn through trial and error” had a mean response of 2.7 and a standard deviation of 0.2. Students tend to disagree (2.7) that they prefer to jump into tasks and learn through trial and error. The low standard deviation indicates a moderate level of agreement among students. There was some disagreement among students regarding their preference for learning through trial and error, suggesting that not all students may be comfortable with this approach.

The statement “Students rely on physical sensations to understand and remember information” had a mean response of 4.0 and a standard deviation of 0.6. Students agree (4.0) that they rely on physical sensations to understand and remember information. The higher standard deviation indicates some variability in reliance on physical sensations. While there is agreement that physical sensations play a role in learning, there may be differences in the extent to which students rely on them for understanding and memory retention.

The statement “Students find it challenging to sit in class for long periods during lessons” had a mean response of 4.9 and a standard deviation of 0.2. Students strongly agree (4.9) that they find it challenging to sit in class for long periods during lessons. The low standard deviation indicates a high level of agreement among students. Prolonged periods of sitting are challenging for students in Kamwenge District, suggesting a need for more active and dynamic learning environments to accommodate kinesthetic learners.

The statement “Students benefit from demonstration examples” had a mean response of 4.4 and a standard deviation of 0.6. Students agree (4.4) that they benefit from demonstration examples. The higher standard deviation indicates some variability in the extent of perceived benefit. While there is agreement on the benefits of demonstration examples, the degree of perceived benefit may vary among students.

The statement “Students are expressive and energetic in their approach to learning” had a mean score of 2.3 and a standard deviation of 0.2. Students tend to disagree (2.3) that they are expressive and energetic in their approach to learning. The low standard deviation indicates a moderate level of agreement among students. There is some disagreement among students regarding their expressiveness and energy in learning, suggesting that not all students may exhibit these characteristics.

Model	Unstandardized Coefficients		Standardized Coefficients		T	Sig.
	B	Std. Error	Beta			
(Constant)	3.132	.039		3.234	.000	
Audio learning style	0.214	.006	.053	2.395	.001	
Kinesthetic learning style	0.313	.042	.522	4.184	.051	

a. Dependent Variable: Academic achievements of students

In summary, the findings suggest a strong preference for kinesthetic learning methods among students in Kamwenge District, with notable agreement on the benefits of hands-on activities, active participation, movement, and reliance on physical sensations. However, there may be differences in

preferences regarding learning through trial and error and expressiveness in learning. These findings can inform educational practices and strategies to better cater to the needs of kinesthetic learners and promote academic achievements in the district.

Table 6: Correlation between audio, kinesthetic learning styles, and academic achievements

		Audio learning styles	Kinesthetic learning styles
Students' academic achievements	Pearson Correlation	0.411	0.671
	Sig. (2-tailed)	0.003	0.000
	N	117	117

Table 6, The correlation between audio learning styles and academic achievements was 0.411. This suggested a moderate positive correlation between audio learning styles and academic achievements. While this correlation is not as strong as that observed for accommodating learning styles, it is still statistically significant ($p < 0.05$). This implies that students who prefer audio learning styles tend to perform better academically.

The correlation between kinesthetic learning styles and academic achievements among secondary students in the Kamwenge District coefficient was 0.671. This indicates a strong positive correlation between kinesthetic learning styles and academic achievements among secondary students in Kamwenge District.

Table 7: Regression between learning styles and academic achievements of secondary students in Kamwenge District

Model	R	R Square	Adjusted R Square
Audio learning style	.363 ^b	0.13	0.18
Kinesthetic learning style	.610 ^c	0.781	0.41

The coefficient for audio learning style (B1) is 0.214, indicating a smaller effect compared to accommodating learning style. The R Square value of 0.13 suggests that approximately 13% of the variance in academic achievements can be explained by the audio learning style in this model.

The coefficient for kinesthetic learning style (B1) is 0.313, indicating a substantial effect on academic achievements. The R Square value of 0.781 suggests that approximately 78.1% of the variance in academic achievements can be explained by kinesthetic learning style in this model.

In conclusion, the Kinesthetic learning style appears to have the strongest impact on academic achievements among the

three learning styles considered in this analysis, as evidenced by its highest R Square value.

DISCUSSION

Audio learning style and academic achievements of secondary students in Kamwenge District

According to findings; on the statement “Students prefer verbal explanations, lectures, and discussions”, the mean response was 1.8 with a standard deviation of 0.9. Therefore, students strongly disagree (1.8) that they prefer verbal explanations, lectures, and discussions. The high standard

deviation indicates a significant variability in responses, suggesting that preferences vary among students. Contrary to expectations, students in Kamwenge District do not prefer verbal explanations, lectures, or discussions as a primary learning method.

On the statement “Students have strong listening skills and are attentive during lectures”, the mean response was 4.1 with a standard deviation of 0.8. Students strongly agree (4.1) that they have strong listening skills and are attentive during lectures. The standard deviation suggests relatively consistent agreement among students. Students in the district possess strong listening skills and are attentive during lectures, which is conducive to audio learning.

The statement “Learners benefit from repetition of verbal information” had a mean score of 4.2 with a standard deviation of 0.4. Students strongly agree (4.2) that they benefit from the repetition of verbal information. The low standard deviation indicates consistent agreement among students.

Repetition of verbal information is highly beneficial for learners in Kamwenge District, contributing to their academic achievements.

The statement “Learners prefer discussing topics or asking questions aloud” had a mean score of 4.5 with a standard deviation of 0.9. Students strongly agree (4.5) that they prefer discussing topics or asking questions aloud. The high standard deviation suggests some variability in preferences among students. Most students prefer active verbal engagement through discussions and asking questions aloud, indicating a preference for interactive learning.

The statement “Learners prefer explanations provided verbally” had a mean response of 4.2 and a standard deviation of 0.4. Students strongly agree (4.2) that they prefer explanations provided verbally. The low standard deviation suggests consistent agreement among students. Verbal explanations are preferred by learners in Kamwenge District, indicating a strong inclination towards auditory learning methods.

The statement “Students find it easier to absorb information through auditory channels” had a mean response of 4.8 and a deviation of 0.2. Students strongly agree (4.8) that they find it easier to absorb information through auditory channels. The low standard deviation indicates consistent agreement among students. Absorbing information through auditory channels is highly effective for students in the district, suggesting a strong preference for audio learning.

The statement “Learners enjoy participating in group discussions” had a mean score of 3.8 and a standard deviation of 0.7. Students tend to agree (3.8) that they enjoy participating in group discussions. The high standard deviation suggests variability in enjoyment levels among

students. While there is general enjoyment in participating in group discussions, preferences vary among students in Kamwenge District.

The statement “Learners prefer oral presentations” had a mean score of 4.1 and a standard deviation of 0.3. Students strongly agree (4.1) that they prefer oral presentations. The low standard deviation suggests consistent agreement among students. Oral presentations are preferred by learners, indicating a preference for auditory learning methods that involve verbal communication.

The statement “Learners study at their convenient time” had a mean score of 2.4 and a standard deviation of 0.2. Students tend to disagree (2.4) that they study at their convenient time. The low standard deviation suggests consistent disagreement among students. Students in the district do not perceive studying at their convenience as a prevalent practice, indicating potential challenges in time management or access to resources.

The statement “Teachers capture learners' attention and maintain their interest in the subject matter” had a mean score of 3.8 and a standard deviation of 0.4. Students tend to agree (3.8) that teachers capture their attention and maintain their interest in the subject matter. The moderate standard deviation suggests some variability in perceptions. While most students feel that teachers effectively maintain their interest, there is some variability in the effectiveness of teacher strategies.

The statement “The method allows learners to develop strong oral communication skills” had a mean score of 4.6 and a standard deviation of 0.2. Students strongly agree (4.6) that audio learning allows them to develop strong oral communication skills. The low standard deviation indicates consistent agreement among students. Audio learning is perceived as highly effective for developing strong oral communication skills among students in Kamwenge District.

The statement “Audio learning accommodates various learning environments” had a mean score of 2.7 and a standard deviation of 0.6. Students tend to disagree (2.7) that audio learning accommodates various learning environments. The moderate standard deviation suggests some variability in perceptions. While audio learning is valued, there is some disagreement among students regarding its adaptability to different learning environments. In summary, the findings suggest a strong preference for auditory learning methods among students in Kamwenge District, with notable agreement on the effectiveness of verbal explanations, repetition of verbal information, participation in group discussions, and preference for oral presentations. However, there are variations in perceptions regarding studying at convenient times and the adaptability

of audio learning to different environments. These findings can inform educational strategies to capitalize on students' preferences and promote academic achievements in the district.

Kinesthetic learning style and academic achievements of secondary students in Kamwenge District

Based on findings on the statement “Learners prefer hands-on activities where they physically interact with materials” showed a mean response of 4.2 and a standard deviation of 0.2. Therefore, students agree (4.2) that they prefer hands-on activities where they physically interact with materials. The low standard deviation indicates a high level of agreement among students. There is a strong preference for hands-on activities among students in Kamwenge District, suggesting that kinesthetic learning methods are highly valued and effective.

The statement “Students thrive due to active participation in the classroom” had a mean score of 4.3 and a standard deviation of 0.1. Therefore, students agree (4.3) that they thrive due to active participation in the classroom. The low standard deviation indicates a high level of agreement among students. Active participation in the classroom is perceived as beneficial for student success, indicating that kinesthetic learners thrive in environments that encourage engagement and involvement.

The statement “Learners enjoy movement and exploration as part of the learning experience” had a mean response of 4.7 and a standard deviation of 0.1. Therefore, students strongly agree (4.7) that they enjoy movement and exploration as part of the learning experience. The low standard deviation indicates a high level of agreement among students. Movement and exploration are highly enjoyable for students in Kamwenge District, indicating a strong preference for kinesthetic learning experiences that involve physical activity.

The statement “Students prefer to jump into tasks and learn through trial and error” had a mean response of 2.7 and a standard deviation of 0.2. Students tend to disagree (2.7) that they prefer to jump into tasks and learn through trial and error. The low standard deviation indicates a moderate level of agreement among students. There was some disagreement among students regarding their preference for learning through trial and error, suggesting that not all students may be comfortable with this approach.

The statement “Students rely on physical sensations to understand and remember information” had a mean response of 4.0 and a standard deviation of 0.6. Students agree (4.0) that they rely on physical sensations to understand and remember information. The higher standard deviation indicates some variability in reliance on physical sensations. While there is agreement that physical sensations play a role in learning, there may be differences

in the extent to which students rely on them for understanding and memory retention.

The statement “Students find it challenging to sit in class for long periods during lessons” had a mean response of 4.9 and a standard deviation of 0.2. Students strongly agree (4.9) that they find it challenging to sit in class for long periods during lessons. The low standard deviation indicates a high level of agreement among students. Prolonged periods of sitting are challenging for students in Kamwenge District, suggesting a need for more active and dynamic learning environments to accommodate kinesthetic learners.

The statement “Students benefit from demonstration examples” had a mean response of 4.4 and a standard deviation of 0.6. Students agree (4.4) that they benefit from demonstration examples. The higher standard deviation indicates some variability in the extent of perceived benefit. While there is agreement on the benefits of demonstration examples, the degree of perceived benefit may vary among students.

The statement “Students are expressive and energetic in their approach to learning” had a mean score of 2.3 and a standard deviation of 0.2. Students tend to disagree (2.3) that they are expressive and energetic in their approach to learning. The low standard deviation indicates a moderate level of agreement among students. There is some disagreement among students regarding their expressiveness and energy in learning, suggesting that not all students may exhibit these characteristics.

In summary, the findings suggest a strong preference for kinesthetic learning methods among students in Kamwenge District, with notable agreement on the benefits of hands-on activities, active participation, movement, and reliance on physical sensations. However, there may be differences in preferences regarding learning through trial and error and expressiveness in learning. These findings can inform educational practices and strategies to better cater to the needs of kinesthetic learners and promote academic achievements in the district.

CONCLUSION

kinesthetic learning style appears to have the most substantial impact on academic achievements, followed by accommodating learning style and then audio learning style.

RECOMMENDATIONS

Teachers should provide professional development opportunities for teachers to enhance their understanding of different learning styles and strategies for accommodating them in the classroom.

Secondary school administrators should encourage collaborative learning environments where students can work together in groups, allowing them to leverage each

other's strengths and learning styles. This approach promotes peer-to-peer learning and fosters a supportive atmosphere where students can thrive academically.

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LIST OF ABBREVIATIONS

CVI	Content Validity Index
KED	Kamwenge Education Department
UCE	Uganda Certificate of Education
USE	Universal Secondary Education
SAQ	Self-Administered Questionnaires
STEM	Science, Technology, Engineering, and Mathematics

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The author did not declare any conflict of interest

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