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Factors That Influence Students Learning Styles in Mathematics at Ullo Senior High School in the Jirapa Municipality, Ghana

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*Factors,
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This study sought to investigate the factors that influence students' learning styles in mathematics at Ullo Senior High School. The study hinged on the positivist philosophy and adopted the descriptive survey design. The school was purposively sampled for the study because of the persistent poor performance of the students. Simple random sampling was used to select 82 from two students who were given questionnaires to be filled out. The data was collected and analysed by means of descriptive statistics (percentage, mean, and standard deviation). Findings from the study revealed that generally, students agreed that their home background, teaching method, interest in or motivation towards mathematics, and classroom management are all factors that influence their learning styles. Another finding was that generally, students disagreed that teaching and learning resources influence their learning styles. It was therefore recommended that mathematics teachers at Ullo Senior High School should strive to create a conducive environment to meet the diverse learning needs of their students.

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INTRODUCTION

Students learn in their own unique way, whether it is through sight, sound, reflection, action, logic, intuition, analysis, or visualisation. Students' physical, psychological, and cultural differences often translate into distinctive approaches to learning, as pointed out by Fasokun et al. (2005). Learning is a process that leads to change, which occurs as a result of experience and increases the potential for improved performance and future learning (Ambrose et al., 2010). The change in the learner may be happy at the level of knowledge, attitude, or behaviour, thereby making learners see concepts, ideas, and the world differently. According to Alavi and Toozandehjani (2017), students' learning is facilitated by an understanding of their learning styles, and this understanding also aids in the development of each student's potential. Teachers can better support their student's academic growth if they are aware of and accommodate a variety of learning styles.

Several factors have been identified to influence the learning styles of students. A study by Wood (2010) revealed that being introverted, shy, extroverted, or talkative can have a detrimental effect on a student's ability to learn. Disabilities and language barriers are two other factors that can have an impact on a student's preferred method of instruction. Ramayah et al. (2011) research on factors that influence the learning style of business students revealed that peers influence how other students learn, and students' preference for a particular learning style is influenced by their cultural backgrounds. A person's ability to remember information depends on a variety of factors, including but not limited to his or her IQ, motivation, emotional state, the learner's physical location, the learner's perceived importance of the material being memorised, and the teaching and learning strategy being employed (Dunn & Dunn, 1992).

Factors in the surrounding environment, such as seating arrangement, temperature, and lighting, are all mentioned by Dunn and Griggs (2000) as having an impact on the learning process in the

physiological learning style domain. Abante et al. (2014) pointed out that physical and environmental factors have a much greater impact on the preferred learning style of students than did teacher and learning, as well as individual factors. Students' preferred methods of instruction can vary depending on several factors, such as aspects of gender, age, education, brain function, cultural background, and imaginative ability, as reported by Honigsfeld (2001)

A study by Zuberu et al. (2019) to investigate the different ways that students at Ghanaian universities learn and approach their coursework revealed that teaching strategies and classroom environments have a significant impact on how students learn. Owusu and Cobbold (2020) reported that there is considerable variation in the resource management learning strategies of Economics students and that this variation can be largely accounted for by differences in teaching method, motivation, student status, and school type. Educators should adopt strategies that encourage student participation by considering the diverse backgrounds of the students, which will give them the opportunity to realise their full potential. It is the responsibility of educators, school administrators, and parents to inspire their students to take an interest in the subjects they learn. Student's individuality can influence whether they learn best through sight or sound.

However, though various research efforts have been made to investigate factors that influence the learning styles of students in schools and other subject areas, not much has been done to examine the factors that influence the learning styles of students in mathematics, especially in the Jirapa Municipality, Ghana. This makes the present study relevant to helping determine factors that influence the learning styles of students in mathematics at Ullo Senior High School.

Purpose of the Study

The study was designed to investigate the factors that affect students' learning styles in mathematics at Ullo Senior High School in the Jirapa Municipality, Ghana.

Research Questions

- What factors influence students of Ullo Senior High School's mathematics learning styles in the Jirapa Municipality?
- What strategies can be employed to improve the learning styles of Ullo Senior High School students in mathematics in the Jirapa Municipality?

MATERIALS AND METHODS

Research Design

The study hinged on the positivist philosophical point of view, which relies on objective facts and empirical observation rather than one's own biased beliefs, as articulated in Bryman (2011). When it comes to planning research, there is no one tried-and-true method. The principle of "fitness for purpose" governs the methods employed in research design. The research's goals should drive its design, which should then guide its methodology (Cohen et al., 2018). In light of these considerations, the study used a descriptive survey design informed by a quantitative methodology.

Location of the Study

This research took place at Ullo Senior High School in the Jirapa Municipality of Upper West Region, Ghana. The Jirapa Municipality is one of 11 municipalities and districts in the Upper West Region of Ghana and one of 261 MMDAs in the country. It is located between latitudes 10.25° and 11.00° North and longitudes 20.25° and 20.40° West (Ghana Statistical Service, 2010). According to the population and housing census taken in 2021, the total population of the Municipality is 91,279, with 43,021 males and 48,258 females. Jirapa, the municipal capital, is located 62 kilometres from the regional capital, Wa. Its strategic placement offers a unique opportunity for the area's growth. Famous "Jirapa Dubai", the Royal Cosy Hills Hotel, is situated in Jirapa Municipal. Most of the people work in agriculture, and most of the city's commerce takes place in Jirapa, its capital.

Sample and Sampling Techniques

The study used two sampling procedures: purposive sampling and simple random sampling. The performance of the participating school in mathematics over the years has been very poor. Hence, the school was purposefully selected for the study. Furthermore, a simple random sampling technique was used to select a total of 82 sample participants from among the nine second-year classes. This was obtained by calculating 20% of the population (410) as indicated by Rubin (2005).

Research Instruments

Researchers create research instruments to help them carry out their studies and meet their goals, as explained by Yarkwah and Donkor (2019). This means that research instruments are specifically crafted to facilitate the gathering of data for the study. A structured questionnaire was developed based on the literature reviewed and used to collect information from the senior high school students. The structured questionnaires were made up of three distinct parts (labelled A, B, and C). The items in Section "A" were designed to elicit information about students' demographic data. The participants were prompted to select their gender and age range using checkboxes. Section "B" included five (5) items about what factors affect students' learning styles, and Section "C" included five (5) items about how to enhance students' learning styles. The participants were given a series of statements and asked to indicate which option best represented their level of agreement or disagreement with each statement. The survey instrument was a 4-point Likert scale, with 1 representing a strong disagreement, 2 representing a disagreement, 3 representing an agreement, and 4 representing a strong agreement.

Data Collection Procedure

The researcher first sought permission from the headmaster of the participating school. After a careful explanation of the purpose of the research to the headmaster of the school, the researcher was given the go-ahead to administer the questionnaires to the participants. The researcher assured the participants that their information

would be kept anonymous. In addition, the researcher reassured the participants that their answers would be kept private and used exclusively for research purposes. The researcher asked the participants to tick on any of the options provided in each item based on their respective honest opinions. All the survey questionnaires were retrieved from the participants for sorting, coding, and analysis to be carried out.

Data Analysis Procedure

After the questionnaires were sorted, they were coded into categories based on the themes and variables that emerged from the research and reflected its aim. The Statistical Package for Social Sciences (SPSS) software version 23 was

used to analyse the data. The data was analysed using descriptive statistics like percentage, mean and standard deviation, which aimed to determine what factors influence the learning styles of students at Ullo Senior High School in the Jirapa Municipality.

RESULTS

Demographic Information of the Participants

To explore the gender and ages of the participants, there were items in the questionnaire that sought participants’ biodata. Descriptive statistics (frequency and percentage) were applied to participants’ responses, as shown in *Table 1*.

Table 1: Descriptive statistics of demographic information of participants

Age range	Gender		
	Male (%)	Female (%)	Total (%)
13 – 16	1 (1.2)	2 (2.4)	3 (3.6)
17 – 20	44 (53.7)	32 (39.0)	76 (92.7)
21 – above	3 (3.7)	0 (0.0)	3 (3.7)
Total	48 (58.6)	34 (41.4)	82 (100)

Source: Field data (2022)

Factors Influencing the Learning Styles

This research question was developed to explore the perceived factors that influence Ullo Senior High School mathematics students' learning styles in the Jirapa Municipality. To respond to this research question, five items based on a four-point Likert scale (1- strongly disagree, 2- disagree, 3 agree, and 4- strongly agree) were structured relating to factors that influence the learning styles

of learners in mathematics. If the mean score is greater than 2.5 ($(1+2+3+4)/4 = 2.5$), then a majority of respondents either agreed or strongly agreed with the statement. If the mean score is less than 2.5, then a larger proportion of respondents disagree or strongly disagree with the statement. *Table 2* displays the results of applying descriptive statistics to the participants' responses (means and standard deviations)

Table 2: Factors that influence learning styles of students in Ullo SHS (n = 82)

Statements	SD	D	A	SA	M	STD	I
My home background influences the way I learn Mathematics	24 (29.3)	13 (15.9)	20 (24.4)	25 (30.5)	2.56	1.21	A
The teacher’s method of teaching influences the way I learn Mathematics.	4 (4.9)	15 (18.3)	35 (42.7)	28 (34.1)	3.06	0.85	A
Teaching and learning resources influence the way I learn Mathematics.	31 (37.8)	26 (31.7)	15 (18.3)	10 (12.2)	2.05	1.03	D
The school and classroom management influence the way I learn Mathematics.	11 (13.4)	22 (26.8)	32 (39.0)	17 (20.7)	2.67	0.96	A
My interest or motivation towards mathematics influences the way I learn it.	7 (8.5)	8 (9.8)	35 (42.7)	32 (39.0)	3.12	0.91	A

Note: SD= Strongly Disagree; D= Disagreed; A= Agree; SA= Strongly Agree; M= Mean; STD= Standard Deviation; I= Interpretation; 1.0 – 1.4 = strongly disagree; 1.5 – 2.4= Disagreed; 2.5 – 3.4= Agree; 3.5 – 4.0= strongly agree.

Source: Field Data (2022)

The results in *Table 2* revealed that a greater percentage of the participants agreed that students' home background influences the way students learn mathematics (M = 2.56, STD = 1.21), and a majority of the participants agreed that teachers' method of teaching is a factor that influences the way students learn mathematics (M = 3.06, STD = 0.85). Furthermore, the majority of the participants disagreed that teaching and learning resources influence the way students learn mathematics (M = 2.05, STD = 1.03), while a majority of the participants agreed that school and classroom environments influence the way students learn mathematics (M = 2.67, STD = 0.96). Also, the results in *Table 2* depicted that a majority of the participants agreed that students' interest or motivation towards mathematics influences the way they learn mathematics (M = 3.13, STD = 0.91).

Strategies Employed to Improve the Learning Styles

This research question was framed to explore how the learning styles of Ullo Senior High School students in mathematics in the Jirapa Municipality can be improved. To respond to this research question, five items based on a four-point Likert scale (1- strongly disagree, 2- disagree, 3 agree, and 4- strongly agree) were structured relating to how the participants can improve their learning styles in mathematics. Participants indicated their extent of agreement with the items or statements on the four-point scale. Mean values above 2.5 (1+2+3+4/4 = 2.5) show that the majority of the participants either agreed or strongly agreed with the statement, while a mean value below 2.5 shows that the majority of the participants either disagreed or strongly disagreed with the statement. Descriptive statistics (Means and standard deviations) were applied to participants' responses, and the results are presented in *Table 3*.

Table 3: Descriptive statistics of how to improve the learning styles of students

	SD	D	A	SA	M	STD	I
Students' participation in teaching and learning improves their way of learning mathematics.	0 (0.0)	0 (0.0)	19 (23.3)	63 (76.8)	3.77	0.42	SA
A good classroom environment improves the way I learn Mathematics.	6 (7.3)	21 (25.6)	29 (35.4)	26 (31.7)	2.91	0.93	A
The use of an appropriate teaching method in the classroom at the right time improves the way I learn Mathematics.	3 (3.7)	2 (2.4)	28 (34.1)	49 (58.8)	3.5	0.72	SA
The use of appropriate teaching and learning resources in the classroom improves the way I learn Mathematics.	1 (1.2)	7 (8.5)	38 (46.3)	36 (43.9)	3.33	0.69	A
Teachers, parents, and peers should guide or motivate students to improve the way they learn Mathematics	0 (0.0)	0 (0.0)	14 (17.1)	68 (82.9)	3.83	0.38	SA

Note: SD= Strongly Disagree; D= Disagreed; A= Agree; SA= Strongly Agree; M= Mean; STD= Standard Deviation; I = Interpretation; 1.0 – 1.4 = strongly disagree; 1.5 – 2.4= Disagreed; 2.5 – 3.4= Agree; 3.5 – 4.0= strongly agree.

Source: Field Data (2022)

The results in *Table 3* show that the majority of the participants agreed that students' participation in teaching and learning ($M = 3.77$, $STD = 0.42$), a good classroom environment ($M = 2.91$, $STD = 0.93$), the use of an appropriate teaching method in the classroom at the right time ($M = 3.50$, $STD = 0.72$), the use of appropriate teaching and learning resources in the classroom ($M = 3.33$, $STD = 0.69$), and teachers', parents', and peers' guidance or motivation ($M = 3.83$, $STD = 0.38$) improve students' learning styles.

DISCUSSION

The study provided discussions about factors that influence the learning styles of Ullio Senior High School students in mathematics. The results from *Table 2* indicated students' confirmation that the home background of the student, teachers' method of teaching mathematics, school and classroom environment, and student's interest in or motivation for mathematics are factors that influence the leaning styles of students. These findings are consistent with Owusu and Cobbold's (2020) study that revealed Economics students' approaches to resource management vary widely, and this variation can be explained by several factors, including the pedagogical approach taken, students' levels of motivation, and the classroom environment. The finding also affirms Abante's (2014) work, which indicates that environmental factors (classrooms, textbooks, equipment, school supplies, and other instructional materials) affect how students learn, and Zuberu et al. (2019) research which indicated that classroom conditions and pedagogical approaches have a significant impact on student's development of learning patterns. These findings re-emphasise studies conducted by Ramayah et al. (2011), who indicated that cultural background (level of poverty or affluence of parents, ethnic background, and weak or strong family structures) can affect the way students learn. In essence, teachers' teaching methods, the home background of students, the classroom environment, and students' interest and motivation towards mathematics greatly influence how students learn mathematics.

Finally, the results, as evidenced in *Table 3*, revealed that student participation in teaching and learning, a good classroom environment, the use of appropriate teaching and learning resources in the classroom, and teachers', parents', and peers' guidance or motivation of learners improve the learning styles of students. According to Owusu and Cobbold (2020), teachers should use strategies that encourage student participation in the classroom. Educators, school administrators, and parents all have a role to play in inspiring their students to take an interest in the subjects they study. This study's findings, along with those of Owusu and Cobbold (2020), suggest that students' engagement in the classroom and the encouragement and direction they receive from teachers and parents can have a significant impact on their learning styles.

CONCLUSION AND RECOMMENDATIONS

The study concluded that students' home background, teaching method, interest in or motivation towards mathematics, and classroom management are all factors that influence their learning styles. These factors do not operate in isolation. Thus, motivation and methods of teaching affect classroom management, which in turn affects the learning styles of students.

It was recommended that mathematics teachers, as well as parents, should provide the opportunity for learners to participate in or engage in mathematical activities in the classroom and at home. This will reveal the best way learner(s) learn mathematics. The classroom environment should be conducive (inclusivity, collaboration, and students' participation) enough to incorporate the varied views of learners, which will enable the mathematics teacher to uncover their learning styles. Mathematics teachers should plan mathematics lessons that involve different teaching strategies (i.e. hands-on Activities, group discussions, projects, and problem-solving) to meet the needs of learners' learning styles. Thus, mathematics instructors should get the requisite experience and training in adapting lessons to accommodate a variety of students' preferred

methods of learning in the mathematics classroom.

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