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CLASSROOM INTERACTION ANALYSIS AND MATHEMATICS PERFORMANCE

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ABSTRACT
The interaction between teachers and students was examined in this study in connection to how well the students performed in math. In this study, a descriptive correlational design was employed. From three randomly selected sections in each grade level, 455 students participated in the survey. The investigation was also conducted with the teachers of the chosen courses. Using the Flanders Interaction Analysis Categories System, data were gathered (Putri, 2014). (1) The age of math professors was determined to be in the "Middle Age" range. Most of them are female, "moderately experienced," and have Master's level units. Additionally, the majority of them have taken part in divisional and regional trainings, and a select handful have received accolades from their schools.; (2) teacher talk, particularly direct lecture, is the most prevalent FIAC; (3) the highest Flanders Formulates Ratio in classroom interaction is the teacher talk ratio, with the teacher direct ratio greater than the teacher indirect talk ratio; (4) the students' Mathematics Performance is at the "Satisfactory" level; and (5) teachers' accounts are significantly correlated with the frequency of Flanders Interaction Analysis Categories (FIAC).. Particularly, teachers with greater knowledge tend to ask their students more questions and refrain from questioning or defending authority. Additionally, students or teachers with greater training tend to speak up more during class participation; (6) the performance of pupils in mathematics is strongly correlated with Flanders Formulates Ratios. Students' mathematics performance is important, and more precisely, students' math performance goes up when teachers talk to them directly and goes down when teachers talk to them indirectly.

Key Words: Flanders Interaction Analysis, mathematics performance, descriptive, correlational.

1.INTRODUCTION
The implementation of K – 12 curriculum is to ‘holistically develop learners with 21st century learning skills. Classroom teachers function not as lecturers but classroom facilitators and consultative rather than directive of students learning. The teacher is skilled in managing multiple learning experiences to create a positive and productive learning environment for all the students in the classroom, foster cooperative and collaborative learning among students within the classroom, Utilize the right tools and opportunities to provide a learning environment that enables each student to build their own knowledge. (DepEd Primer, 2011; Saltrick, 2011).

Most of the students encountered a common issue to comprehend the texts in Mathematics content. The discipline of mathematics presents many challenges to dissimilar learners. It has often been termed the ‘’Gatekeeper’’ of success or failure for high school graduation and career success. Many students fall below their expected level of performance in Mathematics. One of the quite alarming examples here is the low performance result in the National Achievement Test (NAT) of

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many Filipino students. Public high school students' NAT scores have been declining, and they are much lower than those of public elementary school students. According to DepEd data, primary pupils had an average NAT score of 66.79 percent for the 2011–2012 school year, compared to public high school students' 48.9 percent (Ordinario, 2013; Custom Writing, 2012).

In the 21st century learning skills, according to Saltrick (2011), Fusing the mathematical practices and content with 21st century learning skills is one of the most crucial ways to help students achieve mastery. This will make teaching and learning more rigorous, relevant, and engaging while also ensuring that more students have a high level of understanding and proficiency in mathematics. Students should be able to communicate effectively in oral, written, and nonverbal contexts in order to understand concepts such as knowledge, values, attitudes, and intentions. They should also be able to use communication in a classroom setting for a variety of purposes in a variety of teams and environments.

According to Jastraj (2013), classroom engagement enables students to develop the critical thinking skills necessary to express their opinions to both teachers and their classmates. The Flanders Interaction Analysis Categories System (FIACS) can be used to examine this classroom interaction as it is being observed. These categories include verbal and nonverbal specifically, Student talk (student talk reaction and student talk initiation), silence, and confusion. Teacher talk (Indirect Talk: accepts feelings, praise or encouragement, accepts or uses ideas of students, asking questions. Direct Talk: lecturing, providing directions, criticizing and justifying authority. Which type of conversation predominates between the teacher and students throughout the entire class discussion is determined by an examination of the classroom interaction. It is assumed that classroom contact is uncommon since mathematics instruction is thought to rely more on instructor discussion.

They are more motivated to succeed and give their best effort on a daily basis in the classroom when they believe they have good relationships with their teachers. In contrast, pupils who believe they have a tense and hostile connection with their professors are less driven to do well and may even act defiantly toward them. Thus, there is a connection with the teachers' role towards teaching and the students' behavior because both are creating certain reaction to each other that may result to a specific classroom environment. Also, these interactions are important to the knowledge of student's academic achievement (Pianta et al, 1995; Ilias, et al., 2012).

Another study looked into the effects of student-to-student and teacher-to-student interactions on how well students were learning English. The findings of this study revealed that classroom interaction and language output may cause students to notice the target form and have a beneficial impact on enhancing foreign language learning (Castro, 2010). To ascertain the relationships between the dynamics of classroom interaction, the variables affecting students and teachers, and the outcomes of students' physics learning, a study was carried out. (Ali, 2004; Innamullah et. al., 2008).

The goal of this study was to determine how student academic performance and standard accomplishment scores were impacted by the intimate relationships between teachers and students, classroom dynamics, and interaction. Student achievement and classroom elements such teacher instructional strategies, mean teacher-student relationships, and a classroom index of academic

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risk was investigated. The results demonstrate that good teacher-student relationships and teachers' self-reported use of efficient instructional techniques are predictive of positive student academic progress. In classes with higher academic risk, interaction results indicate a marginally bigger link between close teacher-student relationships and student accomplishment (Vu, 2009).

In the secondary schools, specifically, in the subjects of physics, biology, and social studies, several studies had been carried out using FIAC (Ten Categories: Accept feelings, Praise or Encouragement, Accept or Uses Ideas of Students, Asking Question, Lecture, Giving Directions, Criticizing or Justifying, Student Talk Response, Student Talk Intuition, and Silence). However, there's limited research done in the area of secondary mathematics where this FIAC (Ten Categories) is thought to be a factor that can influence math achievement (Ordinario, 2013).

With the aforementioned discussion in mind, it is beneficial to evaluate how mathematics is taught in the classroom, focusing on how teachers and students interact. Therefore, the purpose of this study is to evaluate how students interact in the classroom in connection to their mathematical performance. It is also argued that evaluating the interactions between teachers and students during class sessions helps the development and improvement of teaching practices in the department of education as well as in higher education to maintain the standard of teaching and learning process.

2.STATEMENT OF THE PROBLEM

The researcher aimed to analyze the classroom interaction in relation to students' Mathematics performance in Leyte National High School. Specifically, this study answered the following questions:

1. What is the profile of the teachers along?
   - 1.1 Age
   - 1.2 Sex
   - 1.3 Educational Attainment
   - 1.4 Number of Years in Teaching
   - 1.5 Trainings
   - 1.6 Awards and Recognition
2. To what extent do the Flanders Interaction Analysis Categories (FIAC) occur in classroom interaction in terms of the following
   - 2.1 Teacher Talk
     - 2.1.1 Indirect Talk
       - 2.1.1.1 Accept Feelings
       - 2.1.1.2 Praise or Encouragement
       - 2.1.1.3 Asking questions
       - 2.1.1.4 Accepts or uses ideas of students
     - 2.1.2 Direct Talk
       - 2.1.2.1 Lecturing/Lecture
       - 2.1.2.2 Giving Directions
       - 2.1.2.3 Criticizing or justifying authority
   - 2.2 Student Talk
     - 2.2.1 Student talk response
     - 2.2.2 Student talk intuition

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2.3 Silence
2.3.1 Silence or Pause or Confusion

3. What is Flanders Formulates Ratios in terms of the following?
   3.1 Teacher talk ratio
   3.2 Indirect talk ratio
   3.3 Direct talk ratio
   3.4 Students' talk ratio
   3.5 Silence or Confusion ratio
   3.6 Indirect and direct ratio
4. What is the students' Mathematics performance?
5. Is there a relationship between the FIAC occurrences in classroom interaction and the profile of the teachers?
6. Is there a relationship between Flanders Formulates Ratios and students' Mathematics performance?

3.METHODOLOGY

The study made use of quantitative method. Specifically, a descriptive correlational study. Twelve sections, three (3) from each grade level (Grades 7 to 10), were randomly chosen to participate in this study. There were 12 teachers and 455 students that responded. Using Flanders' Interaction Analysis Categories System, the study's data were gathered. The ten categories of the Flanders Interaction Analysis Categories (FIAC) system of communication are thought to cover all possible communication scenarios. There are 10 categories used: seven for when the teacher is speaking (called "teacher talk"), two for when students are speaking (called "student talk"), and one for silence or bewilderment (Jastraj, 2013). The types of teacher discourse include lecturing/lecture, providing directions, criticizing or justifying authority, accepting sentiments, encouraging or praising students, accepting or using their ideas, and asking questions. The principal of the participating school—the study's setting—was consulted for approval. The methods used to collect the data are observation of the classroom, interaction recording, tally of the Flanders Interaction Analysis Categories, and interaction evaluation. The researcher described students' mathematical performance using the following standards of interpretation, which were modified from DepEd (2015).

Ranges	Description
95 – 100%	Outstanding
85 – 94%	Very Satisfactory
80 – 84%	Satisfactory
75 – 79%	Fairly Satisfactory
Less than 75%	Did Not Meet Expectations

Research data were presented in textual and tabular forms. Percentages, Frequency distribution, and the Means were utilized in presenting, analyzing, and interpreting the research data. The Spearman Correlation was utilized to analyze data if there is a relationship between the Classroom Interaction Analysis and Students' Mathematics Performance. The correlation was tested for its statistical significance using a two-tailed test with an alpha value of 0.95 and $p < .05$ level of significance.

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4.RESULTS AND DISCUSSION

This section discusses the analysis of the data gathered with their corresponding presentation in five parts: (1) Profile of the Mathematics Teachers, (2) Extent of Occurrence of Flanders Interaction Analysis Categories (FIAC) in classroom interaction, (3) Flanders Formulates Ratios, (4) Student's Mathematics Performance (5) Relationship between the extent of Occurrence of FIAC in classroom interaction to the profile of the teachers and (6) Relationship between Flanders Formulates Ratios and students' Mathematics performance.

Profile of the Mathematics Teachers

The demographic variables for the teacher profile include the age, sex, number of years of teaching experience, educational attainment, professional trainings, and the relevant awards of recognitions are presented on Table 1.

Table 1. Distribution of Math Teachers According to Age, Sex, Number of years in Teaching, Educational Attainment, and Number of Trainings Attended and the Awards and Recognition Received. (N = 12)

Teachers Profile		
Age	**F**	**%**
51 - 65 (Senior)	2	16.67
36 - 50 (Middle Age)	7	58.33
21 - 35 (Young)	3	25.00
Total	12	100.00
Mean	40.5 (Middle Age)	
Sex	**F**	**%**
Male	5	41.67
Female	7	58.33
Total	12	100.00
Number of Years in Teaching	**F**	**%**
21 above (HE)	2	16.67
16 - 20 (E)	5	41.67
6 - 10 (SE)	1	8.33
1 - 5 (N)	4	33.33
Total	12	100.00
Mean	15.08 (Moderately Experienced)	
Educational Attainment	**F**	**%**
Units in M.A.	8	66.67
CAR in M.A.	4	33.33
Total	12	100.00
Number of Trainings Attended	**f**	**%**
School	5	41.67
Regional	7	58.33
National	4	33.33
International	3	25.00
Awards and Recognition Received	**f**	**%**
School	8	66.67

HE – Highly Experienced, E – Experienced, ME – Moderately Experienced, SE – Slightly Experienced, N – Novice

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Age. The average age of math teachers is 40.5 years, which is considered to be "Middle Age," according to Table 1. The age range of 36 to 50 years, referred to as the "Middle Age" category, has the highest overall frequency count of 7, or 58.33 percent, of the teachers. Three (3) instructors fall into the age range of 21 to 35 years, indicating that 25% of the teachers fall into the "Young" category, while just two (2) teachers, or 16.67% of the total, fall into the "Senior" age group. The results suggest that the majority of teachers fall into the 36-to-50-year age range, which is the middle age period. The National Union Teachers (NUT) pointed out teachers play an invaluable role and make significant contributions to the schools in which they work in the maturity stage. In addition, the quality of work of the teachers in this age category have in the Office for Standards in Education (OFSTED) significantly above the national average with 90% of lesson being satisfactory or better and majority of whom were aged between 30 and 50 (Redwood, 2008).

Sex. Table 1 demonstrates that the majority of math teachers are female. This is illustrated by the total frequency count of 7 or 58.33 percent of teachers who are female, as opposed to the remaining 5 or 41.67 percent of teachers who are male. According to the commissioner for professional regulation, who also said that male teachers had become an "endangered species," particularly in public institutions, they may be just as nurturing, compassionate, and competent as their female counterparts. The assumption that teaching is primarily a female profession has been bemoaned by the former president of the publicly funded Philippine Normal University. Additionally, male teachers make up a relatively small percentage of the whole teaching profession and are a gradually extinct breed. Of the 491,338 teachers in public elementary and high schools across the country, 423, 549, or 86.3 percent, were women. Thus, the results on the sex of the teachers are consistent with the aforementioned data, with more female teachers than male teachers. (Nelson, 2010).

Number of Years in Teaching. Based on Table 1, it can be seen that the 12 mathematics teachers had a mean of 15.08 years, which is considered to be "Moderately Experienced." As a result, the majority of instructors have been in the classroom for at least 15 years. Particularly, 4 or 33.33 percent of the teachers have one to five years of experience, which is referred to as "Novice" experience. Out of 12 teachers, one (1), or 8.33 percent, are classified as "Slightly Experienced" and have 6 to 10 years of expertise. The remaining 5 instructors, or 41.67 percent, were classified as "Experienced," and there were 2 teachers, or 16.67 percent, with at least 21 years of teaching experience who were classified as "Highly Experienced.". Moreover, the above result confirms the study of Stephen Sawchuk (2015). According to him, teachers' ability to improve student achievement persisted well beyond the 3 – 5 years in teaching, while the teachers did make the most progress during their few years in the classroom, teachers improved their ability to increase student achievements between their 10 – 30 years in the teaching profession. Although, a previous study revealed that more than half – million students concluded that teachers experience is not significantly related to achievement in their profession. (Teaching, 2012)

Educational Attainment. Table 1 also shows that four out of every twelve teachers have acquired Complete Academic Requirements (CAR) at the master's level. These teachers who hold CARs have finished the academic requirements for a Master's degree, but they still need to complete the thesis writing phase in order to receive an MS or MA degree. 33.33 percent of the teachers are CAR holders, while the remaining 8 teachers, or 66.67 percent of the total, have received Master's degree units. This outcome therefore suggests that the teachers continue and complete their

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graduate degrees. The educational level of employed teachers has an impact on the schools' dropout rate. They recommend that schools should encourage hiring teachers with higher educational attainment or with post-graduate certification in order to decrease dropout rates and to encourage students to attain higher grade level (Darling & Hammond, 2000).

Trainings. As reflected on Table 1, there have been 5 teachers, or 41.67 percent, and 7 teachers, or 58.33 percent, respectively, who have attended trainings at the division and regional levels. At the national level, 4 out of 12 teachers, or 33.33 percent of all teachers, have gone; at the international level, just 3 teachers, or 25 percent of all teachers, have gone to professional development sessions. The results reveal that teachers have attended trainings mostly at the division and regional level in the past 5 years although some have attended national and international trainings. There is a less than 5% likelihood that a stand-alone training will actually alter teachers' instructional strategies. However, the likelihood of truly affecting teaching and learning increases dramatically to nearly 90% if you also include ongoing, embedded professional development, professional learning communities where teachers can interact with one another, and ongoing support from coaches and administrative staff. proving that seminars and trainings aid teachers in expanding their knowledge and honing their skills (Joyce and Showers, 2002).

Awards and Recognition. Table 1 also shows that none of the math teachers at LNHS have won any divisional, regional, national, or worldwide recognition. However, 8 or 66.67% of the teachers had received praise at the school level in the previous 5 years. Receiving honors or recognition will be a highly fulfilling experience for a great classroom educator and his or her students. Some of the well-known extrinsic and intrinsic motivating theories are built on teacher recognition. It gives the other educators striving to enhance student learning outcomes hope for genuine recognition. Additionally, the teacher's pupils, the administration, and the broader public show pride and support (Andrews, 2011)

Extent of Occurrence of Flanders Interaction Analysis Categories (FIAC) in Classroom
Table 2 lists the data on the Flanders Interaction Analysis Categories, including Accept Feelings, Praise or Encouragement, Accepts or Uses Ideas of Students, Asking Questions, Lecture, Giving Directions, Criticizing or Justifying Authority, Student Talk Response, Student Talk Initiation, and Silence or Confusion, along with the percentage of each category occurring in the classroom.

Accept Feelings Category. In general, the overall extent of occurrences of this category is 3.16% of the overall teacher – student interaction. Among the 12 teachers observed the highest occurrence of accept feelings category is that of G9 – C with 5.02%. The lowest occurrence of this category is that of G8 – C with a percentage of 2.25%. Moreover, regarding the overall total percentage of talk used by the teachers in this category, implies that these teachers infrequently employ encouraging words as response to their students' complaints or difficulties.

Praise or Encouragement. The highest occurrence of this category is 4.65% of the overall interaction which is that of G7 – A while the lowest is that of Grade 10-A with a percentage of 0.41%. In addition, it is indicated that the overall percentage of occurrence of this category is 2.39% which implies that teachers rarely praise and use encouraging words that could help students' to be more motivated to learn.

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Table 2. Extent of Occurrence of FIAC in classroom

Flanders Interaction Categories													
CODE	GRADE 7			GRADE 8			GRADE 9			GRADE 10			Overall %
	A	B	C	A	B	C	A	B	C	A	B	C	
TEACHER INDIRECT TALK													
C1	2.79	2.69	3.98	3.14	2.97	2.25	4.39	2.83	5.02	2.46	2.37	3.14	**3.16**
C2	4.65	3.76	2.99	3.67	3.47	2.7	0.88	2.83	0.91	0.41	1.19	2.24	**2.39**
C3	2.79	3.23	1.99	3.14	2.48	1.8	3.51	2.36	1.37	4.1	5.53	2.69	**2.97**
C4	21.4	21.5	20.9	20.9	21.8	24.8	22.8	22.6	23.7	24.6	22.9	22.4	**22.61**
TEACHER DIRECT TALK													
C5	22.3	22	19.9	22	22.3	23.9	23.3	21.2	25.1	26.6	24.9	21.5	**23.04**
C6	5.58	4.3	5.47	6.28	5.45	5.41	4.39	5.19	4.11	2.87	3.56	4.04	**4.66**
C7	4.19	5.38	3.48	3.14	3.96	3.15	4.83	3.77	2.28	2.46	3.95	3.59	**3.66**
STUDENT TALK													
C8	21.4	22.6	18.9	22.5	20.3	22.5	22.4	20.3	22.8	26.6	21.7	17.9	**21.73**
C9	9.3	6.45	8.46	7.33	8.42	6.31	6.58	4.72	6.85	5.33	7.91	8.97	**7.2**
SILENCE/PAUSE/CONFUSION													
C10	5.58	8.07	13.9	7.85	8.91	7.21	7.02	14.2	7.76	4.51	5.93	13.5	**8.59**
Total %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	**100%**

Legend:

C1 – Accept feelings
C2 – Praise or Encouragement
C3 – Accept or Uses Ideas of Students
C4 – Asking Questions
C5 – Lecture/Lecturing
C6 – Giving Directions
C7 – Criticizing or Justifying Authority
C8 – Student Talk Response
C9 – Student Talk Intuition
C10 – Silence/Pause/Confusion

Accepts or Uses Ideas of Students. This category is characterized by approval of students' ideas and teachers' ideas of the ideas of students during the discussion. The class with the highest occurrence of this category is G10 – B with 5.53% of all interaction while the lowest is G9 – C with 1.37%. Moreover, the overall percentage of occurrence for this category is 2.97%. This means that teachers do not often deal with the students' suggestions and develop ideas from their students' ideas.

Asking questions. This category comprises the questions raised by the teacher to her students. The teacher with the highest number of 'questions asked' is that of G10 – A with 24.6% of the total interactions while G7-C has the lowest percentage of occurrence with 20.9%. It is also indicated that this category is one of the highest occurrences and most used by the teachers with

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22.61% of the overall total percentage among the first four (4) categories. This means that teachers challenge their students to learn since asking questions fosters students' alternative and more complex representation of their lessons. Moreover, asking questions is based on the teacher's ideas relevant to the content and procedures in which their students are expected to answer and participate.

Lecture. The lecture is the core of the discussion in the classroom. It is where the subject matter revolves. The occurrence of the lecture category is that of G10 – A with 26.64% while G7-C has the lowest occurrence with 19.9%. On the over-all, the lecture category has a mean of 23.04% of the total classroom interaction, the highest among the categories. This implies that the teachers are always expressing and explaining their own ideas, giving facts of opinions about the content and procedures to their classes.

Giving Directions. Generally, this category comprises 4.66% in the over-all extent of occurrence. Among the 12 teachers observed, the highest percentage of occurrence of Giving Direction Category is that of G8 – A with 6.28%. The lowest occurrence of this category is that of G10 - A with a percentage of 2.87%. This category plays around the discourses of teachers with regards commands and directions. Further, the overall mean occurrence in this category implies that the teachers are not usually asking by giving orders or giving instructions to his/her students in which they are expected to comply. Possibly this is due to the result on lecture category.

Criticizing or Justifying Authority. The highest percentage of occurrence of this category is that of G7 – B with 5.38% while the lowest occurrence of this category is that of G9 – C teacher with 2.28%. The over-all percentage of occurrence of this category is 3.66%. This means that the teachers contribute a little amount of criticizing or justifying authority as one with the least occurrence among the first seven (7) categories. This further implies that the 12 math teachers are not used to asking his/her students or interrupting with nonsensical questions, and asking with 'WHAT' or WHY' questions.

Student Talk Response. When teachers ask questions, the tendency is that students will respond. Thus, this category is one with the highest occurrence among categories with 21.73% in the overall percentage of occurrence. Among the 12 classes observed the highest occurrence of Student Talk Response Category was observed in G10 – A with 26.64% while the lowest was in G10-C with 17.94%. Further, the overall percentage of occurrence of this category implies that students have devoted a large amount of talk compared with the other categories. Moreover, in this category, students talk response refers to teacher-initiated contacts to solicit statements and allowing students to express their own ideas relevant to the lessons.

Student talk Intuition. Sometimes even without asking, the students initiate their own talk, when they need to. Among the 12 classes observed G7 – A has the highest percentage with 9.30% of total talk initiated by students, while G10 – A with 5.33% has the lowest percentage of occurrence among the classes observed. Moreover, Table 2 indicates a 7.20% of the overall total initiated talk of the students. Thus, this result implies that students from the 12 classes observed have contributed a little amount of initiated talk as their freedom to develop opinions and initiate new topics in their classes is not encouraged.

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Silence/Pause/Confusion. In this category, the highest percentage of occurrence is in G9 – B with 14.2% and the lowest is in G10 – C with 4.51% of occurrence. Table 2 further indicates that the overall percentage of occurrence of this category is 8.59%. This means that teachers–students talk devoted a total of 91.41%. Thus, the result clearly implies that there is an active interaction between teacher and students during the class.

Conferring to the results shown in Table 2 above, the lecture category, followed by the asking questions and student talk response categories, is the most prevalent talk genre. Thus, the outcome is consistent with the research by Nurmasitah (2010), which found that direct talk, which includes lecturing, giving instructions, and criticizing or defending authority, is the most common type of talk during teacher talk time. Asking questions, which falls under the indirect talk category, is next in importance, followed by the student talk category.

Flanders Formulates Ratios

The Flanders Formulates Ratios refers to the percentages of talk between teacher-students interaction during classroom discussion, these include the teacher talk ratio, indirect talk ratio, direct talk ratio, and Student talk ratio, Silence ratio, and Indirect/Direct talk ratio. Table 3 presents the relevant data.

Table 3. Flanders Formulates Ratios of the Mathematics Classes

FLANDERS FORMULATES RATIOS						
Classroom Code	**Teacher Talk Ratio**	**Indirect Talk Ratio**	**Direct Talk Ratio**	**Student Talk Ratio**	**Silence Ratio**	**Indirect /Direct Talk Ratio**
G7-A	63.72	31.63	32.09	30.70	5.58	98.55
G7-B	62.90	31.18	31.72	29.03	8.06	98.31
G7-C	58.71	29.85	28.86	27.36	13.93	103.45
G8-A	62.30	30.89	31.41	29.84	7.85	98.33
G8-B	62.38	30.69	31.68	28.71	8.91	96.88
G8-C	63.96	31.53	32.43	28.83	7.21	97.22
G9-A	64.04	31.58	32.46	28.95	7.02	97.30
G9-B	60.85	30.66	30.19	25.00	14.15	101.56
G9-C	62.56	31.05	31.51	29.68	7.76	98.55
G10-A	63.52	31.56	31.97	31.97	4.51	98.72
G10-B	64.43	32.02	32.41	29.64	5.93	98.78
G10-C	59.64	30.49	29.15	26.91	13.45	104.62
Mean	**62.42**	**31.09**	**31.32**	**28.89**	**8.70**	**99.35**

Teacher Talk Ratio. Teacher talks ratio refers to the percentage of all the seven (7) teacher talk categories to the overall interaction. The mean of the teacher talk ratio for all Mathematics classes is 62.42%. The highest teacher talk ratio recorded was observed in Grade 10-B with 64.43% while the lowest was observed in Grade 7-C with 58.71%. Hence, the outcome demonstrates that, among

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the Flanders ratios, teacher talk has the greatest ratio and is the most prominent. This finding is consistent with Putri's (2014) findings that instructor speaking dominates classroom interactions.
Indirect Teacher Talk Ratio. The Indirect teacher talk ratio refers to the percentage of occurrence of the categories Accept Feelings, Praise or Encouragement, Accepts and Uses Ideas of Students and Asking Questions to the total number of interactions. The mean of the indirect talk ratio is 31.09%, the lowest of which is that of Grade 7-C with 29.85% and the highest is that of Grade 10-B with 32.02%.

Direct Teacher Talk Ratio. The direct teacher talk ratio measures the proportion of contacts that fall into the categories of lecturing, giving instructions, and criticizing or defending authority. The mean of the direct conversation ratio for all classes is 31.32 percent, which is about the same as the indirect talk ratio. The greatest direct talk ratio is 32.46 percent, which is that of Grade 9-A, and the lowest is 28.86 percent, which is that of Grade 7-C. Furthermore, it is indicated that both indirect and direct talk ratio which is under teacher talk, shows that indirect talk ratio is less than direct talk ratio. This means that most of the 12 teachers use direct teaching. Thus, the result does not agree on the study of Iroha Kalu (2004), that the teachers use Indirect teaching in which indirect talk obtained greatest frequency and the dominant talk in classroom interaction.

Student Talk Ratio. The student talk ratio is influenced by the categories of student talk response and student talk initiation. Nearly half of the teacher talk ratio, or a mean proportion of 28.89%, is found in this ratio. The percentage of students talking during class ranges from 25.0 percent in Grade 9-B to 31.97 percent in Grade 10-A.

Silence Ratio. The least common occurrence is silence, with an average mean of 8.7%. Grade 10-A has the lowest percentage of silent students (4.5%), while Grade 9-B has the greatest percentage (14.15%). All of the pauses and instances of misunderstanding that take place during class discussions are measured by silence. Furthermore, the total of the teacher talk ratio, student talk ratio, and silence ratio equals 100 percent. It is unmistakably showing that the ratio of students talking during class is higher than the ratio of students remaining silent, which suggests that participation is encouraged. According to the study by Iroha Kalu (2004), the conclusion is therefore compatible with the fact that students talk more than they do when they are silent.

Indirect-direct talk ratio. The Indirect-direct talk ratio compares the level of indirect and direct talks. When the ratio is higher than 100 percent, the indirect talk dominates than the direct talk. When the ratio is lower than 100 percent, the direct talk dominates than the indirect talk. The highest of this ratio is 104.62% from Grade 10-C which means that the teacher use more indirect talks than direct talks. The lowest of this ratio is 96.88% from Grade 8-B which means that this class has more direct talks than indirect talks. This result does not agree with the study of Iroha Kalu (2004) that the indirect talk ratio is greater than direct talk ratio. The use of direct talk Lecture, Giving Direction, Criticizing or justifying authority is associated with autocratic while the use of indirect talk is associated with democratic teaching. The result clearly shows that teachers still rely on autocratic teaching as majority of the teachers used direct talk rather than indirect talk.

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Mathematics Performance

The Students' Mathematics Performance was categorized as Outstanding, Very Satisfactory, Satisfactory, and Fairly Satisfactory and did not meet the expectation. Table 4 presents the distribution of the students by level of performance.

Table 4. Distribution of Students' Mathematics Performance

Math Performance	f	%
95 – 100% (O)	21	4.62
85 – 94% (VS)	242	53.19
80 – 84% (S)	91	20.00
75 – 79% (FS)	41	9.01
75% Below (DNME)	60	13.19
Total	**455**	**100.00**
Overall Mean	**84.28 (Satisfactory)**	

Legend: O – Outstanding, VS – Very Satisfactory, S – Satisfactory, FS – Fairly Satisfactory, DNME – Did not meet Expectation

Table 4 shows that the overall mean of all classes combined was 84.28 described as ''Satisfactory''. This means that, in general, students in 12 classes observed have achieved a satisfying grade in mathematics subject. Further, considering the result of students' distribution in Mathematics Performance, Table 4 shows that majority of the students (242 or 53.19%) have 'Very Satisfactory' level of performance. On the other hand, only (21 or 4.62%) have 'Outstanding' level of performance. Moreover, 91 or 20% have satisfactory performance level; (41 or 9.01%) have fairly satisfactory level of performance; and (60 or13.19%) have not met expectation. This further indicates that 77.81% of the students have a performance level of satisfactory or better which implies that majority of the students perform well and have satisfactory level in Mathematics performance.

Relationship between the Teachers' Profile Variables and the Extent of Occurrence of Flanders Interaction Analysis Categories in Classroom

In this study, the relationship of Teachers' Profile Variables to the Extent of Occurrence of Flanders Interaction Analysis Categories (FIAC) in classroom was determined. Table 5 presents the relevant data.

As shown in Table 5, the profile variables Age, Sex, and Year in Teaching Profession, and the Awards and Recognition are not significantly related to the extent of occurrence of Flanders Interaction Analysis Categories. This is indicated that the r – values ranging from -0.505 to 0.559 with p – level higher than the significance level set at 0.05. On the other hand, the profile variables Educational Attainment and Trainings are significantly related to the extent of occurrence of FIAC. Specifically, a significant and positive relationship between Educational Attainment and the Teacher Asking Questions with r – value of 0.666 and p – level at 0.018, but negatively related to Teacher Criticizing or Justifying Authority with r – value of – 0. 666 and p – level at 0.018.

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Table 5. Teachers Profile Variables and Extent of Occurrence of FIAC in Classroom

CODE	AGE		SEX		YEARS IN TEACHING		EDUCATIONAL ATTAINMENT		TRAININGS		AWARDS AND RECOGNITION	
	r-value	p-level	r-value	p-level	r-value	p-level	r-value	p-level	r – value	p-level	r-value	p-level
C1	-0.023	0.944	-0.343	0.275	-0.073	0.823	-0.077	0.812	-0.185	0.564	0.188	0.558
C2	-0.105	0.745	0.367	0.24	-0.247	0.438	-0.563	0.056	-0.068	0.833	-0.369	0.238
C3	-0.27	0.396	-0.122	0.705	-0.095	0.768	-0.307	0.331	0.029	0.929	-0.235	0.463
C4	0.323	0.306	0.073	0.821	0.417	0.177	**.666***	**0.018**	0.302	0.341	0.402	0.195
C5	0.309	0.329	0.122	0.705	0.424	0.169	0.461	0.132	0.535	0.073	0.559	0.059
C6	0.126	0.696	0.171	0.594	-0.088	0.785	-0.512	0.089	0.119	0.714	0.101	0.756
C7	-0.474	0.12	-0.024	0.94	-0.505	0.094	**-.666***	**0.018**	-0.226	0.479	-0.346	0.27
C8	0.263	0.409	0.318	0.313	0.368	0.24	0.358	0.253	0.323	0.305	0.469	0.124
C9	-0.288	0.364	-0.22	0.491	-0.375	0.23	-0.205	0.523	0.183	0.569	-0.171	0.594
C10	-0.147	0.648	-0.122	0.705	-0.251	0.432	-0.205	0.523	**-.686***	**0.014**	-0.406	0.19

*Correlation is significant at the 0.05 level (2 tailed)

Legend:
C1 – Accept feelings
C2 – Praise or Encouragement
C3 – Accept or Uses Ideas of Students
C4 – Asking Questions
C5 – Lecture/Lecturing
C6 – Giving Directions
C7 – Criticizing or Justifying Authority
C8 – Student Talk Response
C9 – Student Talk Intuition
C10 – Silence/Pause/Confusion

Moreover, Attendance in Trainings is significant but negatively related to Silence Category with r – value of – 0. 686 and p – level at 0.014 was found. Thus, the corresponding null hypotheses were rejected. This further imply that among teachers have who pursued Master's Degree or Graduate Studies, the asking questions technique which is under Teacher indirect talk tend to increase. However, criticizing or justifying Authority tend to decrease in the mathematics classes. Moreover, a teacher with more trainings tend to become more capable to manage the class to have an interactive and participative in the classroom setting where the students become motivated to interact in Mathematics class discussion.

Relationship between Mathematics Performance and Flanders Formulates Ratios

In this study, the relationship of Students' Mathematics Performance to the Flanders Formulates Ratios was determined. Table 6 presents the relevant data.

As shown in Table 6, the students' Mathematics performance is not related to the Flanders Formulates Ratios. Specifically in terms of Indirect Talk Ratio, Students Talk Ratio, and Silence Ratio. This is indicated that the r – values ranging from -0.573 to 0.497 with p – level lower than the significance level set at 0.05. On the other hand, the students' Mathematics performance is significantly related to the Flanders Formulates Ratios. Specifically, a significant and positive relationships are observed between students' Mathematics performance and Teacher Talk Ratio with r – value of 0.615 and p – level at 0.033, Direct Talk Ratio with r – value of 0.671 and p – level at 0.017.

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Table 6. Students' Mathematics Performance and Flanders Formulates Ratios

Flanders Formulates Ratios	Students' Mathematics Performance	
	r- value	p-value
Teacher talks ratio	**0.615**	**0.033***
Indirect Teacher talk ratio	0.497	0.101
Direct Teacher talk ratio	**0.671**	**0.017***
Student talk ratio	0.392	0.208
Silence ratio	-0.573	0.051
Indirect/direct talk ratio	**-0.729**	**0.007***

*Correlation is significant at the 0.05 level (2 tailed)

However, a significant but negative relationship between students' Mathematics performance and Indirect/Direct Talk Ratio with r – value of -0.729 and p – level at 0.007 were found. Thus, the corresponding null hypotheses were rejected. This further imply that students have higher performance in Mathematics when teachers contribute more talk with the use of direct teaching to communicate knowledge in facilitating Mathematics class in the teaching learning process. Moreover, this result does not agree with the study of Iroha Kalu (2004) that found a significant and positive relationship between Teacher Indirect Talk and students' performance.

5. CONCLUSION AND RECOMMENDATION

In the light of the above findings, it was concluded that the mathematics teachers are 'Middle Age'. Mostly females 'moderately experienced', teachers with Master's units, attended division and regional level trainings, with few awards and recognitions. The most common Flanders Interaction Analysis Categories are teacher discussions, especially direct lectures (FIAC). The teacher talk ratio is the highest of the Flanders Formulates Ratios in classroom interactions, with the teacher direct ratio being higher than the teacher indirect talk ratio. The students' mathematical proficiency is satisfactory. The Extent of Occurrence of Flanders Interaction Analysis Categories is Significantly Associated with Teachers' Profile (FIAC). Teachers with more knowledge tend to question students more and refrain from criticizing or defending authority. Additionally, pupils of teachers with more training tend to speak up more in class. Flanders Formulates Ratios have a substantial impact on students' mathematical performance.

Based on the study's findings, the following suggestions are made.:

1. Teachers are encouraged to attend trainings/workshops in different levels like national and international level. They should also be intrinsically motivated to earn awards and recognition not only at the school or local level but also at the national and international, if possible.
2. Teachers are encouraged to pursue and finish their Graduate studies to deepen their insights on subject areas knowledge and have the opportunity to apply new concepts and methodology that may help them improve teaching.
3. Mathematics teachers are also encouraged to adopt direct verbal teaching. In addition, teachers should update themselves with the 21st century skills in the teaching learning process. It is also important to practice and demonstrate in class discussion the FIACS categories accepting

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feelings, using their ideas and praising or encouraging our students' so they will be more motivated.

4. Mathematics teachers may provide students' opportunities for both practice and discovery of ideas to construct knowledge in Mathematic to increase the performance.
5. A study be conducted on Classroom Interaction Analysis and Students Academic Achievement in Mathematics at least two (2) grading period or even the whole Academic year.
6. A study be conducted on Classroom Interaction Analysis and Students Academic Achievement in Mathematics including the relationship of the teachers' performance and other profile variables to the extent of occurrence of FIAC in classroom.

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