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The Influence of Peer Assessment on Students' Motivation to Learn Mathematics in Public Secondary Schools in Mezam Division, North West Region of Cameroon

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Abstract: This study examined the influence of peer assessment on students' motivation to learn mathematics in public secondary schools in Mezam division of the northwest region of Cameroon. To achieve this, two specific research questions were formulated in order to find out the effect of peer grading, and peer feedback on students' motivation to learn mathematics. The study employed a cross-sectional descriptive survey design. The population of the study was 840 form fours students from three secondary schools of Mezam division from where a sample of 264 students were randomly selected. Data from participants was collected using a structured 4 Likert type scale questionnaire, with an internal consistency of 0.871, using the Cronbach alpha Reliability test. Data collected was analyzed using both descriptive and inferential statistics, where descriptive statistics such as the mean and standard deviations, frequencies and percentages were used to answer the research questions while linear regression was used as the inferential tool to verify the null hypothesis. Findings from the first research question showed that peer grading has a significant effect on students' motivation to learn mathematics at 0.01 level of significance and 13.9% of the variations in students' motivation to learn mathematics could be accounted for by involvement in peer grading practices. Additionally, it was found that peer feedback has significant impact on students' motivation to learn mathematics at 0.01 level of significance and 10.40% of the variation in students' motivation to learn mathematics can be explained by their engagement in peer feedback activities. Based on these findings it was concluded that peer assessment has a significant effect on students' motivation to learn mathematics in secondary school and it was therefore recommended among other things that teachers should provide opportunities for peer grading and peer feedback during mathematics classes, while students should take these activities with seriousness.

Key points: Peer Assessment, Peer grading, Peer feedback, Motivation to learn mathematics

GENERAL INTRODUCTION

Currently, the majority of educational changes are in favor of moving away from the traditional teacher-centered method of teaching and learning to a more student-centered approach. (Becker, 2017). This approach emphasizes on active learning and collaborative feedback, aligning with Piaget's (1976) idea that learners play an active role in their learning and are engaged in constructing their understanding of the world. Irrespective of the strategy involved, learning has to be measured as the process continues, and timely feedback given to learners in order to improve on their learning, (Asenath, 2020). Measurement of learning therefore is not a mere teacher affair, especially with the inclusion of learners who can foster their learning socially with peer. Bruner (1966), argues that learners actively construct knowledge by engaging in meaningful activities within their social and cultural environments, hence social interaction among peer may bring this to

reality in our today's classroom and this can be achieved through classroom activities like peer assessment.

The idea of peer assessment is critical and can positively influence learners in sciences, especially those in mathematics discipline. Mathematics is a fundamental subject that plays a crucial role in students' academic success and future career prospects (Beyoh, 2018). Application of peer assessment practices in teaching mathematics can therefore be important to students' learning. Teaching, learning and assessment of mathematics through peer assessment can possibly be realized if students actively get involved in the process, considering it importance to their future career prospects.

Background of the Study

According to Nyman (2019) there exist different factors that motivates students to the learning of mathematics such as teaching methodology, but the form of assessment adopted by teachers during assessment can also have a role in this context of mathematics. Peer assessment as a form of collaborative learning, has the potential to enhance students' motivation and improve their understanding of mathematical concepts (Topping, 2007). Peer assessment is a process in which students assess and evaluate the work of their peers. It is widely used in educational settings as a means to promote active learning, social interaction, and collaborative learning. Peer assessment has been recognized in enhancing student learning if sensitively implemented (Sebba et al, 2008). They go on to say that it provides opportunities for students to receive constructive feedback from their peers, which can enhance their self-confidence and self-efficacy in mathematics. The practice of peer assessment can therefore possibly involve classroom activities such as peer grading, and peer feedback.

According Topping (2007) Peer grading involves giving a mark or grade for an assessed item, to specify the quality. This entails that if students get involved into grading their peers it could motivate them to learn mathematics. According to Dongmei (2020), peer feedback, refers to an activity in which a companion exchanges writing essays, negotiates opinions, and provides suggestions for modification and compositions. It usually includes one-on-one conversation, team meetings or classroom discussions. This can possibly imply that, by observing and checking the behavior of others within a class setting while providing feedback support to each other, students can get motivated to work harder, and this can lead to their effective learning of mathematics.

Statement of the Problem

When students participate in peer assessment practices, they become more self-aware and critical of their own work (Cobbinah, 2019). They also provide feedback, grade, and evaluate the work of their peers. This shows that peer assessment practice is seen as a catalyst for behaviors that is helpful in driving students' interest and zeal in learning across different disciplines. Yet it has been realized that in most secondary schools today, students generally feel reluctant or less engaged in learning mathematics as they ought to do and this could be due to the fact that they may possibly lack that drive or that energizer that pushes them to actively get engaged in the mathematics learning process.

Based on researcher' observations it is very possible that this lack of motivation to take up mathematic study actively in order to develop the skills and interest in the subject could be due to the absence of peer assessment practices during mathematics learning where they could possibly grade, and provide feedback to each other. But the absence of this practice can possibly come about with that lack of motivation to learn the mathematics. Therefore, this study investigates the influence of peer assessment on students' motivation to learn Mathematics in public secondary.

Main Objectives of the Study

To determine the influence of peer assessment on students' motivation to learn mathematics in public secondary schools in Mezam Division.

Specific objectives

- To find out the influence of peer grading on students' motivation to learn mathematics in public secondary schools
- To determine the influence of peer feedback on students' motivation to learn mathematics in public secondary schools

Main Research Questions

What is the influence of peer assessment on students' motivation to learn mathematics in public secondary schools?

Specific Research Questions

- How does peer grading affect students' motivation to learn mathematics in public secondary schools?
- How does peer feedback affect students' motivation to learn mathematics in public secondary schools?

Research Hypotheses

- **Ho**: Peer assessment has no significant influence on students' motivation to learn mathematics in public secondary schools.
- **Ha**: Peer assessment has a significant influence on students' motivation to learn mathematics in public secondary schools.

Specific Hypotheses

- **Ho1:** There is no significant influence of peer grading on students' motivation to learn mathematics in public secondary schools.
- **Ha1:** There is a significant e influence of peer grading on students' motivation to learn mathematics in public secondary schools.
- **Ho3:** There is no significant influence of peer feedback on students' motivation to learn mathematics in public secondary schools.
- **Ha3**: There is a significant influence of peer feedback on students' motivation to learn mathematics in public secondary schools.

Scope of the Study

This study was carried out in secondary schools in Mezam division of the northwest region of Cameroon, specifically in public secondary schools with target being form four students. The main concepts of the study were; peer assessment, motivation to learn mathematics, peer grading, and peer feedback. The study was limited to the theories of social learning by Bandura (1986) and social constructivism by Vygotsky (1934). Methodologically, the study adopted a quantitative approach with the use of closed ended questionnaire for data collection.

Operational Definition of Terms

Peer assessment: According to Cobbinah (2019), Peer-assessment is the process by which learners assess, critique, make value judgment and express their views points on the quality and standard of work of other learners, providing feedback upon which they can improve their performance.

In this paper, peer assessment is the act of helping students work by themselves in order to acquire skills, as they set goals, grade peers, reward peers, monitor and provide feedback to peer or group of peers.

Motivation to Learn: According to National Academies of Sciences, Engineering, and Medicine (NASEM) (2018), Motivation to learn is a condition that activates and sustains behavior toward a

learning goal. In this paper, motivation to learn is that drive which activates and pushes a learner to peruse, the achievement and understanding of a particular concept in given area of study.

Motivation to Learn Mathematics: Motivation to learn mathematics is that drive which activates and pushes a learner to peruse the achievement and understanding of mathematical concepts as triggered by peer assessment.

Peer Grading: According Topping (2018) Peer grading involves giving a mark or grade for an assessed item, to specify the quality. In this study, peer grading is defined as the act of scoring, judging and grading each other based on teachers clearly determined criteria

Peer feedback: According to Dongmei (2020), Peer feedback, refers to an activity in which a companion exchanges writing essays, negotiates opinions, and provides suggestions for modification and compositions. According to this paper, it is a collaborative approach where students read, assess and brainstorm on tests, exercises, presentations, assignments, projects or other forms of academic works of peers, and offer suggestions for improvement.

LITERATURE REVIEW

Peer Grading and Motivation to Learn Mathematics

According to Newton et al. (2010), peer grading, is a cooperative learning technique that refers to a set of activities conducted either inside or outside of the classroom where students review, evaluate, and, in some cases, actually recommend grades on the quality of their peer's work. Peer grading is usually guided by a rubric developed by the instructor. An effective rubric makes grading more clear, consistent, and equitable (Ramon-Casas et al. 2019). This definition of peer grading highlights the key importance of social interaction, as students get engaged in activities that foster their learning. This therefore implies that; mathematical problems may easily be handled amongst students if they get involved into activities that brings about social interaction while challenging their thinking as they grade peers. In the specific context of mathematics, peer grading can therefore possibly address students' anxiety and fear of making mistakes in mathematics. This also means that, by receiving feedback from their peers, students may feel less intimidated by the subject and more willing to engage in problem-solving activities. This can lead to increased confidence and motivation in mathematics learning and can further incentivize active participation and excellence in mathematics learning.

Topping (1998) on the other hand is of the view that peer grading is "the process of students assessing the quality of their peer's work and providing feedback on it." This definition emphasizes the active involvement of students in evaluating the work of their peers, thereby promoting a sense of ownership and responsibility for their learning. Peer grading has shown to have a positive impact on students' learning across various disciplines, including mathematics. When students engage in peer grading activities, they can develop critical thinking skills as they analyze and evaluate their peers' work and this activity can bring about a sustained motivation towards learning the subject. Similarly, Falchikov (2005) defines peer grading as "a form of assessment in which students evaluate the quality of their peers' work using predetermined criteria." This definition highlights the structured nature of peer grading, where students apply specific criteria to assess their peers' performance. Therefore, in mathematics, this process can deepen students' understanding of mathematical concepts and problem-solving strategies and may contribute to their learning of subject. In fact, Hattie and Timperley (2007) emphasize that peer grading involves students critically evaluating mathematical solutions and providing constructive feedback to their peers. This process not only enhances students' understanding of mathematical concepts but also fosters a collaborative and supportive learning environment while maintaining their motivation towards the subject. This goes a long way to explain also why Black and Wiliam (2000), posits that when students receive feedback from their peers, they are more likely to view mistakes as opportunities for improvement rather than as failures. This positive mindset not only contribute to a growth-oriented approach to learning mathematics, but can bring about a strong motivation and interest toward the subject.

Peer Feedback and Motivation to Learn Mathematics

Topping (1998), defines peer feedback as "an instructional strategy in which students provide comments and suggestions on each other's work with the goal of improving the quality of their peers' performance." This definition underscores the collaborative nature of peer feedback, emphasizing the role of students as active participants in the learning process, providing valuable insights to their peers Topping (2018), goes further to elaborate peer feedback as that peer assessment which involves peer assessors giving information to their assesses about how they found the strengths and weaknesses of the item that was assessed. This feedback can come in the form of grade or comments and may not necessarily be verbal or two-way conversation (Gielen et al., 2010). This therefore suggest that the provision of peer feedback amongst students in mathematics classes can bring about a constant motivation of students towards the subject. According to Gielen et al. (2010), the bidirectional nature of giving and receiving feedback potentially enhances students' learning as they could learn from different examples and approaches in the process, implying that in mathematics learning, the provision of multiple examples and approaches by peers, can impact their solving skills.

Additionally, Cho and MacArthur (2010) define peer feedback as "a formative assessment tool that encourages students to engage in critical thinking and reflective learning by evaluating and offering suggestions for their peers' work." This definition highlights the developmental aspect of peer feedback, emphasizing its potential to promote metacognitive awareness and self-regulated learning among student which can also be seen as a driving force that initiates and sustain students' motivation in learning the subject. Andrade and Cizek (2010) emphasize that peer feedback can contribute to creating a community of writers within the classroom, where students learn from each other's strengths and areas for improvement.

Peer feedback has shown to have a significant impact on students' learning outcomes and communication proficiency across various educational disciplines. According to Brown et al. (2007) when students engage in providing and receiving constructive feedback from their peers, they are more likely to develop a deeper understanding of the communication process and improve on their own writing and solving skills in mathematics and this can contribute to their motivation in learning the subject as they ought to do and this explains why Hattie and Timperley (2007), emphasize that when students receive specific and targeted feedback from their peers, it enhances their self-regulation and motivation to revise and refine their works. This activity can bring about an improvement in the quality of students' solution and learning motivation as far as mathematics education is concerned.

Theoretical Perspective

Firstly, Bandura (1986) in his social learning theory; posits that individuals learn diverse aspects from each other, mainly through observation, imitation and modeling. According to Denier et al (2013), Bandura like Thorndike and Skinner, has the assumption that learning occurs through observation but learners have the ability to influence their own behaviors and the environment. This means that, when students are exposed to an environment of peer assessment practice, it can foster their learning through social interaction as they, grade and provide feedback to peers. Bandura (2001) claimed that learning is not limited to acquisition of new behaviors but also of cognitive skills, concepts, values, habits, rules, abstract and knowledge. In peer grading process, students can acquire cognitive skills, develop deeper understanding of the mathematical concepts and demonstrate positive habits that can foster their learning as they grade and receive feedback from others. According to Bandura (2001), observational learning can occur in relation to three models such as, verbal model, live model and symbolic. In the specific context of peer feedback, verbal instruction from peers during peer assessment, bring about positive learning behaviors that can foster motivation towards learning in mathematics. Bandura (1986) holds that the modeling process involves several steps, which include attention, retention, reproduction and motivation. During peer assessment, when students pay attention to the feedback provided by peer on an assessed work, they

can model them, and get motivated to learn and reproduce their solutions in excellent ways. Peer assessment allows students to observe and learn from their peers' work, providing them with examples and models for improvement, therefore indicating how relevant this theory is, to this study.

Secondly, Vygotsky (1934) theory of social constructivist, particularly the aspect of zone of proximal development (ZPD), provides a valuable framework for understanding the role of peer assessment in students' motivation to learn mathematics. Vygotsky (1978) introduced the concept of the zone of proximal development (ZPD) to describe the range of tasks that a learner can perform with the assistance of a more knowledgeable peer or adult, but cannot yet accomplish independently. In the context of peer feedback, when students engage in evaluating and providing feedback on their peers' mathematical work it can contribute to their motivation of learning mathematics. Through this process, students have the opportunity to both receive and offer support within their ZPD, thereby enhancing their understanding of mathematical concepts and solution strategies. In peer assessment the provision of feedback and constructive criticism by students to each other, students can guide their peers toward tasks that are challenging yet achievable with support, thereby promoting cognitive growth and skill development. Vygotsky (1978) emphasis on the importance of social interactions in facilitating learning within the ZPD.

Additionally, another key concept in social constructivist theory is scaffolding, which refers to the support provided by a more knowledgeable individual to assist a learner in accomplishing tasks within their ZPD. In the context of peer assessment in mathematics, students can act as scaffolds for each other by offering guidance, explanations, and feedback during the evaluation process. Han and Xu (2019) are of the view that in peer assessment, students have the opportunity to not only receive feedback from their peers but also to provide scaffolding support based on their own understanding of mathematical concepts. Peer assessment allows students to engage in reciprocal scaffolding, as they take turns assuming the roles of evaluator and recipient. By articulating their reasoning and justifying their assessments, students can develop that motivation that may deepen their own understanding of mathematical principles while also supporting their peers' learning and this explains why this theory is relevant to this study.

METHODOLOGY

Research design

The study employed a descriptive survey research design. This approach was chosen for two primary reasons. First, surveys can be administered to large samples, enhancing the reliability and generalizability of the findings. Secondly, surveys facilitate standardized data collection, ensuring that all participants answer the same questions in a consistent manner.

Area of the Study

The study was carried out in Mezam division. This division is found in the North West Region of Cameroon, and constitutes one of the seven divisions of the region, created in 197. Administratively, Mezam division has seven subdivisions, namely; Bamenda I, Bamenda II, Bamenda II, Bali, Bafut, Santa, and Tubah (MAOAR, 2013). The division has 39 public secondary schools and these rich educational facilities, ranging from nursery, through primary, to secondary and higher education, characterizes this division. The low interest in studying mathematics within the secondary schools of this division, as shown by poor performance in public exams made it necessary to carry out the study in some secondary schools in this area.

Population of study

The population of the study was made up of three secondary schools in Mezam division, North West region of Cameroon with a population size of 6057 students, 4126 females and 1931 males. The accessible population constituted of from 4 students of GBHS Bamenda, GBHS Bayelle and CCAST Bambili with a population size of 840 students, 459 females and 381 males.

Sample and Sampling Techniques

The study's participants were drawn from Form 4 students at GBHS Bamenda, GBHS Bayelle, and CCAST Bambill, all of whom resided within the same community as their respective schools. The researchers employed a non-probability sampling technique, specifically simple random sampling, to select the study sample and a sample size of 264 students was arrived at using the Krigcie and Morgan table

Instruments for Data Collection

Data collection relied on a 4-point Likert-type scale questionnaire, demonstrating high internal consistency (Cronbach's Alpha = 0.87). This instrument was chosen for its efficiency, enabling the researcher to gather data from a significant number of students quickly and affordably. The questionnaire focused on gauging Form 4 students' perspectives on the impact of peer grading and feedback on their mathematics learning motivation. Using a standardized questionnaire ensured consistent data collection, eliminating potential bias and enhancing the reliability of the obtained results.

RESULTS AND DISCUSSION

Introduction

This section presents the findings of the statistical analysis, organized into two parts. The initial part presents descriptive statistics related to the research questions. The second part presents the inferential statistics used to test the null hypothesis, culminating in a discussion of the findings based on the results of each hypothesis.

Research Question One: How does peer grading affect students' motivation to learn mathematics in public secondary schools?

Table 1: How peer grading affect students' motivation to learn mathematics.

Items		Positive Response		Negative Response			
	N	SA+A	(%) Agreed	D+SD	(%) Disagreed	Mean	Std.
When I am graded by my peer it pushes me to work harder in solving more exercises	264	244	92.4%	20	7.6%	3.31	.676
When my classmate scores my mathematics works, it moves me to learn new formulas	264	210	79.5%	54	20.5%	3.09	.822
Being scored by my classmate challenges me to work harder for higher grades	264	233	88.3%	31	11.7%	3.40	.783
Grades from my peers serve as boasters for me to sit up in mathematics classes	264	243	92.0%	21	8.0%	3.37	.663
Being assessed by my classmates, activates me to always do mathematics assignments	264	224	84.8%	40	15.2%	3.26	.796
Evaluation from peers boosts my understanding because I feel free getting back to them for clarification	264	220	83.3%	44	16.7%	3.21	.880
Being graded by peers does not motivate me to learn mathematics	264	45	17.0%	219	83.0%	3.27	.876

Mean Multiple Response	**264**	**203**	**77%**	**61**	**23%**	**3.27**	**0.785**

The table 1 presents the responses of students to peer grading and how it affects their motivation to learn mathematics in public secondary schools. The data shows that a majority of students (ranging from 79.5% to 92.4%) agree that being graded by their peers motivates them to work harder, learn new formulas, and boosts their understanding in mathematics. This indicates a positive impact of peer grading on students' motivation and engagement with the subject. Additionally, the mean scores for the positive responses (SA+A) range from 3.09 to 3.40, indicating a relatively high level of agreement among students regarding the positive effects of peer grading. The standard deviations (Std.) are also relatively low, suggesting that the responses are consistent among the students. On the other hand, the negative responses (D+SD) show that a smaller percentage of students (ranging from 7.6% to 20.5%) disagreed with the statement that peer grading motivates them to learn mathematics. The mean score for the negative responses is 3.27, indicating a relatively neutral stance among students in this regard.

Summarily, the data suggests that peer grading has a predominantly positive impact on students' motivation to learn mathematics in public secondary schools as it motivates them to work harder, learn new formulas, and boosts their understanding in solving mathematics.

Testing Hypothesis one

Ha_1: There is a significant effect of peer grading on students' motivation to learn mathematics in public secondary schools.

Ho_1: There is no significant effect of peer grading on students' motivation to learn mathematics in public secondary schools

Table 2: Regression Model Summary on peer grading and students' motivation to learn mathematics

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.373[a]	.139	.136	3.205
a. Predictors: (Constant), **Peer Grading**				

The model summary table shows that a positive relationship (R = 0.373[a]) exists between peer grading and motivation to learn mathematics. This means that the more the students grade themselves during mathematics classes, their motivation to learn mathematics tend to increase. Furthermore, R-Square for the overall model is 0.139, with an adjusted R-Square of 0.136. This suggests that 13.9% of the variations in students' motivation to learn mathematics, can be accounted for by their involvement in peer grading activities during mathematics learning.

Table 3: Regression Coefficients for peer grading and students' motivation to learn mathematics

		Unstandardized Coefficients		**Standardized Coefficients**		
Model		**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	10.603	1.443		7.349	.000
	Peer Grading	.405	.062	.373	6.508	.000
Dependent Variable: **Motivation to learn Mathematics**						

The table for regression coefficients indicates that the regression equation is given by

(Motivation to learn = 10.603+ 0.405 x Peer grading). Thus, when students practice peer grading activity during their mathematics classes, their motivation to learn mathematics is at 10.1603. When the use of peer grading increases by one unit, their motivation to learn mathematics increases by 0.405. This increase is significant at the 0.001 level of significance as indicated by the p-value of 0.000.

Table 4*:* ANOVA Table of peer grading and students' motivation to learn mathematics

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	435.151	1	435.151	42.359	.000[b]
	Residual	2691.481	262	10.273		
	Total	3126.633	263			
a. Dependent Variable: Motivation to learn Mathematics						
b. Predictors: (Constant), **Peer Grading**						

The ANOVA table shows that the F-value at a degree of freedom 263 = 42.359 with p = 0.000, p<0.05. This indicates that the test is significant at 0.01 level of significance, giving a 0.0 percent probability of rejecting the alternative hypothesis (Ha_1). Therefore, it can be concluded peer grading has a significant effect of on students' motivation to learn mathematics, at 0.01 level of significance, and 13.9% of the variations in students' motivation to learn mathematics, can be accounted for by their involvement in peer grading activities during mathematics learning, because peer grading motivates them to work harder, learn new formulas, and boosts their understanding in solving mathematics.

This result is similar to the findings by Sadler and Good (2016) who upon investigating the impact of self- and peer-grading on student learning in Sudbury, found that there exists a very high correlation between teachers' grades and students' grades and that peer grading was effective in fostering students learning. Similarly, a study by Abdou (2017) on the effect of peer/self-assessment on students' learning Kentucky University revealed that peer grading contributes to students' learning through collaboration, and a supportive learning environment and promote a sense of responsibility through awareness of course requirements and expectations, as well as the development of evaluative skills and strategies to fill identified learning gaps

Research Question Two: How does peer feedback affect students' motivation to learn mathematics in public secondary schools?

Table 5: How peer feedback affects students' motivation to learn mathematics

Items		**Positive Response**		**Negative Response**			
	N	**SA+A**	**(%) Agreed**	**D+SD**	**(%) Disagreed**	**Mean**	**Std.**
Suggestions from my classmates on mathematics exercises pushes me to learn well	264	227	86.0%	37	14.0%	3.17	.778
Comments from peer on mathematics problems, helps to improve the quality of my solutions	264	190	72.0%	74	28.0%	2.84	.908
Corrections from my peers challenges me to master mathematics formulas	264	114	43.2%	150	56.8%	2.32	1.063
Timely feedback from peer improves my solving skills in mathematics	264	214	81.1%	50	18.9%	3.02	.820
Obtaining clarification from my peers, helps me to use correct methods and formulas in solving	264	240	90.9%	24	9.1%	3.27	.781

mathematics questions							
Receiving guide from my classmates makes it easy for me to understand solving	264	236	89.4%	28	10.6%	3.32	.744
Feedback from peers on mathematics exercises does not help me to learn	264	49	18.6%	215	81.4%	3.22	.976
Multiple response	**264**	**182**	**68.7%**	**82**	**31.3%**	**3.022**	**.867**

The responses from the table above about peer feedback on students' mathematics learning, shows a positive impact on their motivation to learn mathematics in public secondary schools. The majority of students (ranging from 68.7% to 90.9%) agreed that various forms of peer feedback, such as suggestions, comments, corrections, timely feedback, obtaining clarification, and receiving guidance from their peers, positively influence their motivation and learning outcomes in mathematics. Students expressed that peer feedback pushes them to learn well, helps improve the quality of their solutions, challenges them to master mathematical formulas, improves their solving skills, and helps them use correct methods and formulas in solving mathematics questions. The mean scores for these positive responses range from 2.32 to 3.32, indicating a relatively high level of agreement among students regarding the motivating effects of peer feedback. The standard deviations (Std.) are also relatively low, suggesting consistent responses among the students. On the other hand, a smaller percentage of students (ranging from 9.1% to 31.3%) disagreed with the positive impact of peer feedback on their motivation to learn mathematics. The mean score for the negative responses is 3.022, indicating a relatively neutral stance among students in this regard.

Summarily, it can be seen that peer feedback has a predominantly positive impact on students' motivation to learn mathematics in public secondary schools. This is shown by the fact that when students receive feedback such as suggestions, comments, corrections, clarification, and guidance from their peers, it helps improve the quality of their solutions, challenges them to master mathematical formulas, improves their solving skills, and helps them use correct formulas in solving mathematics questions.

Testing Hypothesis Two

Ha_2: There is a significant effect of peer feedback on students' motivation to learn mathematics in public secondary schools.

Ho_2: There is no significant effect of peer feedback on students' motivation to learn mathematics in public secondary schools

Table 17: Regression Model Summary on peer feedback and students' motivation to learn mathematics

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.375[a]	.141	.138	3.202
a. Predictors: (Constant), **Peer Feedback**				

The model summary table shows that a positive relationship (R = 0.375[a]) exists between peer feedback and motivation to learn mathematics. This means that the more students provide feedback to their peers during mathematics classes, the more their motivation to learn mathematics increases. The table further reveals the overall R-Square for the model to be 0.141, with an adjusted R-Square of 0.138. This means that 10.40% of the variations in students' motivation to learn mathematics, can be accounted for by their involvement in peer feedback practices during mathematics learning.

Table 18: Regression Coefficients for peer feedback and students' motivation to learn mathematics

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	10.529	1.444		7.293	.000
	Peer Grading	.443	.068	.375	6.555	.000
Dependent Variable: **Motivation to learn Mathematics**						

The table for regression coefficients indicates that the regression equation is given by

(Motivation to learn = 10.529 + 0.445 x Peer Monitoring). Hence, when students monitor their peers during mathematics classes, their motivation to learn mathematics is at 10.529, when peer monitoring increases by one unit, their motivation to learn mathematics increases by 0.445. This increase is significant at 0.001 level of significance as indicated by a p-value of 0.000.

Table 20: ANOVA Table of peer feedback and students' motivation to learn mathematics

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	440.572	1	440.572	42.974	.000[b]
	Residual	2686.061	262	10.252		
	Total	3126.633	263			
a. Dependent Variable: **Motivation to learn Mathematics**						
b. Predictors: (Constant), **Peer feedback**						

The ANOVA table shows that the F-value at a degree of freedom 263 = 42.94, with a p-value of 0.000, $p<0.05$. This shows that the test is significant at 0.01 level of significance, giving a 0.0 percent probability for rejecting the alternative hypothesis (Ha_3). Thus, since Ha_3 is retained, it can be concluded there exist a significant influence of peer feedback on students' motivation to learn mathematics with 0.01 level of significance and 10.40% of the variations in students' motivation to learn mathematics, can be accounted for when they receive feedback such as suggestions, comments, corrections, clarification, and guidance from their peers.

This finding is in line with that of what Kim-Daniel et al., (2023) who upon examining students' experiences of peer feedback practices as related to awareness in raising of learning goals, self-monitoring, self-efficacy, anxiety, and enjoyment in mathematics found that peer- feedback practices lead to peer monitoring which, increases motivation in peer tutoring of mathematics. Similarly, findings are related to that of Choi (2018), who investigated the effects of peer tutoring and feedback on academic learning of mathematics in Hanbat National University and found that participants in the test group were significantly affected by peer feedback, which satisfactorily improved on their mathematics learning.

SUMMARY, CONCLUSIONS AND RECOMMENDATION

Introduction

This section synthesizes the study's findings, drawing conclusions and offering informed recommendations. Additionally, it provides suggestions for future research directions based on the insights gained.

Summary

The objectives of the study were to find out the extent to which peer grading influences students' motivation to learn mathematics and how peer feedback also influences students' motivation to learn mathematics in public secondary schools in Mezam Division, North West Region Cameroon

Peer grading and students' motivation to learn mathematics in public secondary schools

Peer grading has a significant influence on students' motivation to learn mathematics, at 0.01 level of significance, and 13.9% of the variations in students' motivation to learn mathematics, can be accounted for by their involvement in peer grading activities during mathematics learning.

Peer Feedback and students' motivation to learn mathematics in public secondary schools

There exists a significant influence of peer feedback on students' motivation to learn mathematics with 0.01 level of significance and 10.40% of the variations in students' motivation to learn mathematics, can be accounted for when they receive feedback such as suggestions, comments, corrections, clarification, and guidance from their peers

Conclusion

The following conclusion were made based on the findings that study obtained. Firstly, the study found that there exists a statistically significant positive effect of peer grading on students' motivation to learn mathematics in public secondary schools and based on this finding the study concludes that peer grading such as scoring, critiquing and judging has significant effect on students' motivation toward learning of mathematic. Secondly, the study found a statistically significant influence of peer feedback on students' motivation to learn mathematics. The study concludes that peer feedback such as suggestions, comments, corrections, clarification, and guidance have significant influence on students' motivation toward learning of mathematics in secondary school.

Recommendations

- Teachers should intensify the use peer grading as a formative assessment tool during mathematics classes and students should engage actively in peer grading activities
- Teachers should applaud and encourage peer feedback activities within students in mathematics classrooms while students should take peer feedback activities seriously by offering suggestions and providing helpful comments to peers.

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