Relative Contributions of Motivating Factors on Pupils’ Academic Performance in Mathematics in Bamenda II Sub-Division

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Abstract:
The main objective of this study was to determine the relative contributions of motivating factors on pupils’ academic performance in mathematics in Bamenda II Sub Division. Two specific objectives, two research questions and two hypotheses guided the study. The study adopted the descriptive survey research design and correlational research design. The population of the study was made up of 150 primary three pupils from two functional public primary schools in Bamenda II Sub Division. Making use of the Krejcie and Morgan table and employing the stratified proportionate sampling technique, 108 pupils were selected to constitute the sample of the study. Data was collected using a questionnaire. The questionnaire was validated by experts and its reliability assured using the Cronbach Alpha. The data was analyzed using Pearson product moment correlation (r), the co-efficient of determination (r²) to answer the research questions and the two tailed p-value for correlation to test the hypotheses at 0.05 level of significance. The findings of the study revealed that pupils’ interests, incentives and rewards in mathematics classrooms all contribute significantly to their academic performance in mathematics. It was therefore recommended among other things that pupils’ interest should be carefully instilled, nurtured, reactivated and sustained in a bid to keep them focused on the subject even in their later years of study. Furthermore, well thought of incentives and rewards in mathematics classrooms should be used as they play a significant role in improving the performances of pupils in mathematics.

Keywords: motivating factors, pupils’ academic performance, incentives and rewards, pupils’ interests, mathematics.

Introduction
Mathematics is a key subject required by every citizen to be able to survive in this 21st century. No doubt digital literacy is considered to be a 21st century skill. It is however sad to note that many learners have phobia for this very important subject, leading to mass failures in official examinations in Cameroon. This phobia which starts as early as in primary schools needs to be nipped. From observation, the foundation to study mathematics is not well laid in the primary schools in Cameroon as sufficient motivation appears to be lacking. There is therefore great need to find out how motivating factors such as pupils’ interest, incentives and rewards, contribute to the academic performance of primary school pupils in Cameroon.

Literature Review
Motivation could be seen as our enthusiasm for doing something. It is the why behind every action. Motivation is the reason or reasons for acting or behaving in a particular way. It helps us to set a goal and reach it. Etymologically, the term motivation is derived from the Latin verb

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“movere” which literally means to move (Hawthrone, 2021). It is therefore what keeps us moving in education. Motivation helps children and young people to focus their attention on a key goal or outcome. In doing so, they are not worried by possible distractions and are therefore able to maintain their attention during longer periods of time. Pupils who are motivated display goal-orientated behaviors. They take initiative, show resilience, harness their curiosity, care for and respect their work. They are equipped to coordinate their own learning journey. Motivating factors such as pupils’ interest, incentives and rewards especially in the early years of study are very crucial.

Interest can be seen as a psychological state of getting an effective response to any topic of focus. In education, pupils’ interest refers to the inclination of the pupils towards a particular subject in which they are easily able to connect without any stress or obstacle. Meanwhile rewards are often retrospective and given after a pupil has completed a task or has achieved a goal. Thus they act as a form of acknowledgement for a pupil's hard work. On the other hand, Incentives are eventual and announced ahead of time, providing pupils with a clear objective to work towards to receive the promised benefit.

Considering that mathematics is a subject still dreaded by many, and that one cannot do without it in this 21st century; given that many stakeholders in Cameroon still think that the unsatisfactory performances in mathematics witnessed at the General Certificate of Education (GCE) examinations at the ordinary level can still be largely attributed to the mathematical foundations laid at the basic education level, it is hoped that the aforementioned motivating factors could eventually help primary school teachers to nip the mathematics phobia problem at its bud and consequently improve and sustain good performance in the subject right from the initiation stage of pupils’ formal learning.

When we talk academic performance we are referring to specified level of attainment or ability in academic work as appraised by the teachers, by standardized tests or by a combination of both as outlined by Chaplin (2017). Furthermore, Bhatnagar (2015) on his part considers Academic Performance of pupils as a part of their total behaviour. It is the product of the interaction of the student, as an individual with his or her environment such as school, teachers and peers. Some researchers seem to suggest that some motivating factors have a link with learners’ academic performance.

Herpratiwi & Tohir (2022) carried out a study on learning interest and discipline on learning motivation. The study was carried out in Stkip Al Islam Tunas Bangsa with a population size of 38 students. They used a descriptive quantitative research study with the use of questionnaire in carrying out the study. Findings proved that interest in learning influences learning motivation and consequently, the learners’ academic performance.

West (2014) carried out a study on the use of incentives for motivating students to read which was carried out in New York with a population size of 22 students. The study used the descriptive survey design and a questionnaire to come out with the findings. The findings of the study indicated that increase in incentives leads to an increase in students’ motivation to read, including students with increased access to books and consequently to their performances in reading.

### Objectives of the Study

- To determine the relative contribution of pupils’ interests on their academic performance in mathematics in Bamenda II Subdivision.
- To find out the relative contribution of incentive and rewards on pupils’ academic performance in mathematics in Bamenda II Subdivision.

### Research Questions

- What is the relative contribution of pupils’ interests on their academic performance in mathematics?
- What is the relative contribution of incentives and rewards on pupils’ academic performance in mathematics?
Hypotheses

H₀₁: Pupils’ interests have no significant contribution to their academic performance on mathematics.

H₁₁: Pupils’ interests have a significant contribution to their academic performance in mathematics.

H₀₂: Incentives and rewards have no significant contribution on pupils’ academic performance on mathematics.

H₁₂: Incentives and rewards have a significant contribution on pupils’ academic performance in mathematics.

Materials and Methods

This study adopted both the descriptive survey research design and the correlational research design. The survey research design was chosen because the researcher was interested in studying only a representative portion of the population, where findings would be generalized to the entire population. Furthermore, the correlational research design was also considered appropriate because the researcher was interested in establishing relationships between variables.

The study was carried out in the North West Region of Cameroon, precisely, in Bamenda II subdivision. Bamenda II subdivision is one of the seven subdivisions that make up Mezam division. Specifically, it is one of the three subdivisions recently carved out from Bamenda. They were carved out as Bamenda I, II and III sub divisions respectively for administrative reasons. Bamenda II subdivision is an educational zone which is host to many public, private and mission educational institutions from basic to higher education.

The population of this study was made up of all the 150 primary three pupils of the two functional public primary schools in Bamenda II subdivision (See Table 1).

<table>
<thead>
<tr>
<th>Public Primary Schools</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>Goupemang Mobile Intervention (GMI) Bamenda</td>
<td>27</td>
</tr>
<tr>
<td>Government Bilingual School (GBS) Down Town</td>
<td>34</td>
</tr>
</tbody>
</table>

Source: Field Data

With the aid of the Krejcie and Morgan table, a representative sample of 108 pupils was appropriate for the population of 150 pupils. The stratified proportionate sampling technique was used to select the sample size of 108 (See Table 2).

<table>
<thead>
<tr>
<th>Public Primary Schools</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>Goupemang Mobile Intervention (GMI) Bamenda</td>
<td>19</td>
</tr>
<tr>
<td>Government Bilingual School (GBS) Down Town</td>
<td>25</td>
</tr>
</tbody>
</table>

Source: Field Data

Primary data was collected by the use of a self-designed questionnaire. The questionnaires were distributed to the 108 pupils of GMI and GBS.

The questionnaire was made up of three sections distributed as follows:

Section A handled ethical issues and the demographic characteristics of pupils.

Section B: Pupils’ Interest in Mathematics Classrooms.

Section C: Incentives and Rewards in Mathematics Classrooms.

Section D: Pupils’ Academic Performance in Mathematics.

Pupils’ annual averages in mathematics in the 2022/2023 academic year was considered as their performance in this study.
The content and the content validities of the instrument were assured. On the other hand, the Cronbach alpha reliability of the questionnaire yielded an overall index of 0.84. Thus, the reliability of the questionnaire was assured as the minimum accepted value for Cronbach’s alpha according to Shulman (2004) is 0.70 with maximum expected value being 1.

Data was collected using the Direct Delivery Technique (DDT). The researcher personally went to the two sampled schools in this study and distributed the questionnaires to the 108 pupils. The researcher also helped to clarify some difficulties which some pupils had.

Data was analyzed using Pearson product moment correlation (r), the co-efficient of determination (r²) to answer the research questions and p-value for correlation to test the hypotheses at 0.05 level of significance. The analysis was carried out with the aid of the Statistical Package for Social Sciences (SPSS) version 26.

Results

Research Question 1: What is the relative contribution of pupils’ interest on their academic performance in mathematics?

H₀₁: Pupils’ interests have no significant contribution to their academic performance in mathematics.

H₁₁: Pupils’ interests have a significant contribution to their academic performance in mathematics.

Table 3. Relative Contribution of Pupils’ Interest on their Academic Performance in Mathematics

<table>
<thead>
<tr>
<th>Pupils’ Interest</th>
<th>Academic Performance</th>
<th>Coefficient of Determination (r²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation (r)</td>
<td>1</td>
<td>.621**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>108</td>
<td>108</td>
</tr>
<tr>
<td>Academic Performance</td>
<td>Pearson Correlation (r)</td>
<td>.621**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>108</td>
<td>108</td>
</tr>
</tbody>
</table>

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

Source: Analysis of collected data

The table reveals that a high positive relationship (0.621) exist between pupils’ interest in mathematics and their academic performance. The table further shows that the coefficient of determination (r²) is 0.386. This means that pupils’ interests have a significantly positive contribution to their academic performance in mathematics as indicated by a two tailed p-value of 0.000.

Research Question 2: What is the relative contribution of incentives and rewards on pupils’ academic performance in mathematics?

H₀₂: Incentives and rewards have no significant contribution on pupils’ academic performance on mathematics.

H₁₂: Incentives and rewards have a significant contribution on pupils’ academic performance in mathematics.

Table 4. Relative Contribution of Incentives and Rewards on Pupils’ Academic Performance in Mathematics

<table>
<thead>
<tr>
<th>Incentives and Rewards</th>
<th>Pearson Correlation (r)</th>
<th>Academic Performance</th>
<th>Coefficient of Determination (r²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation (r)</td>
<td>1</td>
<td>.502**</td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>108</td>
<td>108</td>
<td></td>
</tr>
</tbody>
</table>
The table reveals that a moderate positive relationship (0.502) exists between incentives/rewards in mathematics and pupils’ academic performance. The table further shows that the coefficient of determination ($r^2$) is 0.252. This means that incentives/rewards have a significantly positive contribution to pupils’ academic performance in mathematics as indicated by a two-tailed p-value of 0.000.

**Discussion**

The findings reveal that a high positive relationship (0.621) exist between pupils’ interest in mathematics and their academic performance. This means that when pupils’ interest in mathematics increases, their academic performance also increases. Furthermore, the findings also show that the coefficient of determination ($r^2$) is 0.386. This suggests that 38.6% of the variations in pupils’ academic performances in mathematics can be accounted for by their interest in the subject. Hence, pupils’ interests in mathematics contribute significantly to their academic performance in the subject as indicated by a p-value of 0.000. This finding supports that of Herpratiwi and Tohir (2022) who found that students’ learning interest affected their academic performance positively. This study suggests that pupils’ interest is one of the strongest motivating factor that can enhance their performance in mathematics, given that it accounts for up to 38.6% of the variations in their academic performances in the subject.

The findings also show that a moderate positive relationship (0.502) exists between incentives/rewards in mathematics and pupils’ academic performance. This means that when incentives/rewards in mathematics increase, pupils’ academic performance in the subject also increases. Furthermore, the findings show that the coefficient of determination ($r^2$) is 0.252.

This suggests that 25.2% of the variations in pupils’ academic performances in mathematics can be accounted for by incentives/rewards in the subject. Thus, incentives/rewards in mathematics contribute significantly to pupils’ academic performance in the subject as indicated by a p-value of 0.000. This finding is in line with that of West (2014) who established that rewards improve student achievement greatly. This finding suggests that to improve pupils’ performance in mathematics, teachers, parents and other stakeholders in education need to introduce some form of rewards or give incentives to their pupils. This is because this study has revealed that they account for up to 25.2% of the variations in pupils’ academic performances in mathematics.

**Conclusion**

This study which set out to determine the relative contributions of motivating factors on pupils’ academic performance in mathematics in Bamenda II Sub-Division, arrived at the conclusion that pupils’ interest and incentives/rewards in mathematics account for 38.6% and 25.2% of the variations in pupils’ academic performances in mathematics respectively. These contributions were significant. These findings imply that pupils’ interests in mathematics in the primary school need to be carefully instilled, nurtured and sustained in a bid to keep them focused on the subject even in their later years of study. Furthermore, rewards and incentives in mathematics, when cautiously used, will also contribute greatly to pupils’ performance in this indispensable subject.

Although this study has achieved its set objectives, there is need to research on others key motivating factors which also greatly account for pupils’ performances in primary
school mathematics. This, is in the hope that all the key motivating factors which contribute greatly to pupils’ performance in mathematics, including those obtained from this study, could be used to formulate educational policies which will help to nip mathematics phobia at its bud.

Acknowledgement
I thank in a very special way all the head teachers and teachers who assisted me in the collection of data.

Conflict of interests
No conflict of interest.

References


West, T. M. (2014). Bridging the gap between individual will and effectiveness at work. Capstone.