Optimization of Group Investigation (GI) Co-operative Learning Model to Improve Students' Creativity in Science Learning

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Abstract: The study aimed to assess the impact of medium of instruction on student performance in secondary schools within Hargeisa district, Somaliland. Prompted by concerns over declining education quality, the research focused on examining the influence of medium of instruction on knowledge acquisition, skill acquisition, and attitude development among secondary school students. Data were collected from 342 form two students across various secondary schools in Hargeisa using questionnaires and analyzed using t-test analysis. Results indicated that while medium of instruction did not significantly affect knowledge acquisition (t (250) = 1.618, p = 0.107), it did impact both skill acquisition (t (250) = 3.977, p = 0.000) and attitude development (t (250) = 2.047, p = 0.042) among students. Consequently, the study concludes that the choice of medium of instruction does indeed influence student performance within Hargeisa district's secondary schools.

Keywords: Medium of Instruction, Student Performance, Secondary Schools, Hargeisa District, Somaliland.

1. INTRODUCTION

Medium of instruction started as a discipline in Philippine in 1900 when President William of the United States declared English the medium of instruction at all levels of public education in the Philippines [1]. In Africa, Tanzania was the first sub-Saharan African country to use an African language as a medium of instruction throughout the schooling years [2]. In Ghana, Kenya, and Zambia, the medium of instruction is English from the first grade [3]. Somaliland, the medium of instruction has passed through different stages from the colonial era of the late 19th century through different regimes that emphasized different languages [4].

According to Melesse and Obsiye [5], it has passed through Somali, Arabic and English. Since the independence of Somaliland in 1991, the medium of instruction in secondary schools are English and Somali. The medium of instruction is the language used in teaching and learning in schools. It may or may not be the official language of the country or territory [6], [7]. While Performance was used here to refer to the extent to which a student has achieved the short or long-term educational goals. There are various indicators of school performance. It can be measured by scores obtained from teacher-made test, or national exams (Drever, 1981). The students can be acquired as knowledge, skills and attitude development.

The poor performance of the students in secondary schools in Hargeisa district is suspected with the medium of instruction which is not their mother tongue and this study investigated if medium of instruction has any affect on this poor academic performance.

2. LITERATURE REVIEW

Medium of Instruction and Knowledge Acquisition

The role of knowledge acquisition in education is important for improving student’s performance. Knowledge acquisition is an awareness of the existence of something like information and understanding of a specific subject of the world in general which is usually acquired by experience or studying [8]. The main indicators of Knowledge acquisition include understanding, information and application. According to Khan et al. [9], understanding can be defined as the result

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of facts acquiring meaning for the learner. But Information is much more refined data that have evolved to the point of being useful for some form of analysis. Application is the act of putting to a special use or purpose [10].

The knowledge acquisition has been connected to medium of instruction. A case Tai and Wei [10], investigated effect of English as a medium of instruction on knowledge acquisition found that English medium of instruction has negative effect of knowledge acquisition. The study adapted qualitative design. A study by Molosiwa [11], in Botswana found that language of instruction has negative effect on knowledge acquisition. A study Tai and Wei [12] of how language of instruction affect the knowledge acquisition of the students with a sample size of 8000 south African students found that proficiency in English language does correlate with their achievements in knowledge acquisition. A study Chebanne and van Pinxteren [13], conducted quasi experimental classes one treatment group was taught in Kiswahili and another control group was taught in English. She found that those taught Kiswahili perform high knowledge acquisition than those taught in English.

Medium of Instruction and Attitude Development in Education

Letsholo-Tafila and Ramaeba [14], define an attitude development as a process of individual consciousness which determines real or possible activity of the individual in the social world. According to Sah and Karki [15], attitude development can be measured by receiving phenomena, responding phenomena and valuing phenomena. Receiving is the awareness; willingness to hear selected attention Xie and Curle [16] defines responding phenomena as things that requires active participation from the learner. Valuing focuses on the value a learner attaches to a particular object. The improvement of medium of instruction is directly related to the development of student’s attitude towards learning.

The attitude of the student has been connected to medium of instruction. A study by Mahboob [17], in Pakistan with a sample size of 300 university students. they found that most students have positive attitude towards use of English as medium of instruction. A case study investigated by Soyoof et al. [18], with a sample of 100 instructors at the university in Ankara in Turkey, in a cross sectional survey shows that medium of instruction can promote student attitudes towards learning better. The tools used were self-report questionnaire and focus group discussions. Kalra and Butt [19], found that majority of students have positive attitude and addressed psychological benefits of mother tongue as a medium of instruction.

Medium of Instruction and Skill Acquisition

Skills play an important role in the success and improvement of student performance. Skill acquisition is the science that underpins movement learning and execution [16]. Hakimi et al. [20] defines skill acquisition as a particular movement or action which is acquired through an immense amount of practice and experience. The skill is acquired through mind set, adaptation or origination. According to Louise [21], mindset is a self-perception that people hold about themselves. Believing that you are either “intelligent” or unintelligent is a simple example of a mindset. Adaptation refers to an individual ability to adjust to changes and new experiences, and to accept new information. Adaptation is acquired through repeated [22]. Origination can be defined as the process of bringing something into existence. The improvement of medium of instruction helps the acquisition of skills which improves student academic performance and is important in education.

There has been association between medium of instruction and students skill acquisition. A case study of medical students in Korea investigated by Joo et al. [23] with a sample of sixty one medical students taking a required medical course participated in the study. The student’s data concerning their lecture comprehension and perceptions were collected by means of pre and posttest and survey questionnaire during English and Korean medium lectures. Park [24] found that the medium of instruction had no effect on the understanding of the students. The study adopted descriptive survey method where scores of thirty students’ in general English, physics and computer science were collected for analysis. Finding reveals that English as a medium of instruction had no
influence on students’ performance in physics and computer science and there was correlation between students’ performance in physics and computer science. A study by Tai and Wei [12] investigated Medium of instruction and skill acquisition in Tanzania found that the use of English as a medium of instruction has negative effect on skill acquisition of students.

3. METHOD

Research Methods

The study used questionnaire method to collect data on performance of students and teacher’s medium of instruction from students. The sample consisted of 346 for form two students of students from 51 secondary schools (40 private and 11 public secondary schools). Students were instructed in the survey to offer information about their experiences and impact of medium of instruction and academic performance in a quantitative approach and was given the students a written exam to measure their level of education. The sample consisted of 346 for form two students. Miles et al. [25] recommend that a population of 4183 will use a sample of 346 while population of 28 will use a sample of 26, at level of confidence 95%, and 5% margin error. The study focused on proportionate stratified random sampling method to select the sample. The population is first divided into distinct subpopulations, or strata, and random samples are then taken separately from each stratum.

Data Analysis

The study demonstrated the t-test analysis method to analyze the data. T-test statistic is commonly used for testing effect and comparing means. This was used to find out if the performance of the students when taught in Somali language is significantly different from performance of the students when taught in English language.

4. RESULT AND DISCUSSION

Knowledge Acquisition with Medium of Instruction-Descriptive

Table 1 presents information on medium of instruction and knowledge acquisition in students of secondary schools in Hargeisa district. The table shows that the knowledge acquisition by students when taught in English medium (M = 70.76, S = 20.16) was higher than the knowledge acquisition by students taught in Somali (M = 66.62, S = 19.84). This indicates a relationship between medium of instruction and knowledge acquisition; the more English language teacher uses, the higher the knowledge acquisition of the students.

<table>
<thead>
<tr>
<th>Medium of instruction</th>
<th>Average KA (%)</th>
<th>N</th>
<th>S</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somali</td>
<td>66.62</td>
<td>145</td>
<td>19.84</td>
<td>58</td>
</tr>
<tr>
<td>English</td>
<td>70.76</td>
<td>105</td>
<td>20.16</td>
<td>42</td>
</tr>
<tr>
<td>Total</td>
<td>68.36</td>
<td>250</td>
<td>20.04</td>
<td>100</td>
</tr>
</tbody>
</table>

The data in Table 2 was analyzed by using independent t-test to determine if medium of instruction has significant effect on knowledge acquisition of the students. The results show that medium of instruction has not a significant effect on knowledge acquisitions, t (250) = 1.618, p = 0.107.

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>df</th>
<th>t</th>
<th>e</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill</td>
<td>250</td>
<td>248</td>
<td>-1.618</td>
<td>2.526</td>
<td>0.107</td>
</tr>
</tbody>
</table>

Note: t (0.05,248) =1.968. Grouping variable is medium of instruction, ε is Std. error
The present study investigated the association between the medium of instruction and knowledge acquisition among secondary school students in the Hargeisa district. Descriptive analysis revealed that students instructed in English exhibited higher levels of knowledge acquisition compared to those taught in Somali. However, the subsequent independent t-test analysis did not yield a statistically significant effect of the medium of instruction on knowledge acquisition ($t(248)=1.618, p=0.107$). These findings diverge from previous research. For instance, Xie and Curle [16] found a significant positive impact of English instruction on academic performance in China secondary schools, contrasting the non-significant effect observed in this study. Conversely, Widyasari [26] highlighted the initial advantages of instruction in students' mother tongue, aligning more closely with the current study’s findings. Werang et al. [27] emphasized the importance of language proficiency for academic success, suggesting that varying levels of English proficiency among students may have influenced the outcomes. Wolfger [6], review of language education in Africa also provides insights into the complexities of language instruction and its impact on academic outcomes.

**Skill Acquisition with Medium of Instruction Descriptives**

Table 3 presents information on medium of instruction and skill acquisition in students of secondary schools in Hargeisa district. The table shows that the skill acquisition by students when taught in English ($M = 49.29, S = 22.32$) was higher than the skill acquisition in students taught in Somali ($M = 39.64, S = 16.06$). This indicates a relationship between medium of instruction and skill acquisition. English language improves the skill acquisition of the students more than Somali language.

<table>
<thead>
<tr>
<th>Medium of Instruction</th>
<th>Mean of SA (%)</th>
<th>N</th>
<th>S</th>
<th>N. Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somali</td>
<td>39.64</td>
<td>145</td>
<td>16.06</td>
<td>58</td>
</tr>
<tr>
<td>English</td>
<td>49.29</td>
<td>105</td>
<td>22.32</td>
<td>42</td>
</tr>
<tr>
<td>Total</td>
<td>43.69</td>
<td>250</td>
<td>19.49</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table 3 Medium of Instruction and Skill Acquisition in Students of Secondary Schools in Hargeisa District**

Note: SA is Skill Acquisition; N is Sample; S is Standard deviation

The data in table 4 was analyzed by using independent t-test to determine if there were significant difference between skill acquisition of students taught by English and those taught with Somali. The study found that medium of instruction has a significant effect on skill acquisition of the students in secondary schools in Hargeisa Somaliland but medium of instruction affects the skill acquisition of the students, $t (250) = 3.977, p = 0.000$.

**Table 4. t-test Result for Skill Acquisition with Medium of Instruction**

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>df</th>
<th>$t$</th>
<th>$\varepsilon$</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill</td>
<td>250</td>
<td>248</td>
<td>-3.977</td>
<td>2.42</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Note: $t (0.05,248)$ is 1.968; grouping variable is medium of instruction; $\varepsilon$ is Std. error. Equal variances assumed.

Table 3 provides descriptive statistics on skill acquisition among secondary school students in the Hargeisa district, categorized by the medium of instruction. The data reveal that students instructed in English exhibited higher skill acquisition ($M = 49.29, SD = 22.32$) compared to those taught in Somali ($M = 39.64, SD = 16.06$). This suggests a relationship between the medium of instruction and skill acquisition, indicating that English instruction enhances students' skill acquisition more effectively than Somali. The subsequent independent t-test analysis, as presented in Table 4, aimed to determine whether there were significant differences in skill acquisition between students instructed in English and those taught in Somali. The results indicate a significant effect of the medium of instruction on skill acquisition among secondary school students in the Hargeisa district ($t(250)=3.977, p=0.000$). This suggests that the choice of medium of instruction significantly influences students' skill acquisition abilities. These findings align with previous research indicating the importance of the medium of instruction in shaping students' skill acquisition. For instance,
studies by Tai and Wei [12], demonstrated that English-medium instruction contributed to higher skill acquisition levels compared to instruction in local languages. Conversely, research by Tang [8], suggested that the effectiveness of the medium of instruction depends on various contextual factors, including teacher proficiency and curriculum alignment.

Medium of Instruction and Attitude Development—Descriptives

Table 5 presents information on medium of instruction and attitude development in students of secondary schools in Hargeisa district. The table shows that the attitude development by students when taught in English (M = 58.976, S = 23.112) was higher than the attitude development of students taught Somali (M = 52.768, S = 24.061). This indicates a relationship between medium of instruction and attitude development. The attitude development of the students in English is higher than their attitude development in Somali language.

Table 5 Medium of Instruction and Attitude Development in Students of Secondary Schools in Hargeisa District

<table>
<thead>
<tr>
<th>Medium of instruction</th>
<th>Average AD (%)</th>
<th>N</th>
<th>S</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somali</td>
<td>52.768</td>
<td>145</td>
<td>24.061</td>
<td>58.0</td>
</tr>
<tr>
<td>English</td>
<td>58.976</td>
<td>105</td>
<td>23.112</td>
<td>42.0</td>
</tr>
<tr>
<td>Total</td>
<td>8.347</td>
<td>250</td>
<td>5.48</td>
<td>100</td>
</tr>
</tbody>
</table>

Note: AD is Attitude Development; N is Sample; S is Standard deviation

The data in table 6 was analyzed by using independent t-test to determine if there were significant difference between medium of instruction and attitude development of the students in Hargeisa district. The study found that medium of instruction has a positive effect on attitude development of the students in secondary schools in Hargeisa district. \( t (250) = 2.047, p = 0.042 \).

Table 6 t-test Medium of Instruction and Attitude Development of The Students in Hargeisa District

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>df</th>
<th>t</th>
<th>( \varepsilon )</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>250</td>
<td>248</td>
<td>-2.047</td>
<td>3.031</td>
<td>0.042</td>
</tr>
</tbody>
</table>

Note: \( t (0.05,248) \) is 1.968; Grouping variable is medium of instruction; \( \varepsilon \) is Std. error. Equal variances assumed

Table 6 presents descriptive statistics regarding attitude development among secondary school students in the Hargeisa district, categorized by the medium of instruction. The data indicate that students instructed in English exhibited higher levels of attitude development (M = 58.976, SD = 23.112) compared to those taught in Somali (M = 52.768, SD = 24.061). This suggests a relationship between the medium of instruction and attitude development, with English instruction leading to more favorable attitudes among students compared to Somali instruction. The subsequent independent t-test analysis, as shown in Table 6, aimed to determine whether there were significant differences in attitude development between students instructed in English and those taught in Somali. The results reveal that the medium of instruction has a positive effect on attitude development among secondary school students in the Hargeisa district \( (t(250)=2.047, p=0.042) \). This indicates that the choice of medium of instruction significantly influences students' attitude development. These findings are consistent with previous research demonstrating the impact of the medium of instruction on students' attitudes. For example, studies by Sah and Karki [15], found that English-medium instruction fostered more positive attitudes among students compared to instruction in local languages. Conversely, research by Xie and Curle [16], suggested that the effectiveness of the medium of instruction depends on various contextual factors, including cultural relevance and teacher-student relationships.

5. CONCLUSION

The study investigated the effect of the medium of instruction on the performance of secondary school students in the Hargeisa district. The findings revealed that the medium of
instruction does not significantly impact students' knowledge acquisition, as evidenced by the to result of 1.618<1.968 with a significance level of 0.107. However, the medium of instruction has a significant effect on skill acquisition, with the to to result showing 3.977>1.968 and a significance level of 0.000. Additionally, it significantly affects students' attitude development, indicated by to being 2.047>1.968 with a significance level of 0.042. Therefore, the study concludes that while the medium of instruction does not affect knowledge acquisition, it significantly influences both skill acquisition and attitude development among secondary school students in the Hargeisa district. Given that two out of three performance indicators were positively affected, the balance of probability suggests that the medium of instruction does have a substantial overall effect on student performance.

6. AUTHOR DECLARATION

Author contributions and responsibilities - The authors made major contributions to the conception and design of the study. The authors took responsibility for data analysis, interpretation and discussion of results. The authors read and approved the final manuscript.

Funding - This research did not receive external funding.

Availability of data and materials - All data is available from the author.

Competing interests - The authors declare no competing interests.

Did you use generative AI to write this manuscript? - We do not use AI assistance in the script.

Declaration of generative AI and AI-assisted technologies in the writing process - During the preparation of this work the author did not use AI for writing, editing, or anything else related to the manuscript.

7. REFERENCES


