EFFECTIVENESS OF GOOGLE EARTH ON THE ACHIEVEMENT IN GEOGRAPHY OF SECONDARY SCHOOL STUDENTS

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ABSTRACT: This study has been undertaken to investigate the Effectiveness of Google Earth on the Achievement in Geography of Secondary School students. Google Earth is one of the most useful tools to strengthen the teaching and learning of Geography. Apart from being easy to use it promotes critical thinking, and analytical skills. It presents layers of information in the form of satellite and aerial images which are educationally relevant. The study was conducted with an aim of finding out how effective the use of Google Earth on the achievement in geography as a whole and on the different levels of the revised bloom’s taxonomy. For this purpose an experimental study was conducted. The control group was taught with traditional method while the experimental group was exposed to the study material with the help of Google Earth. The result proved the effectiveness of Google Earth in enhancing the achievement of students in geography at different levels of the revised bloom’s taxonomy.

Key Words: Google Earth, Achievement, Geography, Revised Bloom’s Taxonomy

Introduction

Computers as devices of instructional technology have been of interest since the advent of personal computers. There has been a dramatic increase over the last few decades. Many schools have advanced beyond the first level of adopting technology (i.e. acquisition and implementation of hardware and network wiring). But thanks to the lack of technology-rich curricular activities (Cates et al. 2003, 155) these expensive set ups have remained mere decoration. This situation has also limited the implementation of Geographic Information Systems (GIS) in elementary and secondary education (Bowman et al. 2005; Baker 2005; Donaldson 2000; Kerski 2000). The time associated with learning GIS applications has also been an important factor in GIS and related technologies having only limited implementation (Bednarz and Bednarz 2004). The time required for educators to learn the use of the software, understand the underlying data and apply the tools is enormous. Educators also need to prepare materials to support lessons, as well as provide sufficient time for students to learn the software and incorporate the tool in the learning experience (Meyer et al. 1999). In 2002 Kansas review identified that a high proportion of GIS teacher training workshops were focused on the development of GIS skills (KanGIS, 2002); experiences from a comparable Texas institute reiterated that finding (Bowman et al. 2005). In India where there is dearth of competent teachers sufficiently equipped with technology to teach geography it is almost an impossible task to introduce GIS. Apart from time factor, Baker (Baker 2005, 44) cited several other obstacles in implementing GIS in classroom settings, which included: insufficient resources, incompatible computing and network systems, demands from the education department/board, and separation of subject disciplines to correspond to a school day’s schedule.

Google Earth, however, is a formidable technological tool to help strengthen the weaknesses in geography curriculum. Although limited in analytical tools in comparison to the true GIS, Google Earth can be implemented in the classroom setting. This makes spatial information more relevant for the students at all levels and helps them to understand information in geographic context. Google Earth promotes critical thinking and also develops critical analytical skills. Lessons developed with Google Earth help in improving students’ comprehension of major concepts and also sharpen their skill. Apart from being easy to use it presents a great deal of information in a visual geospatial context. This facilitates understanding of the earth system and many subject areas. The aerial and satellite imagery along with the numerous layers of information offered by Google’s database along with third party data, offer an interesting and educationally relevant package for the learner. Using Google Earth, students can casually browse on their own or engage in structured inquiry-based explorations individually or as teams. The main aim of the study was to explore
the use of Google Earth as an appropriate educational technological tool to ensure the achievement in Geography of the Secondary School Students.

Objectives of the study
- To find the effectiveness of Instructional Strategy on the achievement in Geography of Secondary School students.
- To find the effectiveness of Google Earth on the achievement in Geography on the cognitive process dimension based on revised Bloom's Taxonomy namely remembering of secondary school students.
- To find the effectiveness of Google Earth on the achievement in Geography on the cognitive process dimension based on revised Bloom's Taxonomy namely understanding of secondary school students.
- To find the effectiveness of Google Earth on the achievement in Geography on the cognitive process dimension based on revised Bloom’s Taxonomy namely application of secondary school students.
- To find the effectiveness of Google Earth on the achievement in Geography on the cognitive process dimension based on revised Bloom’s Taxonomy namely analysis of secondary school students.
- To find the effectiveness of Google Earth on the achievement in Geography on the cognitive process dimension based on revised Bloom’s Taxonomy namely evaluation of secondary school students.

Hypotheses of the study
There is no significant difference in the pretest and posttest mean scores of the achievement in Geography of the experimental and control group.
There is no significant difference in the pretest and posttest mean scores of the achievement in Geography on the cognitive process dimension based on revised Bloom's Taxonomy namely remembering of secondary school students.
There is no significant difference in the pretest and posttest mean scores of the achievement in Geography on the cognitive process dimension based on revised Bloom's Taxonomy namely understanding of secondary school students.
There is no significant difference in the pretest and posttest mean scores of the achievement in Geography on the cognitive process dimension based on revised Bloom's Taxonomy namely application of secondary school students.
There is no significant difference in the pretest and posttest mean scores of the achievement in Geography on the cognitive process dimension based on revised Bloom’s Taxonomy namely analysis of secondary school students.
There is no significant difference in the pretest and posttest mean scores of the achievement in Geography on the cognitive process dimension based on revised Bloom’s Taxonomy namely evaluation of secondary school students.

Methodology
Tools used
The accuracy of the measurement depends on the precision of the instrument or tool. Keeping this in mind the researcher selected the following tools:

i. The Experimental method required of the investigator to measure the achievement in geography of the secondary school students. Therefore an achievement test based on the topics of geography was used. It was a multiple choice objective type test prepared by the investigator.

ii. Experimental Strategy planned in the study involved the use of specially Designed Learning Material using Google Earth to enhance the Achievement in Geography among secondary School Students.

Research procedure
In the present study, experimental method was adopted for its suitability and accuracy. Two groups namely control and experimental groups of students were taken for the study. The control group was taught through conventional method while the experimental group was taught using Google Earth.

Sample of the study
The sample consisted of 66 students within the age group of 14-15 years, studying in Standard Nine of a randomly chosen school. Based on their Spatial Ability scores, matched pairs were identified and formed...
There are various types of experimental designs and they vary in complexity and adequacy. The investigator selected 2x3 Factorial Design for the study. **Factorial design** involves having more than one independent variable, or factor, in a study. **Factorial designs** allow researchers to look at how multiple factors affect a dependent variable, both independently and together. **Factorial design** studies are named for the number of levels of the factors. In the present study the experimental and control groups were matched.

### Statistical Technique Used
The answer sheets that were obtained from the students of both the Experimental and Control groups with reference to pre-test and post-test were scored. The scores were tabulated and the required gain scores were computed. The gain scores were subjected to statistical analysis. In pursuance of the objectives of the study, the following statistical techniques were employed:

- Mean, Standard Deviation, and graphical representations,
- Two way analysis of Covariance (ANCOVA)

### Analysis and Interpretation
It is inferred from the table 1 that the computed value of ‘t’(3.48) between the experimental group and control group with respect to their Pretest is more than the critical values of 2.00 and 2.66 at 0.05 and 0.01.
level of significance. Hence it is significant. Consequently the null hypothesis is rejected. It can be said there is significant difference between the pretest mean scores of the achievement in geography of the experimental group and control group.

Table 1: Test of Significance of Difference between the Pretest and Posttest Mean Scores of the Achievement in Geography of the Experimental Group and Control Group

<table>
<thead>
<tr>
<th></th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>'t'</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>Experimental</td>
<td>33</td>
<td>15.818</td>
<td>3.0151</td>
<td>3.48</td>
<td>P&lt;0.05</td>
</tr>
<tr>
<td></td>
<td>Control group</td>
<td>33</td>
<td>18.273</td>
<td>2.6957</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posttest</td>
<td>Experimental</td>
<td>33</td>
<td>22.909</td>
<td>3.3482</td>
<td>3.17</td>
<td>P&lt;0.05</td>
</tr>
<tr>
<td></td>
<td>Control group</td>
<td>33</td>
<td>20.424</td>
<td>3.0107</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It is also inferred from the above table that the computed value of ‘t’ (3.17) between the experimental group and control group with respect to their posttest is greater than the critical value of 2.00 at 0.05 level of significance. Hence it is significant. Consequently the null hypothesis is rejected and it can be said that there is significant difference between the Posttest mean scores of the achievement in Geography of the experimental group and control group.

Table 2: Test of Significance of Difference between the Pretest and Posttest Mean Scores of the Achievement in Geography of the Experimental Group with respect to cognitive process dimension based on Revised Bloom’s Taxonomy namely remembering

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III sum of squares</th>
<th>df</th>
<th>Mean square</th>
<th>F</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy</td>
<td>5.515</td>
<td>1</td>
<td>5.515</td>
<td>8.300</td>
<td>.006</td>
</tr>
</tbody>
</table>

Table 2 shows that the computed value ‘F’ (8.300) is more than the critical value at 0.05 and 0.01 levels respectively. Hence the main effect is significant. Consequently the null hypothesis is rejected and it can be said that Google earth learning environment is more effective when compared to that of conventional environment in improving the cognitive process dimension of remembering based on Revised Bloom’s Taxonomy.

Table 3: Test of Significance of Difference between the Pretest and Posttest Mean Scores of the Achievement in Geography of the Experimental Group with respect to cognitive process dimension based on Revised Bloom’s Taxonomy namely understanding

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III sum of squares</th>
<th>df</th>
<th>Mean square</th>
<th>F</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy</td>
<td>3.526</td>
<td>1</td>
<td>3.526</td>
<td>5.962</td>
<td>.018</td>
</tr>
</tbody>
</table>

Table 3 shows that the computed value ‘F’ (5.962) is more than the critical value at 0.05 and 0.01 levels respectively. Hence the main effect is significant. Consequently the null hypothesis is rejected and it can be said that Google earth learning environment is more effective when compared to that of conventional environment in improving the cognitive process dimension of understanding based on Revised Bloom’s Taxonomy.

Table 4: Test of Significance of Difference between the Pretest and Posttest Mean Scores of the Achievement in Geography of the Experimental Group with respect to cognitive process dimension based on Revised Bloom’s Taxonomy namely application

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III sum of squares</th>
<th>df</th>
<th>Mean square</th>
<th>F</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy</td>
<td>11.499</td>
<td>1</td>
<td>11.499</td>
<td>25.969</td>
<td>.000</td>
</tr>
</tbody>
</table>

The computed value of ‘F’ (25.969) as seen in Table 4, is more than the critical value at 0.05 and 0.01 levels respectively. Hence the main effect is significant. Consequently the null hypothesis is rejected and it can be said that Google earth learning environment is more effective when compared to that of conventional environment in improving the cognitive process dimension of application based on Revised Bloom’s Taxonomy.
Table 5: Test of Significance of Difference between the Pretest and Posttest Mean Scores of the Achievement in Geography of the Experimental Group with respect to cognitive process dimension based on Revised Bloom’s Taxonomy namely analyzing

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III sum of squares</th>
<th>df</th>
<th>Mean square</th>
<th>F</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy</td>
<td>8.201</td>
<td>1</td>
<td>8.201</td>
<td>22.311</td>
<td>.000</td>
</tr>
</tbody>
</table>

The computed value of ‘F’ (25.969) Table 5 shows that is more than the critical value at 0.05 and 0.01 levels respectively. Hence the main effect is **significant**. Consequently the null hypothesis is rejected and it can be said that Google earth learning environment is more effective when compared to that of conventional environment in improving the cognitive process dimension of analyzing based on Revised Blooms Taxonomy.

Table 6: Test of Significance of Difference between the Pretest and Posttest Mean Scores of the Achievement in Geography of the Experimental Group with respect to cognitive process dimension based on Revised Bloom’s Taxonomy namely evaluation

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III sum of squares</th>
<th>df</th>
<th>Mean square</th>
<th>F</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy</td>
<td>5.559</td>
<td>1</td>
<td>5.559</td>
<td>23.014</td>
<td>.000</td>
</tr>
</tbody>
</table>

The computed value ‘F’ (25.969) as seen in Table 6 is more than the critical value at 0.05 and 0.01 levels respectively. Hence the main effect is **significant**. Consequently the null hypothesis is rejected and it can be said that Google earth learning environment is more effective when compared to that of conventional environment in improving the cognitive process dimension of evaluation based on Revised Blooms Taxonomy.

Discussion and conclusion

This study has added to the literature base by providing evidence that Google Earth improves the achievement of the students (Baker, 2005; Britt and LaFontaine, 2009; Goodchild, 2008; Kerski, 2008; Molenda and Pershing, 2008; Patterson, 2007).

The findings have shown that the difference between the scores of the experimental and control group are significant. Therefore suggesting that the use of Google Earth enhances the achievement of the students. Thus justifying the findings of the studies conducted by Audet & Abegg, 1996; Bednarz & Audet, 1999; Keiper, 1999; Audet & Ludwig, 2000; Lemberg & Stoltman, 2001; Hall-Wallace & McAuliffe, 2002; Baker & White, 2003; Kerski, 2003; West, 2003; Sinton & Lund, 2007. These authors are very enthusiastic about the opportunities GIS provides for enhancing secondary education in general, and geography education in particular at the secondary level. GIS itself does not produce learning, but can make it easier to design geographic inquiry projects. GIS therefore can be seen as a facilitating tool. It allows teachers and students to engage in more sophisticated investigations than otherwise possible (Sinton & Lund, 2007). Claire Jarvis in her keynote lecture on spatial literacy at the AGIT Conference 2009 in Salzburg argued that: “Thanks to GIS, I can finally teach geography the way I want.” GIS allows teachers and students to do geography, instead of teaching and learning about geography. Many of the GIS-supported geographic inquiry projects with GIS are very different from traditional geographic inquiry projects. In such a way, GIS has the potential to change geography education (Baker & White, 2003; Kerski, 2003; Sinton & Lund, 2007).

Recommendations

In the light of the findings of the study, the following areas can be suggested:

i. New teaching methodologies using Google Earth can be introduced

ii. In-service courses on lesson planning using Google earth should be given to geography teachers

iii. Geography teachers should be trained to use Google earth effectively in the classroom

iv. Students who are studying geography should be trained in the use of Google earth for academic purposes.

References


