POLICY BRIEF ON STUDENTS’ CONCEPTUAL REASONING IN SECONDARY SCHOOL COMPUTER APPLICATIONS THROUGH META-COGNITIVE STRATEGY

INTRODUCTION:
The study examined students’ ability to recall previous knowledge, reads, understands and monitors development in promoting conceptual reasoning and Computer Applications (Microsoft Word and Excel) problem solving in secondary school through Meta-cognitive strategy.

SUMMARY OF FINDINGS RECOMMENDATIONS:
The outcome of the study revealed that there was an increase in students conceptual reasoning in Computer Applications (Microsoft Word and Excel) based on the exposure of the students to Meta-cognitive strategy.
For this reason, it is highly recommended that:
i. Meta-cognitive Strategy should be used as a useful tool to develop students’ conceptual reasoning in Computer Applications (Microsoft Word and Excel) in Secondary Schools Systems.
ii. Computer Teachers should be encouraged to undergo Meta-cognitive strategy training which could be in form of seminar series for adaptation in their work.
iii. Computer Teachers should support the students with questions regarding their own thinking process during the process of solving problems in Computer Applications (Microsoft Word and Excel) as this would trigger Meta-cognitive strategy behaviours.
iv. Computer Teachers should always ask students to justify or explain their solutions and ideas, which promote Meta-cognitive strategy behaviors in the students, they should always guide the learners and make sure they are actively involved during Computer Applications classes.
v. Computer laboratory should be built in all secondary schools to enhance the development of Computer Applications (Microsoft Word and Excel) teaching and learning thereby promotes the effectiveness of Meta-cognitive strategy in developing students’ conceptual reasoning. Government should increase support to the schools by providing adequate learning materials (Computer Systems) to aid the process.
vi. Studies similar to this one are encouraged to be carried out for some Engineering and Computer topics which students at higher level might found difficult to comprehend. This would serve as giant step to reduce academic wastage in the face of scarce resource.

RESEARCH:
The study was designed to find out students’ ability to recall previous knowledge, read and understand, and monitor development in promoting conceptual reasoning and Computer Applications (Microsoft Word and Excel) problem solving in secondary school through Meta-cognitive strategy. To achieve this stated goal, four research questions and hypotheses were formulated as follows;

Research Questions:
RQ 1: What are the mean score of experimental and control groups on Meta-cognitive strategy and conceptual reasoning in Computer Applications (Microsoft Word and Excel)?
RQ 2: What are the mean score of experimental and control groups on recall of previous knowledge and performance level in Computer Applications (Microsoft Word and Excel)?
RQ 3: What are the mean score of experimental group and control groups to read, understand and conceptual reasoning in Computer Applications (Microsoft Word and Excel)?
RQ 4: What are the mean score of experimental group and control groups to monitor development and achievement in Computer Applications (Microsoft Word and Excel)?

Method:
As a quasi-experimental design which made used of two groups namely experimental and control in the selected public secondary schools in Alimosho local government area of Lagos State, intact classes of the school was adopted due to the administrative reason.

Results:
H01: There is no significant difference between experimental and control groups on Meta-cognitive strategy and conceptual reasoning in Computer Applications (Microsoft Word and Excel).
Table 1. Analysis of Meta-Cognitive Strategy in improving Students’ Conceptual Reasoning in Computer Applications (Microsoft Word and Excel)

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Standard Error</th>
<th>df</th>
<th>t-cal</th>
<th>t-val</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>80</td>
<td>6.1563</td>
<td>1.58433</td>
<td>0.17713</td>
<td>79</td>
<td>4.531</td>
<td>1.960</td>
<td>0.000*</td>
</tr>
<tr>
<td>Control</td>
<td>80</td>
<td>4.6250</td>
<td>1.32388</td>
<td>0.14780</td>
<td>79</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significance (*)
The table 1 above presents the descriptions of students’ performances of an experimental and control groups on the analysis of Meta-cognitive strategy in improving students’ conceptual reasoning in Computer Applications (Microsoft Word and Excel). While results seemed to be closer to each other based on the fact that these students were taught on the premise of preparing them for the forth-coming entrance examination yet the experimental group performed better than the control group, and this made the study to conclude that there was significant difference between experimental and control groups on Meta-cognitive strategy and conceptual reasoning in Computer Applications (Microsoft Word and Excel) (t-cal> t-val, df=158; P<0.05).

H02: There is no significant difference between experimental and control groups on recall of previous knowledge and performance level in Computer Applications (Microsoft Word and Excel).

Table 2. Analysis of Students’ recall of previous knowledge and their Performance in Computer Applications (Microsoft Word And Excel)

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Standard Error</th>
<th>df</th>
<th>t-cal</th>
<th>t-val</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>80</td>
<td>5.6813</td>
<td>1.63862</td>
<td>0.18320</td>
<td>79</td>
<td>3.467</td>
<td>1.960</td>
<td>0.000*</td>
</tr>
<tr>
<td>Control</td>
<td>80</td>
<td>4.7188</td>
<td>1.39478</td>
<td>0.17830</td>
<td>79</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The table 2 above presents the descriptions of students’ recall of previous knowledge and their performance in Computer Applications (Microsoft Word and Excel) with the study revelation that there was significant difference between experimental and control groups on recall of previous knowledge and performance level in Computer Applications (Microsoft Word and Excel) (t-cal>t-val, df=158; P<0.05).

H0: There is no significant difference between experimental group and control groups to read, understand and conceptual reasoning in Computer Applications (Microsoft Word and Excel).

H1: The significance difference between experimental group and control groups to read, understand and conceptual reasoning in Computer Applications (Microsoft Word and Excel).

H2: There is no significant difference between experimental group and control groups to read, understand and conceptual reasoning in Computer Applications (Microsoft Word and Excel).

H3: There is no significant difference between experimental group and control groups to read, understand and conceptual reasoning in Computer Applications (Microsoft Word and Excel).

Table 3: Analysis of Students’ abilities to read, understand and Conceptual Reasoning in Computer Applications (Microsoft Word And Excel)

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Standard Error</th>
<th>df</th>
<th>t-cal</th>
<th>t-val</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>80</td>
<td>5.2313</td>
<td>1.72279</td>
<td>0.19261</td>
<td>79</td>
<td>2.045</td>
<td>1.960</td>
<td>0.000*</td>
</tr>
<tr>
<td>Control</td>
<td>80</td>
<td>3.1875</td>
<td>1.67705</td>
<td>0.18750</td>
<td>79</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significance (*)

The table 3 above presents the descriptions of students’ abilities to read, understand and conceptual reasoning in Computer Applications (Microsoft Word and Excel) (Microsoft Word and Excel) but finding showed that there was significant difference between experimental group and control groups to read, understand and conceptual reasoning in Computer Applications (Microsoft Word and Excel) (t-cal>t-val, df=158; P<0.05).

H4: There is no significant difference between experimental group and control groups to monitor development and achievement in Computer Applications (Microsoft Word and Excel).

Table 4: Analysis of Students’ abilities to monitor Development and Achievement in Computer Applications (Microsoft Word And Excel)

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Standard Error</th>
<th>df</th>
<th>t-cal</th>
<th>t-val</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>80</td>
<td>4.2313</td>
<td>2.03753</td>
<td>0.22780</td>
<td>79</td>
<td>2.363</td>
<td>1.960</td>
<td>0.000*</td>
</tr>
<tr>
<td>Control</td>
<td>80</td>
<td>3.2188</td>
<td>2.76603</td>
<td>0.30925</td>
<td>79</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significance (*)

The table 4 above presents the descriptions of students’ abilities to monitor development and achievement in Computer Applications (Microsoft Word and Excel) where it was observed that there was significant difference between experimental group and control groups to monitor development and achievement in Computer Applications (Microsoft Word and Excel) (t-cal>t-val, df=158; P<0.05).

Discussion:
The study demonstrated that students in experimental group performed largely better than those in the control group, and this could be attributed to their exposure to the treatment called Meta-cognitive strategy instruction. This showed that the instruction of Meta-cognitive strategy has a distinctive impact on students’ conceptual reasoning and achievement in Computer Applications (Microsoft Word and Excel). Computer Teachers should employ better strategy of knowledge dissemination instead of the stereotype and archaic teaching methods. This was demonstrated when one observed the analysis of students’ recall of previous knowledge and their performance in Computer Applications (Microsoft Word and Excel) where it was clear that those exposed to the Meta-cognitive strategy performed better than the control group even though at marginal rate since both groups were being prepared for their common entrance examination as at that time.

An achievement is measured as a result of quantified development observed in the Computer Applications (Microsoft Word and Excel) students’ performance sequel to the close monitoring of the pace earlier set. These results indicated that the ability of the students to monitor their development has brought about a significant difference as the findings imply that the students in the experimental group performed better than the students in the control group. Study has shown that students’ abilities to monitor development and achievement in Computer Applications (Microsoft Word and Excel) were more pronounced for the Meta-cognitive group, and this is one of the yardsticks among others that learning had actually taken place. Once an establishment has been made in this direction then the society’s aspiration towards modern development which Computer Applications (Microsoft Word and Excel) is expected to fulfill is guaranteed.

Furthermore, study was able to establish reading as necessary condition for understanding, which in turn serves as sufficient condition for conceptual reasoning in Computer Applications (Microsoft Word and Excel), and this was as a result of the experimental group performance over that of the control group in this area. If the level of reading among students is low this would affect the rate of understanding the context, and at the same time affect the understanding of such students. As soon as these two hierarchical components of cognitive thinking are affected then the reasoning level is handicapped.

Based on the outcomes identified so far, it is evident that if teachers learn how to use cognitive strategies and develop positive attitude then, they will encourage their learners, and this in turn improve their performances in Computer Applications (Microsoft Word and Excel) in particular, Computer Science, Communication and Science in general.

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