Effects of Jurisprudential Inquiry Model of Instruction on Performance and Retention on Ecological Concepts among Secondary II Students in Nigeria

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Abstract

This study investigated the effects of jurisprudential model of instruction on the performance and retention ability of Senior Secondary School students of Bichi Educational Zone in ecological concepts. The study population consisted of 2078 biology students, and the sample consisted of 100 SS II biology students sampled using the random table of numbers, 50 for the experimental and 50 for the control group. The design for the study was quasi experimental control with pre and post-tests. The experimental group was taught using jurisprudential model, while the control group was taught using the conventional lecture method. The students were pre-tested and post-tested on Ecology Achievement Test (EAT). To guide the study, three research questions and three hypotheses were put across. Findings revealed that, the jurisprudence model of teaching strategy proved more effective than the conventional lecture method on students' achievement and retention ability in ecological concepts. Jurisprudential model strategy was also found to be gender friendly. Based on the findings, it was recommended that science teachers and curriculum developers should popularize and incorporate jurisprudential model approach into the teachers’ training curricula at all levels.

Keywords: Ecological Concepts, Model of Instruction, Jurisprudential Model Strategy

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The effectiveness of any subject is measured in terms of the knowledge of what to teach, and how and when to teach it, (Ahmad, 2011). The 'how' of teaching constitutes what is called teaching strategy? Investigations into teaching strategies especially in biology have received greater attention now than ever before Ayodele (2010) and Opatoye (2010) observed that the performance of students in science is not any better than in the years that preceded the introduction of the new curricular materials and teaching strategies. The major reason for the prevalent poor performance among students has been attributed to teachers' persistence in adhering to traditional method of teaching in Nigeria (Ibrahim, 2012).

Ecology concepts, is the branch of biology, concerned with the study of interrelationship between living organisms and their external environment. Students regard ecology concepts as one of difficult and unattractive, irrelevant, while others find ecological concepts extremely technical, with ambiguous terms littering every sentence in a typical biological text. Ahmad (2011) reported that candidates showed poor grasp of the concepts and a lot of the candidates did not attempt questions raised on ecology concepts and those who attempted the questions performed badly. Jurisprudential method of teaching emphasizes the role of social interaction as a paradigm for information processing and evaluating social issues, this model is based on a conception of society in which people differ in their views and priorities and in which social values legitimately conflict with one another. The model maintain dialectical style; use confrontational dialogue, questioning, student’s assumptions and using specific instances (analogies) the model maintain a vigorous intellectual climate where all views are respected; avoid direct evaluation of students’ opinions, until issues are thoroughly explored before decision can be rich, this model can be used for instance ethics in science, business and sports etc. A quasi-experiment is an empirical intervention study used to estimate the causal impact of an intervention on target population without random assignment. Quasi-experimental research shares similarities with the traditional experimental design or randomized controlled trial, but it specifically lacks the element of random assignment to treatment or control. Instead, quasi-experimental designs typically allow the researcher to control the assignment to the treatment condition, but using some criterion other than random assignment and making use of a control or comparison group, and time-series designs.

The 6-3-3-4 biology curriculum revised by the Federal Ministry of Education (2008) has one of its objectives, the production of highly motivated, knowledgeable and effective students who can understand and appreciate biological processes and principles. The aim of this system of education is to help the child acquire appropriate skills, abilities and competences that will equip him to live in and contribute to the development of his society. Jurisprudential model is one of the STS. Science and Technology Strategies created by Pederson (1992) approaches teaching issues by dividing a class into the issue view-points. One of the objectives of this model is to give students tools for analyzing and debating social issues by identifying underlying values in conflict in order to develop citizens capable of sharing in the formation of social policy. This model is based on a conception of society in which people differ in their views and priorities and in which social values legitimately conflict with one another. The role of students is to listen to the evidence presented, analyze the legal positions taken by both sides, weigh these positions and the evidence, assess the meaning and provisions of the law and finally make the best possible decision. Obomanu & Nbina, (2010) in a study of chemistry students found jurisprudential model to be very effective in aiding the understanding chemistry concepts and also gender friendly.
One of the most difficult tasks for the teacher is to assist students in integrating the details of a case into a public policy question (Bruce & Marshal, 2009). Most arguments center on definitions, values and facts. The exploration of students' stance through confrontational dialogue is the heart of the jurisprudential inquiry model. This model helps students formulate their stance that they can eventually defend also helping them to revise their position after argumentation. Once students become fluent in their use of jurisprudence inquiry model, they can apply it to conflicts that occur in and around their own lives (Stake & Mares, 2011). Mastery of the framework for analyzing issues is the major direct learning outcome. Snezana, Liljana & Milena (2011) reported that students found a benefit in debating an issue rather than taking tests. Students also mentioned communication skills as benefit. This makes it fall in line with other STS strategies that have been found to increase students’ engagements with science and thus has the potential to improve inclusively (Obieke, 2009). It also shows its socio-scientific approach which considers wider social, political and economic aspects of science and accessible social contact found in other STS strategies by Suman (2011). Jurisprudential model thus creates a techno-scientific society in which learners live. It thus shares this common factor with other STS strategies. Such individuals develop the ability to think or analyze situations in the society critically and resolve them effectively by techno-scientific methods. Tal (2012) discovered that STS education serves as an appropriate leverage for rural development. They constructed a technological model for sustaining development and found it to alleviate poverty in a community to a large extent. The researcher will draw insight from these related works as a guide for this study.

Annual reports of chief examination reports by West African Examination Council (2014) showed that students' performances in ecological concepts are very unsatisfying. Students regard ecology concepts as one of difficult and unattractive, irrelevant, while others find ecological concepts extremely technical, with ambiguous terms littering every sentence in a typical biological text. Ahmad (2011), reported that in West African Examination Council candidates showed poor grasp of the concepts, that a lot of the candidates did not attempt questions raised on ecology concepts and those who attempted the questions performed badly and inability of students to make reasonable connection between concept areas and their application in solving problems. Based on the reviewed literature and the identified problem, the study formulates the following research questions;

**RQ 1:** Will there be any difference in academic performance in ecological between students taught using Jurisprudential model and those taught using lecture method?

**RQ 2:** What is the difference in retention ability in ecology between students taught using Jurisprudential model and those taught using lecture method?

**RQ 3:** How will Jurisprudential model affect gender in academic performance in ecology concepts?

**Hypotheses**

The following hypotheses, stated in null form, were tested in this study at $P \leq 0.05$ confidence level.

**HO$_1$:** There is no significant difference in the mean scores of academic performance in ecology of students taught using Jurisprudential model and those taught using lecture method.

**HO$_2$:** There is no significant difference in retention ability in ecology of students taught using Jurisprudential model and those taught using lecture method.
There is no significant difference in the mean scores of academic performance in ecology between male and female students exposed to Jurisprudential Model.

**Method and Design**

The study utilized a quasi-experimental control pretest post-test group design. Quasi-experimental is a study in which the researcher manipulates the level of some independent variable and then measures the outcome. This is made of two groups, experimental and the control. The experimental group was exposed to Jurisprudential inquiry model while the control group was exposed to lecture method; a pre-test was given for the purpose of determining the equivalence of the two groups before treatment, his research design allows researchers to easily describe and provide an undemanding of a phenomenon using simple t-test statistics. The design was found suitable because it permitted the researches to obtain data from the respondents at a relatively low cost. A posttest was administered after treatment to determine whether Jurisprudential model has an effect. The design of this study is represented thus:

\[ E \rightarrow O_1 \rightarrow X_1 \rightarrow O_2 \rightarrow O_3 \]
\[ C \rightarrow O_1 \rightarrow X_0 \rightarrow O_2 \rightarrow O_3 \]

**Research Design Illustration (Kellinger, 1973)**

**KEY**

E = Experimental Group
C = Control Group
\( X_i \) = Jurisprudential Model Treatment
\( X_0 \) = Lecture Method Treatment
\( O_i \) = Pre-test
\( O_2 \) = Post-test
\( O_3 \) = Post-post-test

The population of the study comprised all the Senior Secondary School II Biology students in Bichi Educational Zone of Kano State. They are 2078 Out of this number the sample for this study was draw. The detailed of the population is presented in table 1.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Bichi Educational Zone</th>
<th>Number of schools</th>
<th>Number of Biology Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bichi</td>
<td>7</td>
<td>774</td>
</tr>
<tr>
<td>2</td>
<td>Danzabuwa</td>
<td>2</td>
<td>169</td>
</tr>
<tr>
<td>3</td>
<td>Tsanyawa</td>
<td>4</td>
<td>218</td>
</tr>
<tr>
<td>4</td>
<td>Kwandawa</td>
<td>2</td>
<td>122</td>
</tr>
<tr>
<td>5</td>
<td>Kabagiwa</td>
<td>2</td>
<td>92</td>
</tr>
<tr>
<td>6</td>
<td>Kiyawa</td>
<td>2</td>
<td>137</td>
</tr>
<tr>
<td>7</td>
<td>Unguwa-Gyartai</td>
<td>2</td>
<td>109</td>
</tr>
<tr>
<td>8</td>
<td>Yandade</td>
<td>3</td>
<td>115</td>
</tr>
<tr>
<td>9</td>
<td>Kunchi</td>
<td>4</td>
<td>174</td>
</tr>
<tr>
<td>10</td>
<td>Shuwaki</td>
<td>3</td>
<td>168</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>20</td>
<td>2078</td>
</tr>
</tbody>
</table>

**Source:** Bichi Education Zonal Office (2015)
Two co-educational schools were randomly selected which is Demonstration school Federal college of education Bichi and G.G.S.S/ G.S.S.Tsanyawa have two location (GGSS/ Female / GSS Male) for this study and randomly sorted out into experimental and control groups.

Sample and Sampling Technique

The sample of this study was made up of total of one hundred (100) SS11 Biology students randomly sampled from two schools using the random table of numbers (Kerlinger, 1973). 50 for experimental group (Jurisprudential model) and 50 for Control group (lecturer method) the two Schools are DSSSFCET Bichi and GGSS/GSSS Tasanyawa 90 Kilometers away from each other, to avoid interaction effect.

Table 2: Sample Selected for the research

<table>
<thead>
<tr>
<th>Name of the School</th>
<th>Status</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Dssfcs(t) bichi</td>
<td>Experimental</td>
<td>29</td>
<td>21</td>
<td>50</td>
</tr>
<tr>
<td>2 G.GS.S/ G.S.S.Tsanyawa</td>
<td>Control</td>
<td>28</td>
<td>22</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>57</td>
<td>43</td>
<td>100</td>
</tr>
</tbody>
</table>

Research Instruments:

An Ecology Achievement Test (EA,T) made up of 50 multiple choice test items drawn from previous WAEC question papers (questions bank) was used as an instrument The tests items were validated by Senior Lecturers at the department of science education, Ahmadu Bello University, Zaria and experienced teachers from the two secondary schools that were used for the study. From the 50 test items constructed 40 were accepted based on the valuators' recommendations. The reliability of the test items was determined using the test-retest method and Pearson Product Moment Coefficient statistic. This test was used for both the pretest and post test. Instructional materials for this study were made up of ecology topics of the SS II biology syllabus.

Two methods of teaching were used: lecture method and Jurisprudential model, for lecture instructional method, lesson plans were prepared and taught by a well qualified teacher, while the experimental group was taught by the researcher using the Jurisprudential model adopted from Pederson (1992) and Hamilton, (2007). This model teaches how to ask good questions in puzzling situations, how to carry out group investigations skills for effective group functioning and how to teach inferential skills. This model has the following stages:

- **Orientation Phase:** This phase introduces the topics. The students are prompted search for information or knowledge on the topic under discussion.
- **Identification and Definition Phase:** At this stage students are allowed to go on their own for a wide search of information on the topic. They engage in brainstorming search for possible answers to the questions raised in phase I. They observe specific phenomena and possibly experiment with the materials.
- **Synthesis Phase:** This is the phase that the students come up with designs in the form of charts, graphs or write ups for presentations as possible solutions to the questions raised. 4.
- **Interaction Phase:** This phase involves the students in a mock public meeting. Here, students come up with their respective answers, findings and solutions on the topic for
sharing and" "communicating with their individual and group findings. This could be written or oral reports.

- **Clarification Phase**: At this phase, students come together, this is the phase the researcher uses the STS strategy along with prepared lesson plan to teach the students the topic under investigation, beginning with the social implications of the topic through technological skills needed to be acquired under the topic and then to scientific concepts and facts about the topic.

- **Action Phase**: This is the decision-making or action taking phase. The cause of action students follow is decided after a consensus clarification on the topic is reached.

**Figure 1: STS Jurisprudential Model,** Adopted from (Pederson, 1992)

Phase 1: Orientation  
Phase 2: Identification  
Phase 3: Synthesis  
Phase 4: Interaction  
Phase 5: Clarification  
Phase 6: Action

The researcher adopted this model and used it to teach ecology concepts such as: man and his environment, ecosystem, habitat, food web, food chain, competition, succession, desert encroachment, population etc. The researcher gathered a list questions on problems that affect man and other organisms in their surroundings. During the teaching session, the researcher asked the students with these questions and sends them out to look for solutions for these problems.

A post test was administered after the treatment to establish the difference in the performance of the two groups. Two weeks after, a reshuffled copy of the achievement test was administered to establish the retention ability of the two groups.

**Table3**

*Ecological Test Blue Print*

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>WEIGHT</th>
<th>Knowledge 30%</th>
<th>Comprehension 22%</th>
<th>Application 17%</th>
<th>Analysis 12.5%</th>
<th>Synthesis 10%</th>
<th>Evaluation 7.5%</th>
<th>Total 100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecology concept</td>
<td>25%</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Ecology terms</td>
<td>20%</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Adaptation</td>
<td>17%</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Food chain</td>
<td>20%</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Application</td>
<td>17.5%</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Ecology</td>
<td>Total</td>
<td>12</td>
<td>9</td>
<td>7</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>40</td>
</tr>
</tbody>
</table>

**Findings**

The result of the performance of the two groups on the post test was analyzed using the means, standard deviations and t-test statistics.
Table 3
*T-test Analysis for Differences in Pre-test Performance of the Experimental and Control*

<table>
<thead>
<tr>
<th>Test</th>
<th>Group</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>SE</th>
<th>df</th>
<th>t-value</th>
<th>P</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>EG</td>
<td>50</td>
<td>14.92</td>
<td>2.25</td>
<td>42.90</td>
<td>98</td>
<td>0.18</td>
<td>0.86</td>
<td>Not sig</td>
</tr>
<tr>
<td></td>
<td>CG</td>
<td>50</td>
<td>15.02</td>
<td>1.28</td>
<td>40.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Result of table 3 shows a P-value = 0.18, df = 98. Since the t-cal-0.18 is more than the P-critical 0.05, it shows there was no significant difference between the experimental and control groups in their pretest scores. This means that students in both groups were equivalent in terms of their prior knowledge on ecology concepts.

**Difference in academic performance in ecology between students taught using STS strategy and those taught using lecture method**

Table 4
*Difference in the Mean Achievement Scores of Jurisprudential Model and lecture Method*

<table>
<thead>
<tr>
<th>Test</th>
<th>Group</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post test</td>
<td>EG</td>
<td>50</td>
<td>15.18</td>
<td>3.75</td>
<td>43.41</td>
</tr>
<tr>
<td></td>
<td>CG</td>
<td>50</td>
<td>12.35</td>
<td>2.75</td>
<td>9.71</td>
</tr>
</tbody>
</table>

Table 4 shows the mean achievement scores the experimental group and control group as 15.18 and 12.35 respectively. The difference is 2.83 in favour of the experimental group. This means that the experimental group performed better than the control group. There is therefore, a difference in performance between the two groups.

**Difference in retention ability between students taught using STS instructional strategy and those taught using lecture method**

Table 5
*Difference in the Retention Ability Scores of Jurisprudential Model and lecture Method Groups*

<table>
<thead>
<tr>
<th>Test</th>
<th>Group</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post test</td>
<td>EG</td>
<td>50</td>
<td>15.2</td>
<td>3.33</td>
<td>43.43</td>
</tr>
<tr>
<td></td>
<td>CG</td>
<td>50</td>
<td>11.80</td>
<td>3.07</td>
<td>11.89</td>
</tr>
</tbody>
</table>

Table 5 shows the performance mean scores on the retention ability test for the experimental and control groups as 15.23 and 11.80 respectively. The difference is 3.43. This shows that, there is a difference between the two groups, in favour of the experimental group.
Difference in academic performance in ecology between male and female students exposed to STS instructional strategy

Table 6
Difference in the Mean Scores of the Male and Female Experimental Groups

<table>
<thead>
<tr>
<th>Test</th>
<th>Group</th>
<th>N</th>
<th>X</th>
<th>SE</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post test</td>
<td>Male EG</td>
<td>28</td>
<td>24.10</td>
<td>6.55</td>
<td>42.70</td>
</tr>
<tr>
<td></td>
<td>Female CG</td>
<td>22</td>
<td>23.76</td>
<td>6.38</td>
<td>7.45</td>
</tr>
</tbody>
</table>

Table 6 shows the achievement mean scores of the male and female experimental group as 24.10 and 23.76 respectively. The difference is in the performance between male and female students of the experimental group are 0.34, in favour of the male students.

Hypotheses

Ho1: There is no significant difference in mean achievement scores of students exposed to Jurisprudential model and those exposed to lecture method of teaching. The result of the analysis is shown below:

Table 7
t-test Analysis for Difference in Performance between the Experimental and Control Groups

<table>
<thead>
<tr>
<th>Test</th>
<th>Group</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>SE</th>
<th>DF</th>
<th>t-value</th>
<th>p-value</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post test</td>
<td>EG</td>
<td>50</td>
<td>15.18</td>
<td>3.75</td>
<td>43.41</td>
<td>98</td>
<td>3.51</td>
<td>0.001</td>
<td>Sig</td>
</tr>
<tr>
<td></td>
<td>CG</td>
<td>50</td>
<td>12.35</td>
<td>2.51</td>
<td>9.71</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at P<0.05

Table 7 shows a t-cal of 3.51, df = 98, P = 0.0001. Since P-cal is less than 0.05. It means there is a significant difference in the mean achievement of the two groups. The null hypothesis which states that there is no significant difference in achievement between the experimental and the control group is therefore, rejected. It then implies that, the difference in the mean scores of the two groups is significant at P = 0.05.

Ho2 There is no significant difference in retention ability between students taught using jurisprudential model and those taught using lecture method.
Table 8
T-test Analysis for Difference in Retention Ability between the Experimental and the Control Groups

<table>
<thead>
<tr>
<th>Test</th>
<th>Group</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>SE</th>
<th>df</th>
<th>t-value</th>
<th>P-value</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post test</td>
<td>EG</td>
<td>50</td>
<td>15.23</td>
<td>3.33</td>
<td>43.43</td>
<td>98</td>
<td>4.51</td>
<td>0.001*</td>
<td>Sig</td>
</tr>
<tr>
<td></td>
<td>CG</td>
<td>50</td>
<td>11.80</td>
<td>3.07</td>
<td>11.89</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at P<0.05

Table 8 shows a t-cal of 4.51, df - 98 and P-cal = 0.000. Since P-cal is less than 0.05, it means there is a significant difference in the retention ability of the two groups. The null hypothesis of no significant difference is therefore, rejected. This also implies that, the difference in the means of retention ability of the two groups is significant.

Ho3: There is no significant difference in academic performance in ecology between male and female students exposed to jurisprudential model

Table 9
T-test Analysis for Difference in performance between male and female students exposed to jurisprudential model

<table>
<thead>
<tr>
<th>Test</th>
<th>Group</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>SE</th>
<th>DF</th>
<th>t-value</th>
<th>p-value</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post test</td>
<td>Male EG</td>
<td>28</td>
<td>2.41</td>
<td>6.55</td>
<td>42.70</td>
<td>48</td>
<td>0.33</td>
<td>0.75</td>
<td>No sig</td>
</tr>
<tr>
<td></td>
<td>Female EG</td>
<td>22</td>
<td>23.76</td>
<td>6.38</td>
<td>7.46</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

P<0.05

Table 9 shows a t-cal of 0.033, df = 48 and P-cal = 0.75. Since p-cal 0.75 is greater than 0.05, it means that there is no significant difference in the mean achievement of the male and female experimental groups. This also implies that the difference in the mean scores of the two groups is not significant. The null hypothesis of no significant difference between the performance of male and female experimental groups is therefore, retained.

Discussion of Results
The results of the analysis show that the experimental group achieved significantly better than the control group. One can infer from this result that the jurisprudential model was more effective than the conventional lecture method in promoting students' understanding of ecology concepts taught. Despite the fact that jurisprudential model is relatively new in the schools where the investigation was conducted, the students in the experimental group performed better than the conventional group. This shows that jurisprudential model facilitated the understanding of ecology concepts more than the conventional lecture method. This finding which shows the superiority of jurisprudential model of STS over the conventional method is in agreement with those of Obieke, (2009); Obomanu & Nbina (2010) Suman, (2011), also found from their studies that STS strategies make
learning very interesting, enjoyable and relatively easy. This could be due to the fact that learning by jurisprudential model of STS relates closely with students' common issues and problems in their immediate environment.

The study also showed that jurisprudential model enhances students' retention ability more than the conventional method. This finding is supported by those of Snezana, Liljana & Milena (2011), Stake & Mares (2011). This could be due to the constructivist nature of the jurisprudential model of STS which helps to modify and build on their viewpoints. It could also be due to the brainstorming exercises of students which characterize discussion. The study found that there is no significant difference in performance between male and female experimental (jurisprudential model) groups in the post test. This is in agreement with the findings of Stake & Mares (2011), who found no difference in similar strategies that involve problem-solving abilities between boys and girls. Abubakar & Oguguo (2011) and Wabuke (2013) also found no significant different difference in science achievement of boys and girls exposed to activity-based methods of instruction similar to jurisprudential model. This result indicates that, jurisprudential model is gender friendly. Jurisprudential model of STS offers occasions to practice some of the 'humanistic' skills that are largely excluded from the hard science (Ahmad, 2011; Achor, Wude & Duguryil, 2014). This is one of the reasons for introducing STS strategies like this into science education. The major finding was ability to express themselves, interacting within the group and brainstorming in handling ecological investigation which shown in outcome of post-posttest jurisprudence model of teaching strategy hard greater retention ability and performances than conventional lecture method on students' achievement.

**Conclusion and Recommendations**

This study has shown that jurisprudential model of STS could effectively enhance the understanding of ecology concepts in students and subsequently improve their performances significantly in the subject more than the conventional lecture method. Jurisprudential model has also proved to improve retention of knowledge gained. This model helps students formulate their stance that they can eventually defend also helping them to revise their position after argumentation. Once students become fluent in their use of jurisprudence inquiry model, they can apply it to conflicts that occur in and around their own, such individuals develop the ability to think or analyze situations in the society critically and resolve them effectively by technological methods. Finally, jurisprudential model is gender friendly. In the light of these findings the following recommendations are made:

Curriculum planners should consider the introduction of jurisprudential model in the teaching and learning of ecology concepts, since ecology deals with students' environment in its natural set up and interaction within organism and their contact with environment which include interspecific and intra-specific competition. Moreover Professional associations and Educational resource centers should carry out researches; organize conferences, seminars and workshops to sensitize the various stakeholders on adoption of the jurisprudential model in our secondary schools. In addition, Science curriculum developers, educators and teachers should try and popularize and incorporate jurisprudential model into the teacher training curricula at all levels. More also Science educators and teachers should also see to the production of textbooks and teacher guides based on jurisprudential model of teaching and learning. Finally the implication of the findings of this study for the teachers is that there is the dare need for more effective methods of presenting science to
young learners if we are to achieve the objectives school science programs. Although ecology
teaching in our schools is burdened with large class sizes and limited time as provided by school
time table and calendar, giving students opportunities to be actively involved and responsible for
their own learning although discussions and manipulation of skills improve students understanding
and performances in Ecology. For the students: Being able to verbally share what has been learnt (one’s knowledge) with peers in discussion and the teacher helps a learner gain better understanding
of Ecology concepts, reinforce positive interdependence and improves a student’s social skills.
Having access to models will also help students understand abstract biological concepts.

Limitation of the study and Implication for further Study
Although ecology teaching in our schools is burdened with large class sizes and limited time as
provided by school time table and calendar, the results and conclusion were restricted to the
population from sample drawn. The finding may different or otherwise if the samples were larger
also problem of ecological instruments. The study investigated jurisprudential inquiry model of
instruction on performance and retention on ecological concepts thus, there is need to try the strategies
on other concept and disciplines such as, chemistry Geography and Agriculture among other secondary
school students to see what the result will be, also the strategies used in the study could be used in
other higher institution of learning i.e Polytechnics, Colleges of education

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