Students’ Teleologic and Anthropomorphic References to Select Concepts of Environmental Science

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Abstract This study attempted to ascertain the students’ teleologic and anthropomorphic references to select concepts of Environmental Science. Using questions forming generalizations on abstract topics of Hydrologic Cycle, Acid Rain, Air Pollution and Global Warming, students’ teleologic-anthropomorphic references were determined. It was found out that the students’ who had just finished their secondary education program and underwent the English curriculum had the least affordance of teleologic and anthropomorphic references. Statistical analyses, based on the scope of the study, discriminated the following results: classroom pedagogical interventions made a 61.5% impact on the correction of their teleologic- anthropomorphic references; teleologic and anthropomorphic references were highly significant related to age in an inverse relation and an emerging relationship to the English curriculum was discerned.

Keywords: academic learning and cognition, anthropomorphic language, pedagogical interventions, teleologic reference


1. Introduction

Learning is an active process that takes place in a dynamic environment of sustained community of inquiry. The self-motivated erudition of conceptual cognition to various academic ventures is a result of a shared culture of teaching and learning inside and out of the classroom environment.

Learners construct concepts based on their default knowledge and beliefs which were acquired through mental cognition and reception to various environmental stimuli. The construction of a concept to various phenomena changes as a learner accumulates conceptual knowledge and understanding through cognitive and metacognitive learning strategies.

Anthropomorphism, or the tendency to attribute human motivation, characteristics, or behavior to nonhuman entities, reflects and shapes perception and beliefs to the nonhuman world [4,11]. Believed to be attributed to age and exposure to metal cognition and learning, it diminishes as one gets full cognition to a phenomenon through conceptual and scientific explanation through learning experience.

The students’ teleologic references and anthropomorphic languages is interpreted in a framework that converts personal beliefs and practices into contextual frameworks affected by their learning exposures through classroom discussions and cognition between teacher and students, student and students, students and select learning modules and other academic infrastructures.

Learning exposure plays a vital role in the re-formation of their capabilities on teleologic references and anthropomorphic reasoning. If not intervened properly by academic learning and cognition, this forms an impetus-type of conception which eventually forms mounting-roadblocks that can hinder their scientific understanding and explanations to the abstraction process of new concepts.

Telelogic references and anthropomorphic languages among learners had been regarded as an intangible configuration of the mind which in turn plays an active role in the process of constructing their personal knowledge in learning concepts of science.

1.1. Theories of Anthropomorphism

1.1.1. Familiarity Thesis

The familiarity thesis affirms that we anthropomorphize phenomenon because it allows us to explicate things we do not comprehend in a manner that we understand; hence, what we understand best is ourselves. The familiarity thesis is a primarily cognitive motivation for anthropomorphism: it attempts to understand the world based on a mental model of the world that we are most familiar with [5,7].

1.1.2. Comfort Thesis

The comfort thesis is the prime emotional motivation for anthropomorphism. People anthropomorphize because they are not comfortable with things that are not like us;
hence, “making” things be like us reduces discomfort. According to the comfort thesis, anthropomorphism is “an attempt to feel like we can delineate and persuade the world if it is more like us than not.” [5,7].

1.1.3. Best-Bet Thesis

The best-bet thesis is a cognitive and game-theoretic approach to anthropomorphism. The best-bet thesis states that “in a world of chronic uncertainty about the nature of the world, guessing constitutes a good bet on something or to an event that has a human cause: we gain much if we are right and we usually lose little if we are wrong” [5,7].

1.1.4. Social Thesis

Caporael and Heyes [3] put forth a theory of anthropomorphism in a term Species-Specific Group-Level Coordination System, which was then translated to social thesis. This thesis claims the psychological discussion of anthropomorphism is not neutral but is in fact value laden and defines our interaction with the environment. “From this perspective, attributing human characteristics to animals is a way of changing the values we place on them and how we can behave towards them”. In the social thesis, the act of anthropomorphizing reflects values and possesses the potential for social consequence [7].

1.1.5. Object Subject Interchangeability

The concept of object-subject interchangeability proposes that people attribute meaning to other people and objects in the construction, adaptation, and maintenance of the self. The distinction between the influence of other people and objects is not always firm. Anthropomorphism may be used to attribute a human-like quality to an object that has particular salience in defining who we are individually or culturally [5,8].

1.1.6. Phenomenological Inter-subjectivity

The concept of phenomenological inter-subjectivity proposes that anthropomorphism is a reflection of how we experience and order the world. This concept argues we experience objects that seem to be animated by human experience and order the world. This concept advocates for an account of justifiable rejection of explanation-request, and (2) the accounting for the asymmetries of explanation. To this end, he takes explanation as a ternary relationship between theory and fact. This explanation as a relationship between theory and fact. This cognition ends up to the existence of causal relationships beyond the observable phenomena [1].

1.3. Objectives of the Study

This study attempted to analyze the students’ teleologic and anthropomorphic references to select concepts of Environmental Science.

Specifically, it sought to find explanations of the following:

1. What is the extent of students’ preconceptions on select concepts in Environmental Science as a result of their affordance of teleologic-anthropomorphic references?
2. Do classroom pedagogical interventions correct the students’ teleologic-anthropomorphic references on select concepts in Environmental Science?
3. Which learning factor is associated with the students’ teleologic-anthropomorphic reference on select concepts in Environmental Science?

2. Methodology

This study made use of Descriptive-Correlation method in ascertaining the preconceived research problems. It involved a systematic investigation using pre-assessment results, formative evaluations, interview and questionnaire as predominant methods of data collection. Corroboration of findings, vis-à-vis with the identified norms of the context of the study, was used to conclude on the students’ teleologic and anthropomorphic references on select concepts of Environmental Science.

The respondents of the study were the 40 students of the author in Environmental Science at AMA International University in the Kingdom of Bahrain for the first trimester, AY 2012.

Pearson-r correlation was used in determining the relationship of select variables to their teleologic and anthropomorphic references while ANCOVA results were utilized to determine which of the variables used is cogently discriminated in the process.

![Figure 1. Research Paradigm](image)

Presented in the foregoing figure is the paradigm of the study. It made use of the assumptions that teleologic explanation and anthropomorphic language of the students are influenced by their age and learning exposure. Moreover, it also assumes that their learning exposure is dependent on the type of their attended secondary education curriculum. In this set up, there are two curriculums which the respondents are grouped of: English and Arabic. The English curriculum was used by the International and Private Schools and the Philippine School-Bahrain while the Arabic Curriculum was the...
public Science Curriculum. These variables are believed to be the respondents’ input on their affordance of teleologic explanation and anthropomorphic language on select concepts in Environmental Science.

On the other hand, the teleologic explanation and anthropomorphic language of the respondents are expected to be corrected by classroom pedagogical interventions. The interventions made were multimedia presentations, classroom interactions and other class works based on notional hours to complement the designed learning competencies to hone their background understanding of the subject. These cognitions help them formulate new concepts and scientific explanations on select concepts in Environmental Science: Hydrologic Cycle, Acid Rain, Air Pollution and Global Warming.

<table>
<thead>
<tr>
<th>Table 1. The Extent of Preconceptions of the Students on Select Concepts in Environmental Science as a Result of their Teleologic-Anthropomorphic References</th>
</tr>
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<tbody>
<tr>
<td>Age</td>
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<tr>
<td>---</td>
</tr>
<tr>
<td>16-17</td>
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<tr>
<td>18-19</td>
</tr>
<tr>
<td>20 and above</td>
</tr>
<tr>
<td>16-17</td>
</tr>
<tr>
<td>18-19</td>
</tr>
<tr>
<td>20 and above</td>
</tr>
</tbody>
</table>

Legend: F – Frequency; D.I – Descriptive Interpretation: L – Low; M – Moderate; H – High

Presented in the foregoing table are the extents of preconceptions of the student-respondents as a result of their teleologic-anthropomorphic references in eliciting concepts in Environmental Science when grouped according to age and type of secondary education attended. Using questions forming generalizations on select topics of Hydrologic Cycle, Acid Rain, Air Pollution and Global Warming, students’ teleologic-anthropomorphic reference was determined. It can be said that the students’ who had just completed their secondary education had the least affordance of teleologic-anthropomorphic reference when compared to their counterparts.

Concomitantly, the students who completed English curriculum in their Secondary Science Program had the least affordance of teleologic-anthropomorphic references when compared to their counterparts who had the Arabic curriculum. This phenomenon can be attributed to the fact that the medium of instruction used in the present study is English. This attribution is believed to be useful as students who have both the linguistic and semantic competences in English can easily infer on phenomenon and validate generalizations based on facts [2].

The foregoing results can be construed by the conjectures stipulated in Piaget’s Cognitive Development Theory which in turn used by the students in their construction of pragmatic explanations to various phenomenon (VF Theory of Explanation) [1]. It was posited that language takes part in the cognitive development of a person. Concomitantly, their linguistic and semantic competences discriminates their concept abstraction abilities in forming a functional schema to a ready and available conceptual understanding. This functional schema takes a potent role in resembling a pragmatic explanation in the verbal mode of the student in explaining abstract concepts [1,2].

<table>
<thead>
<tr>
<th>Table 2. Tests of Between-Subjects Effects of Classroom Pedagogical Interventions on the Students’ Affordance of Teleologic and Anthropomorphic Reference in relation to their Age and Curricular Exposure</th>
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<tbody>
<tr>
<td>Source</td>
</tr>
<tr>
<td>Corrected Model</td>
</tr>
<tr>
<td>Teleologic and Anthropomorphic Reference</td>
</tr>
<tr>
<td>Age</td>
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<tr>
<td>Curriculum</td>
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<tr>
<td>Age * Curriculum</td>
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</table>

Presented in the table are the tests of between-subjects effects of classroom pedagogical interventions on the students’ affordance of teleologic and anthropomorphic references on select concepts in Environmental Science. It was found out that there is a significant difference on the students’ affordance of teleologic and anthropomorphic reference after various classroom pedagogical interventions had been introduced: F-value of 13.501 and a p-value of <.001, at .05 level of significance. Hence, it can be said that teleologic and anthropomorphic references can be corrected as student-learners are confronted with various classroom pedagogical interventions.

The interactions of the classroom pedagogical interventions to the respondents’ affordance of teleologic and anthropomorphic references were also analyzed when the respondents were grouped according to their age and curricular undertakings: F-values of 6.737 and 6.663, and p-values of 0.003 and 0.014, at .05 level of significance, respectively. Hence, it can be said that anthropomorphism reduces as one gets expose to conceptual explanation through curricular learning experiences.

It may be noted, however, that the impact of the classroom pedagogical interventions is moderately high considering that the coefficient of determination indicated by the adjusted R-squared is 61.5 %. This means that the pedagogical interventions done in the subject account for 61.5 % of the variability in the teleologic and anthropomorphic reasoning of the students. It is construed...
then that there are other important variables or factors that affect the students’ teleologic and anthropomorphic reference, e.g., cognitive and metacognitive abilities, attitude and motivation in learning Physics.

Table 2 likewise presents the interaction between classroom pedagogical interventions and the age and curricular undertakings of student-respondents. It presents the impact of the interventions done in the study: F-value of 3.554 and p-value of .038 at .05 level of significance. These results were analyzed using the estimated marginal means with a covariate value of 1.45 as shown in Figure 2.

![Figure 2. Estimated Marginal Means of Between-Subjects Effects of Classroom Pedagogical Interventions on the Students’ Teleologic and Anthropomorphic References in relation to their Age and Curricular Exposure](image)

Covariates appearing in the model are evaluated at the following values: Initial = 1.45

Figure 2. Estimated Marginal Means of Between-Subjects Effects of Classroom Pedagogical Interventions on the Students’ Teleologic and Anthropomorphic References in relation to their Age and Curricular Exposure

Table 3. The Attribution of the Students’ Teleologic and Anthropomorphic Reference to their Age and Curricular Undertakings

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Teleologic and Anthropomorphic Reference of the Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Pearson Correlation - .470**  Sig. (2-tailed) .001</td>
</tr>
<tr>
<td></td>
<td>Pearson Correlation .208</td>
</tr>
<tr>
<td>Curriculum</td>
<td>Sig. (2-tailed) .156</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed).

Presented in the foregoing table is the attribution of the students’ teleologic and anthropomorphic reference to their age and curricular undertakings.

As can be gleaned on the table, the teleologic explanations and anthropomorphic reference of the student-respondents are attributed to their age: r-value of -.470 and p-value of .001, at .01 level of significance. This means that their teleologic explanations and anthropomorphic languages diminish as they ages. It can be construed further that learning corrects their
misconceptions to a certain phenomenon. These results confirm the assumption of the study which says that teleologic explanations and anthropomorphic languages of students are related to their age.

On the other hand, curriculum is not significantly related to their teleologic explanations and anthropomorphic languages: r-value of 0.208 and p-value of 0.156, at 0.05 level of significance. However, an emerging positive correlation is getting evident as indicated by the results value.

3. Conclusion

Based on the findings of the study, the following are concluded: (1) the students who completed English curriculum in their Secondary Science Program had the least affordance of teleologic-anthropomorphic references when compared to their counterparts who had the Arabic curriculum; (2) students’ teleologic-anthropomorphic references can be corrected by classroom pedagogical interventions; and (3) teleologic and anthropomorphic references is highly significant related to age in an inverse relation and an emerging relationship to the English curriculum was discerned.

4. Recommendation

Based on the conclusions of the study, the following are forwarded: (1) the use of English, as medium of instruction, is highly recommended to equip students comparable learning experiences with their counterparts, e.g. local, regional, national and international. This phenomenon is necessary in creating a bar-none curriculum which is fundamental in rationalizing the world’s educational system – the internalization in higher education; (2) Teachers, as facilitator of student learning, should exude extra effort in the teaching-learning process as they play a critical role in reaping and reducing the drawbacks of the contrasting learning modes of student-learner. In this manner, students’ teleologic-anthropomorphic references maybe corrected; (3) divergent learning experiences, in all learning platforms, are highly recommended to harness students’ potentials in an integrated learning mechanism.

References


