

The Significance of Symbolic Logic in Teaching English in the Level of Academic Performance of College Students

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Abstract: *This study sought to improve classroom instruction for English subjects with the employment of symbolic representation. It was made on the bases of theories in learning and principles of psychology on perception and cognitive processes. The research contends that the use of symbolic logic in the instruction of English subjects, especially in the areas of reading and writing, may enhance students' learning. The data was analyzed using descriptive and inferential statistical tools: mean was used to determine the central tendency of the responses; standard deviation to determine the significant difference, T-test to derive the significance of variations and Pearson Product Moment Coefficient of Correlation was used to ascertain whether there was significant relationship between dependent variables. The independent variables include the course, year level and sex of the respondents; on the other hand dependent variables include "the frequency of the use of symbolic representation in teaching English" and the "performance level of students." Findings reveal that there is significant relationship in the use of symbolic representation in teaching English and the performance of level of students.*

Keywords: Symbolic Logic, Gestalt Theory, Grammar, Academic Performance, Constructivist Theory, Representation

1. Introduction

Symbolic logic is already a contemporary technique in the teaching of Mathematics. However, this study aimed to discover the effectiveness of using symbolic logic for classroom instruction in the English subjects, especially in the areas of reading and writing. This study has analyzed information as basis in designing curriculum and the structuring of the syllabus as well as for improving and revising the curriculum for the achievement of quality education. It gathered inferences on the effectiveness of using symbolic logic for classroom instruction in teaching reading and writing skills. The study also has discussed results for future experimentations regarding the development of strategies and approaches in teaching for better learning performance of students.

The research essentially employed inferential statistics in deriving its objectives. To prove a significant relationship between the employment of symbolic representation in the teaching of English and the performance level of students, the study, first had to identify the frequency of the use of symbolic representation as perceived by the learners and the performance level of students in English classes and establish significant difference in the frequency of the use of symbolic representation and the performance of learners when grouped according to each independent variables. Second, the study had to identify the reliable population size in conducting the gathering of data. Through an instrument, it then identified the frequency, effectiveness and the nature of the use of symbolic representation as perceived by the learners. Lastly, it identified the respondents' performance in English classes per dependent variables.

1.1 Objectives of the study

1) To identify the frequency of the use of symbolic representation in teaching English as perceived by the

students when taken as a whole and categorized according to variables of:

- a. Year Level, b. Course, and c. Sex
- 2) To identify significant difference in the frequency of use of symbolic representation as perceived by the students in teaching English when categorized according to variables of:
 - a. Year Level, b. Course, and c. Sex
- 3) To identify the performance level of students in English classes when they are taken as a whole and categorized according to variables of:
 - a. Year Level, b. Course, and c. Sex
- 4) To identify the significant difference in the performance level of students in English classes when they are taken as a whole and categorized according to variables:
 - a. Year Level, b. Course, and c. Sex
- 5) And to establish significant relationship between the frequency of use of symbolic representation as perceived by the students in teaching English and their performance level in English classes

2. Literature Review

2.1 Gestalt Theory of Cognitive Perspective

In this study, we adopted the Gestalt Theory of Cognitive Perspective. Gestalt theory was the initial cognitive response to behaviorism which emphasized the importance of sensory wholes and the dynamic nature of visual perception. Gestalt here means the outward appearance or the visual manifestation of the idea. The psychologists who studied perception were Max Wertheimer, Wolfgang Kohler and Kurt Koffka who found out that learners were not passive and receptive to learning; rather they were active and dynamic. Learners are not merely collectors of information. They process the information and reshape it in a form that they can understand. This is termed as the perceptual process [1].

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In Gestalt Theory, learners form their own perception upon the guidance of principles and laws which determines what people see or make of things or situations they meet. The following are the Gestalt Principles of Perception:

- a) Law of Proximity: This law states that when certain objects are placed closer together then they will be perceived as coherent objects. When we see objects near each other, our perception is that - they belong together.
- b) Law of Similarity: This law states that when objects look similar then they are part of the same form. We have the tendency to link or group elements that are alike.
- c) Law of Closure: This law states that we have the tendency to fill the gaps and blanks or “close” the figures we perceive. We have the perception of the complete object and we tend to ignore the blanks and gaps in between.
- d) Law of Good Continuation: This law states that people have the tendency to continue the outline of a figure or shape when its pattern is implied in a certain direction.
- e) Law of Good Pragnanz: This law states that when we perceive objects, we based it on previous experience and “expect” a certain pattern and we actually perceived our expected pattern.
- f) Law of Figure/Ground: This law states that when an object is presented, the first thing we pay attention to is the foreground and not the background. We tend to see these two things as separate from each other [2].

These six Gestalt principles and the Gestalt Theory instigate learning as an experience for both the learners and the teacher. Through the technique of visualization and use of images and symbols by the teacher, learning becomes not just an accumulation of ideas but the reformation of ideas and the acquiring of new insights to old ideas.

Another theory that was adopted in this study is the Constructivist Theory by Jerome Bruner which states that learners construct their new ideas and learning based on previous experience and knowledge. Bruner’s theory gave one concept on Representation. This concept of Representation states that there are three ways of representing knowledge: Enactive Representation, Iconic Representation and Symbolic Representation. Enactive representation is usually practiced with young learners, specifically small children, because objects are presented with the involvement of the immediate sensation of the learners such as digging the soil or eating vegetables. Iconic representation is the second stage where learning is acquired using models and pictures. The models and pictures stand for certain events or ideas. The learners are allowed to recognize object when they represent for something else or when they are changed in minor ways [1]. Symbolic representation is the third stage where the learners develop their abstract thinking skills. Knowledge is presented through the use of symbols. Symbol systems are usually used in language and mathematical notation.

2.2 Symbolic Representation in Approaching Grammar

Language and grammar can be regarded as a formal system in various aspects. The conventional way of presenting grammar to students as a set of morphosyntactic rules in order to speak a language correctly can be substituted by

formal models and symbols that explain the integration between morphology, syntax and semantics. There are countless grammatical theories that can be named logical grammars or formal grammars that represent these models. Historically, these formal theories about natural language have been developed by logicians, mathematicians or linguists that were interested in the figurative aspects of linguistics.

Many aspects of actual theories about language and grammar cannot be understood unless they are seen as a historical consequence of the ancient Greek theories about the predicative sentence. Medieval speculative grammar and theoretical rational grammars are based on the Aristotelian distinction on the relations between subject and predicate in asertoric sentences. On the other hand, they are also based on the concept of category, firstly used in a technical manner by Aristotle and adopted in its grammatical sense by stoics and alexandrines [9]. In modern times, the grammaticality of a sentence can now be taught to students with the use of symbols and other visual displays.

The most comprehensible and practicable use of symbolic logic in teaching language is through Semantic Mapping in Vocabulary Development. Semantic mapping and webbing, a method for graphically and visually displaying relationships among ideas and concepts, emphasizes cognitive processes and encourages problem solving.

According to Norton (1989) semantic mapping encourages higher thought processes, stimulates ideas and encourages oral interactions among students and teachers as they consider and complete various portions of the web. This web (mapping) is an evident use of symbolic logic and its utilization in classroom instruction gives learners an advantage of clearly picturing out relationships between words, sentences and ideas [1].

Pearson (1984) added that semantic mapping procedures increase vocabulary development; enhance literary discussions that highlight plot development, setting, characterization, and theme; enhance the development of instructional units; stimulate the composition process; encourage interaction and understanding in various content areas; and encourage the integration of reading, literature, writing, listening and oral discussion within the Language Art curriculum [5].

Semantic mapping as a type of symbolic logic strategy may be used to help learners identify words with similar meanings, expand a precise vocabulary, understand multiple meanings for words, develop concepts and perceive relationships among words and ideas [4]. According to the study of Klein and Grover (2000) using symbolic logic in classroom instruction in a secondary school field situation would affect greater improvement in composition and logical sentence analysis of the students in an English program. Eighteen English teachers, in grades 9 to 12, from seven school systems employed the use of symbolic logic in their classes and there was a significant effect on the scores of the learners’ essays.

One study noted that the use of symbols can actually be used as a form of language. Results of the studies conducted on animal research had proven that indeed the use of symbolic representation as a medium of communication may actually be feasible, in fact, real and commonly used among individuals with speech, and/or hearing dysfunction.

One of the most interesting aspects of human behavior is our nearly infinite capacity to arrange and coordinate symbols. Think of the symbols that permeate our existence. Paper money has no value in and of itself. A wedding ring is just a band of metal. The progress of the science might even be seen as the creation of an incredibly elaborate super-abstraction from which we can derive novel and testable predictions. Human beings, in short, are into symbols.

We know, however, that we are not the only animals capable of symbolic thinking. For example, it can be argued that whenever a rat is taught, a treat was placed under a particular toy; the toy comes to symbolize the treat for that rat. There have been neuronal recordings done for a similar experiment that show the formation of a stimulus-reward pairing in the brains of rats. These recordings were done in the orbitofrontal cortex for odor-reward pairings; however, this sort of stimulus response learning is not really symbolic in the sense that we understand the term.

The real hallmark of symbolic reasoning is the ability to compare and manipulate symbols. On this ground, we have evidence that chimpanzees are capable of symbolic logic. Chimpanzees can be trained to use linguistic symbols to ask for certain items, and two similarly trained chimps can conduct simple conversations with one another on the basis of these symbols. [10]

Another study which proves the feasibility of symbolic representation in teaching or classroom instruction is a study conducted by an American psychologist, in a kinder school where the pupils were actually oriented with tasks that involve symbolism or 'dual representation'. Results show that children can adopt themselves into this dual coded instruction.

A vital function of symbols is to enable humans to acquire information without direct experience. Our vast stores of cultural knowledge exist only because we can learn indirectly through symbolic representations. A research on this has revealed many factors influencing very young children's ability to exploit the informational potential of symbolic artifacts. In this research, very young children are provided with information about the location of a hidden toy via a symbolic object – scale model, picture, video, or map. For example, in the model task, children observe an experimenter hide a miniature toy somewhere in a realistic scale model of a room, and they are told that a larger version of the object is hidden in the corresponding place in the room itself. If the child understands the relation between the model and the room, finding the toy is relatively easy. On the other hand, the child does not appreciate it when asked to draw a balloon and a lollipop; 4-year-olds produced drawings that could have been either one. The same was true of their renderings of the experimenter and themselves. Nevertheless, when asked to name a given picture, the

children were adamant that it was whatever they had intended to draw when they produced it [11]. Without the traditional conventions of using oral communication, symbolic representation guarantees that the human brain can acquire learning.

Several studies have revealed dramatic age differences in the performance of children between 2 and 3 years of age in this task. Three-year-old children very successfully use the model-room relation to find the hidden toy, but 2.5-year-olds give little evidence of understanding that relation. The success of the older children depends on several factors, including the need for the experimenter to make the intentional basis for the symbol-referent relation clear by explaining everything about the task.

The age difference in this task is attributed to the difficulty that young children have achieving 'dual representation'. The younger the children, the more inclined they are to focus on the concrete object itself rather than its relation to what it represents. Several highly counterintuitive results provide strong support for the dual representation hypothesis. For example, it has been shown that decreasing the salience of a model as an object by placing it behind a window enables 2.5-year-olds to succeed in the model task. When the children never touch the model, its representational function is more obvious to them than when they physically interact with it. Conversely, increasing the physical salience of the model by letting 3-year-olds play with it for several minutes before the retrieval task leads to a decrement in their performance. Interacting with the model as an object blocks the child's appreciation of its symbolic function, the strongest evidence for dual representation comes from eliminating the need for dual representation altogether. 2.5-year-olds were led to believe that a shrinking machine (that looked much like an oscilloscope) could shrink a room, turning a large tent into a small scale model. The idea was that if the children believe the scenario (the model) is the larger space dual representation is not required. The children first observed a large toy being hidden in the tent, and then left the room while the shrinking machine worked its magic. When they returned, the small model was in the place of the large tent. Believing the model to actually be the larger space, the children successfully retrieved the miniature toy. Further support for the importance of dual representation comes from the fact that 2.5-year-old children who fail the model task nevertheless perform well in a video version of the task.

A video image is much less physically salient than a model, so it is easier to achieve dual representation. Two-year-old children, however, perform relatively poorly in the video task, even if they watch on a monitor as the experimenter models finding the toy in the room. However, this age group does succeed in an analogue of the shrinking room. If they are led to believe that they are looking through a window at a person hiding a toy in the room next door (they are actually watching the event on video), they can find the toy [12]. Thus, 2-year olds can learn from an event when they directly observe it or think they are directly observing it, but not when they knowingly view the same event via a symbolic medium.

The latter shows that symbolism may be a plausible tool for giving classroom instruction, since it is somewhat an innate system in our language to acquire a degree of familiarity among coded representation. Studies have shown that children very often acquaint themselves with this form of language, thus it is not surprising to find a few modern instructors who use the classroom technique.

2.3 Role of Visual Perception in Learning Language and Reading

Perception is the combination of the different sensations and the utilization of past experiences in recognizing objects and facts where the present stimulation arises. Since the use of symbolic logic involves graphics, pictures and other visual representations; visual perception is the primary element in recognizing its use. It is the most frequently used process in reading. In English classes, reading is one of the four fundamental elements which include writing, listening and speaking.

Reading is a unitary occurrence, meaning that an action taking place while one is reading occurs simultaneously [5]. When a reader concentrates on a written message, the next step is that the message must be perceived. Subsequently, one has to interpret whatever one has seen. Visual perception in reading means interpretation.

Symbolic logic in its essence employs the use of symbols and pictures, and the use of written words is rare. These visual representations are also called Non-linguistic representations. According to Corpuz et al. (2006) there are several non-linguistic representations that could help learners in their English classes and other language subjects. Photographs and pictographs are examples which could help students in visualizing information, recognize patterns, and remember new content such as vocabulary [7].

2.4 Students' Preferences for Representations

It is frequently observed that students in the classroom show certain preferences for one particular external representation. The literature contains important research studies concerning preferences exhibited by students in order to select a representation. Hart (1991), who developed extensive research concerning representations, explored their management. She studied students' preferred representations and how they vary their selection of representations depending on the problem. Hart's findings indicate that the representations used by students in solving problems are strongly influenced by their previous experiences. Hart found that there are factors that influence students' choice of representation. Her findings are summarized in the following points:

- 1) Students confident in their symbolic manipulation skills tend to use alternate representations only when unsuccessful at finding an answer symbolically.
- 2) Students make a choice of representations depending on the complexity of the symbolic information provided.
- 3) Some students do not use a certain representation because they do not recognize that it's a viable choice.
- 4) Students lack confidence in using certain representations.

- 5) Students who do not have access to a graphing calculator do not typically choose to use the graphical representation.

Keller and Hirsch (1998) identified several factors that influence the preference of representations. These factors included: (a) the nature of students' experiences with each representation, (b) the students' perception of the acceptability of using a representation, and (c) the level of the task.

Another theory concerning representation-preferences comes from the research done by Donnelly (1995), Dufour-Janvier, et al. (1987), Eisenberg and Dreyfus (1991), Poppe (1993), Porzio (1994), and Vinner (1989). Özgün-Koca (1998) summarized the previous findings of research in reasons for students' preferences for representations. These reasons were classified in two sections: internal and external effects. In the first section (internal effects) there are: personal preferences, previous experience, previous knowledge, beliefs about Mathematics, and rote learning. Under external effects, there are: presentation of problem, the problem itself, the sequential Mathematics curriculum, dominance of algebraic representation in teaching, and technology and graphing utilities [13].

3. Research Methodology

The descriptive analyses used in this study are frequency counts and mean. The inferential analysis used a t-test for independent samples and Pearson Product Moment Coefficient of Correlation. The questionnaire was the main tool for gathering the data. Data on 143 out of 223 students or 64% respondents are needed to satisfy the sample population based on the formula. The study used a combination of a stratified and convenient distribution of respondents. The 143 respondents required by the valid population threshold were divided among four categories of the research's subjects, thus having a distribution of 36-35 respondents on each 4 categories.

Before conducting the actual data gathering, a pilot testing was conducted to assure the reliability of the data gathering instrument. 30 initial questionnaires were distributed among the target respondent. The first part of the questionnaire looked in to the frequency and area of the usage of symbolic representation in classroom instruction. The second part is on the effectiveness of the usage of symbolic representation in the classroom instruction. The last part of the questionnaire is a checklist on the nature of the usage of symbolic representation in English classes. The questionnaires were face validated and the researchers personally administered the answering of the questionnaires to the respondents.

The data were analyzed using descriptive and inferential statistical tools. Mean was used to determine the central tendency of the responses of the frequency and area of usage of symbolic representation in English classes and the effectiveness of the usage of symbolic representation in English classes. Standard deviation was used to determine the significant difference in the frequency, area of usage and

effectiveness in the usage of symbolic representation in classroom instruction in English classes in terms of the independent variables.

T-test was used to determine the significance of variations in the performance level of students in English classes when they are grouped as a whole or categorized according to the independent variables. Pearson Product Moment Coefficient of Correlation will be used to ascertain whether there is significant relationship between the use of symbolic representation in classroom instruction and the performance level of students in English classes. The result of inferential analysis will be interpreted in reference to a 0.05 level of significance.

Moreover, the study employed the descriptive method. According to Key (1997) descriptive research involves the collection of data in order to test hypotheses or to answer questions concerning the current status of the subjects of the study. Specific procedures were used to make inferences about an unknown population or unknown score which will vary depending on the type of data used and purpose of making the inference. There are two main categories of inferential procedure; they are the t-test and Pearson Product Moment Coefficient of Correlation. When a correlation was used the study was able to determine the strength and direction of the relationship between two or more variables.

4. Results and Discussions

In terms of frequency of the use of symbolic representation, the study's findings reveal that symbolic representation was often used, although not always, in the teaching of English. Also, it shows that the performance of learners in English courses correlatively increase with the employment of symbolic representation. This means that there is a significant relationship between the use of symbolic representation in teaching English and the performance level of students. In lieu of these, it has been recommended that English teachers employ the use of such technique in administering classroom instruction.

The employment of logical representation in the teaching of language enhances the learners' perception of grammatical, syntactic and cohesive elements in a text. Such is the case, students in the secondary level, as early as grade seven, are exposed to academic, expository and literary texts, most of which are dangling with modifiers, cohesive tools, transitional phrases and implied ideas. Because of the nature of these reading materials, per se, the veracity or the logical truth that the text is communicating has often times been obscured; however, the perception of linguistics elements help learners derive the truthfulness behind the text and such discernment of words has been found to have been conveniently aided by logical representations.

Ultimately, the use of symbolic logic in teaching language has been employed since the existence contemporary methods of language pedagogy. It has been revealed that the frequency of its use significantly improves learners' perception and acquiring of knowledge and ideas. It is, therefore, sensible to state that such technique be employed in the teaching of English.

5. Conclusion and Recommendations

The study reveals that there is a significant relationship between the use of symbolic representation in teaching English and the performance level of students. It implies that the use of such a teaching method could enhance teacher performances whenever it is employed since the results show that there is consistent satisfactory performance of learner that is related to the use of symbolic logic.

English teachers should use symbolic representation in teaching grammar, literature and other aspects of the subject area because of the satisfactory performance level of the students whether they are of different courses, year level or sex. Importantly, administrators and curriculum makers should make the use of symbolic representation as a suggested (or an alternative teaching technique) when designing the curriculum. It is recommended that further studies be developed based on this study to establish the appropriateness of this teaching technique in other subject most especially other language courses.

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