



# Occurrence and Presentation of Natural Resource Management Themes of Mathematics Textbooks in Public High Schools

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**Abstract**-Content analysis of Mathematics textbooks is one of the very interesting topics especially if we focus on nowadays relevant issues concerning natural resource management. Our environment has been confronted with many pressing problems and the endeavors from the government and non-government organizations to help solve these concerns still remain inadequate. There is a need to go down at the very roots of the problem-the low level of knowledge on natural resource-based education. Textbooks are among the main instructional materials in educational systems. As such, textbooks are being used as an opportunity for increasing the awareness among the young, particularly on natural resource management topics. Hence, this study was conducted. It aimed to assess the frequency of occurrence and the presentation of Natural Resource Management (NRM) themes in Mathematics textbooks of public high schools. Tallies on the occurrence of the NRM themes and their presentations were done manually. Results showed that Mathematics textbooks did not give much importance to NRM themes. Further, these textbooks were not playing much on the role as eye-openers and contributors in molding student values on NRM. It is desirable that Mathematics textbooks carry more NRM themes to substantiate their roles of creating awareness on NRM education among the students.

**Keywords**- *Content Analysis, Themes, Textbooks, Natural Resource Management, Mathematics*

## I. INTRODUCTION

Content analysis is a systematic, objective, and quantitative method for studying communication messages and developing inference concerning the relationship between messages and their environment [12]. Dated to the late 1600s, content analysis has evolved into a common scientific research method used by various disciplines like psychology, sociology, and politics [3]. In the education sector, many printed communication materials offered new study objects to content analysis research. Book contents are the most interesting to investigate.

There are various themes that can be analyzed in books. With the global concerns on environment, natural resource

management themes should be prioritized. Today, the world confronts many natural resource base and environmental issues. Based on the Department of Environmental and Natural Resource's report, such issues include land degradation, deforestation, desertification, air pollution, solid waste generation and disposal, coastal pollution, loss of water quality, urbanization, and natural disaster.

For instance, In the Asia Pacific Region, statistics show that 850 million hectares of land had some degree of degradation; about 250 million people live within 100 km of coast line; forest cover is declining at a rate of 1% per year; 50-70% of mangrove stands lost to aquaculture; irrigation water in Asia accounts for 80-85% of total fresh water needs; ground water abstraction exceeded causing saline intrusion. The Philippines, likewise, has its own share of problems related to natural resource management, which includes land or soil dilapidation, deforestation, impairment of water resources, and marine and coastal degradation.

Aware of the negative impacts of these problems, concerned sectors have exerted efforts to reverse the degradation of the natural resource base. In the Philippines, for instance, the government, in cooperation with non-government and people's organizations, is implementing projects on social forestry, anti-pollution campaigns, reforestation, and timber stand improvements. Likewise, the church and the academic community lobby for policies that can promote the maintenance of functional ecosystems.

However, governmental, non-governmental, and organizational endeavors to help solve natural resource base degradation and environmental problems still remain inadequate. There is a fierce cry to go down at the very roots of the problem-the low level of knowledge on natural resource base education.

Undeniably, the school is the primary venue of a structured education on natural resource management. In addition, textbooks are among the main instructional materials in educational systems. However, the question is whether the school textbooks are being used as an opportunity for increasing the awareness among the young and mobilizing them into action. Hence, this study was conducted.

The study aimed to analyze the Natural Resource Management (NRM) themes and the presentations of these themes in the Mathematics textbooks of public high schools.

## II. METHODOLOGY

### A. Research Design

A qualitative approach was used in the analysis of Natural Resource Management (NRM) themes contained in Mathematics textbooks of public high schools. This was also used in determining the presentation of the NRM themes. A quantitative approach, on the other hand, was applied in determining the occurrence of the NRM themes and its presentations.

### B. Books Used and the Natural Resource Management Themes and Presentations

The researcher used grades 7-10 Mathematics textbooks in the public high schools for content analyses. In the content analyses, a validated guide on the different NRM themes was used. The themes were soil and water management, forest conservation, wildlife conservation, water resource management, mineral conservation, plant conservation, marine life conservation, natural environment conservation, energy conservation, and biodegradable conservation. For the presentation of the different NRM themes, classification is based on genres. These included short story, play, fable, essay, legend, myth, poem, picture and slogan, comics, diagram, dialogue, letter, speech, paragraph, epic, story, and video.

### C. Data Gathering Procedure and Statistical Analysis Used

In determining the number of NRM themes in the textbooks, the NRM themes were categorized into specific areas—e.g. soil and water conservation, water conservation, forest conservation, environmental conservation, etc. and the frequency counts of specific NRM themes contained in Mathematics textbooks were determined.

Determining the number of presentations used in portraying every NRM theme, however, was done by (1) categorizing the

NRM themes as to the type of presentation to which it falls under—e.g. short story, fable, legend, essay, poem, etc. and (2) determining the frequency counts of the presentations.

## III. RESULTS AND DISCUSSION

### A. Occurrence of the Natural Resource Management (NRM) Themes in Mathematics Textbooks

Only three (3) articles contained the NRM themes in the four Mathematics textbooks of public high schools. The articles represented only two NRM themes, Forest Conservation and Biodegradable Conservation (Table 1). Presence of Forest Conservation theme can be due to many products that have been and can be extracted from forest-based resources such as timber. The forest has long been exploited and the concept of forest conservation is not a new one; hence, articles have been written about its conservation. Furthermore, many people have discovered the important role of forests in people’s lives such as the protection it provides to in times of natural calamities like flood, typhoon and many others. Forest conservation topic has been a global talk because of the rapid clearing and concomitant biodiversity loss [5] [4] and climate change concerns [8] [7].

Biodegradable Conservation was also evident in the Level 9 textbook. The school should take part even at least on the awareness level because globally, there is a need to focus on solid waste reuse and recycling [6]. The appreciation on recycling of plastic solid wastes [11] and on animal waste treatment and recycling technology [13] are just two of the many “biodegradable conservation” practices that should be developed by the students.

Most of the NRM themes did not occur in the pages of Mathematics textbooks of public high schools. This can be due to the focus of Mathematics textbooks on processes and procedures on problem solving [2]. In the study conducted by An *et al* [1], Chinese teachers emphasized developing procedural and conceptual knowledge through reliance on traditional, more rigid practices, which have proven their value for teaching mathematics content.

TABLE I. TOTAL NUMBER OF NATURAL RESOURCE MANAGEMENT THEMES IN MATHEMATICS TEXTBOOKS OF PUBLIC HIGH SCHOOLS

Grade Level	Natural Resource Management Themes										TOTAL
	Soil and Water Mgt.	Forest Conservation	Wildlife Conservation	Water Resource Mgt.	Mineral Conservation	Plant Conservation	Marine Life Conservation	Natural Environment Conservation	Energy Conservation	Biodegradable Conservation	
7	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
9	0	1	0	0	0	0	0	0	0	1	2
10	0	1	0	0	0	0	0	0	0	0	1
Total	0	2	0	0	0	0	0	0	0	1	3

**B. Presentation of the Natural Resource Management (NRM) Themes in Mathematics Textbooks**

Among the 17 presentations used to portray NRM themes, only picture and slogan was evident. This form of presentation can be an easy way of explaining concepts in the field of Mathematics. Though it provides shorter phrases or simple sentences to describe or explain a particular theme, pictures could reveal more of its thought to the readers. According to Sadiq [10], using photographs for explaining complex phenomena is one of the teaching aids of modern education

system all over the world. Visual aids have the tendency to materialize the thoughts of students in the form of graphics to give thoughts a concrete frame of reference. In a related study, text with pictures can help to improve reading comprehension for students especially those with hearing impairment [9].

Other forms of presentations were not observed as a consequence from a very low occurrence of the NRM themes in the Mathematics textbooks. Also, other forms of presentation are not applicable in Mathematics such as short story, fable, essay, legend, myth and poem.

TABLE II. PRESENTATION OF NATURAL RESOURCE MANAGEMENT THEMES IN MATHEMATICS TEXTBOOKS OF PUBLIC HIGH SCHOOLS

Grade Level	Presentation of Natural Resource Management Themes																	TOTAL
	Short Story	Play	Fable	Essay	Legend	Myth	Poem	Picture and Slogan	Comics	Diagram	Dialogue	Letter	Speech	Paragraph	Story	Epic	Video	
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
10	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3

**IV. CONCLUSION**

Based on the findings of the study, Mathematics textbooks from grades 7-10 of the public high schools did not give much importance to Natural Resource Management (NRM) themes. This could be proven from the following observations: 1) less than 3% in the total articles of the books that were content-analyzed were NRM themes and the rest were non-NRM themes; 2) there are books which do not contain any NRM theme; and 3) the NRM themes were presented only thru picture and slogan. It can therefore be deduced that these textbooks were not playing much on the role as eye-openers and contributors in molding student values on NRM.

**RECOMMENDATIONS**

In the light of the findings of this study, book editors and authors need to re-examine their textbook policies to spot provisions that tend to hinder publication of natural resource management articles in Mathematics textbooks of public high schools. With their wide scope and coverage, it is desirable that these textbooks carry more natural resource management themes in their articles and present them in-depth. With these suggestions, the Mathematics textbooks of the public high schools can very well substantiate their roles of creating awareness among the students and subsequently mobilizing them for action.

Further study is suggested to include in depth qualitative analysis of NRM themes by conducting interviews to students who have been using the analyzed books in the present study.

Other themes that are within the textbooks of public schools, including those used in the elementary levels are also very important to look into.

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