Comparison on the Natural Resource Management Themes between English and Science Textbooks in Public High Schools

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Abstract-Content analysis of 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 comparison study on Natural Resource Management (NRM) themes between English and Science textbooks was conducted. It aimed to assess the frequency of occurrence and the presentation of NRM themes in English and Science textbooks of public high schools. Tallies on the occurrence of the NRM themes and their presentations were done manually. Results showed that Natural Environment Conservation theme had the highest occurrence both in English and Science textbooks among all NRM themes. Further, the presentation of themes was mostly in the form of essay and "picture and slogan". Test of significant difference on the occurrence of NRM themes and their forms of presentation between English and Science textbooks revealed no significant differences in the two parameters. However, at a grade level comparison, the Science textbooks of grade levels 8 and 9 have NRM themes that occur significantly frequent compared to the NRM themes found in English textbooks of same grade levels. In general, at the grade level category, the analyzed textbooks contained only few articles with NRM themes and the presentation of these themes were less variable. It is desirable that these textbooks carry more NRM themes to substantiate their role of creating awareness on NRM education among the students.

Keywords- Content Analysis, Themes, Textbooks, Natural Resource Management, Awareness, Public Schools

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 [15]. Dated to the late 1600s, content analysis has evolved into a common scientific research method used by various disciplines like psychology, sociology, and politics [4]. 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 and compare the Natural Resource

Management (NRM) themes and the presentations of these themes in the English and Science 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 English and Science 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 English and Science 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 was 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 English and Science 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.

To test the significant difference between English and Science textbooks on the NRM themes and their presentations, a t-test was applied for the two independent variables using online software for T-Test Calculator [2].

III. RESULTS AND DISCUSSION

A. Comparison on the Occurrence of the Natural Resource Management (NRM) Themes between English and Science Textbooks

A total of 157 articles were analyzed to have contained the NRM themes both in English and Science textbooks of public high schools (Table I). It can be gleaned from the table that Natural Environment Conservation theme had the highest number of NRM themes (53 articles). This is maybe because that natural environment conservation theme involves all aspects about the physical surroundings. It tackles everything that is related to the natural environment, what we see and experience in our daily lives, that is why, it is not difficult to write about the conservation of the natural environment due to its being a broad field.

According to Smith et al. [14], natural environment has been considered important for human health. In fact, in Europe, a systematic review of evidence for the added benefits to health exposure to natural environments was conducted [1].

Forest Conservation ranked second, with 13 articles. This 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, many 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 them 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 [6] [5] and climate change concerns [10] [9].

Biodegradable Conservation has the lowest number of NRM themes (5 articles). This is quite alarming considering that students should always be reminded on recycling concepts and practices. 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 [7]. The appreciation on recycling of plastic solid wastes [13] and on animal waste treatment and recycling technology [16] are just two of the many "biodegradable conservation" practices that should be developed by the students.

In all books across grade levels, there was no significant difference on the occurrence of NRM themes between English and Science textbooks. This implies that both English and Science textbooks, across grade levels, have comparably introduced the different NRM themes in their contents. In most of the grade levels, however, Science textbooks have more of the NRM themes compared to English textbooks.

There were significant differences in the occurrence of NRM themes between English and Science textbooks at grade levels 8 and 9. This implies that at these grade levels, Science textbooks are incorporating topics related to NRM themes that are significantly frequent than those observed in English textbooks. Hence, Science textbooks are playing its role on NRM education more than the English textbooks at grade levels 8 and 9. At a grade level category, most of the NRM themes were observed to occur rarely in the English textbooks of public high schools. In Grade 8 level, none of the NRM themes occurred.

TABLE I.   COMPARISON OF NRM THEMES BETWEEN ENGLISH AND SCIENCE TEXTBOOKS

Grade Level	Subjects	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	English	0	4	4	0	0	5	0	7	1	1	22
	Science	5	1	0	2	5	0	1	9	1	1	25
p-value		0.316ns										
8	English	0	0	0	0	0	0	0	0	0	0	0
	Science	1	1	0	0	0	2	2	1	0	0	7
p-value		0.008**										
9	English	0	2	0	1	2	1	1	3	0	0	10
	Science	0	2	6	3	9	2	4	8	1	0	35
p-value		0.015*										
10	English	1	7	1	1	2	3	1	20	3	2	41
	Science	1	3	2	2	0	0	2	5	1	1	17
p-value		0.113ns										
Total	English	1	13	5	2	4	9	2	30	4	3	73
	Science	7	7	8	7	14	4	9	23	3	2	84
p-value		0.375ns										
GRAND TOTAL		8	20	13	9	18	13	11	53	7	5	157

*ns- not significant; * significant at 5% confidence level; ** significant at 1% confidence level*

B. Comparison on the Presentation of the Natural Resource Management (NRM) Themes between English and Science Textbooks

Among the 17 presentations used to portray NRM themes, essay ranks first (43 articles: Table 2). This shows that essay is appropriate for better explanation of topics that talk about NRM. It gives good opportunity to include as many sentences as possible in order to fully discuss the themes. The use of essay allows authors to express point of view on a matter [3], and this is more advantageous to many writers. In fact, most of the book reviews are in a form of essay. Example to this is the study conducted by Mizruchi [8].

Picture and slogan ranks second (39 articles), perhaps because it is an easy way of explaining various concepts in the subjects. 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 [12], 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 [11]. Fable, comics, dialogue, and letter were not used in portraying the NRM themes.

In general, English textbooks were more variable in the presentation of the NRM themes compared to Science textbooks. The former represented 13 forms of presentations on NRM themes while the latter obtained only five (Table II). The difference in the occurrence of forms of presentation on NRM themes between two textbooks, however, was not significant. This was observed across levels and at grade level categories for the textbooks analyzed. This implies that presentations of NRM themes in Science and English textbooks are comparable with each other. The contribution of the variability on the presentation of NRM themes to NRM education for the students in both textbooks is generally equal.

IV.   CONCLUSION

The findings of the study showed that there was no significant difference in the occurrence and presentation of NRM themes between English and Science textbooks across grade levels. At a grade level comparison, the Science textbooks of grade levels 8 and 9 have NRM themes that occur significantly frequent compared to that of the NRM themes found in English textbooks of same grade levels. Hence, Science textbooks are playing its role on NRM education more than the English textbooks at grade levels 8 and 9. For the presentation of the NRM themes, no significant difference was observed between English and Science textbooks. Hence, the contribution of the variability on the presentation of NRM themes to NRM education for the students in both textbooks is generally equal.

In general, at the grade level category, the analyzed textbooks contained only few articles with NRM themes and the presentation of these themes were less variable. It is desirable that these textbooks carry more NRM themes to substantiate their role of creating awareness on NRM education among the students.

TABLE II.   COMPARISON ON THE PRESENTATION OF NRM THEMES BETWEEN ENGLISH AND SCIENCE TEXTBOOKS

Grade Level	Subjects	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	English	2	0	0	4	1	1	2	1	0	0	0	0	0	8	0	3	0	22
	Science	0	0	0	8	0	0	0	7	0	5	0	0	0	5	0	0	0	25
p-value		0.419ns																	
8	English	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Science	0	0	0	5	0	0	0	2	0	0	0	0	0	0	0	0	0	7
p-value		0.097ns																	
9	English	0	0	0	2	0	0	0	6	0	1	0	0	0	0	0	0	1	10
	Science	0	0	0	13	0	0	0	13	0	7	0	0	0	1	0	0	1	35
p-value		0.103ns																	
10	English	0	1	0	3	0	0	7	7	0	2	0	0	1	9	6	0	5	41
	Science	0	0	0	9	0	0	0	3	0	5	0	0	0	0	0	0	0	17
p-value		0.077ns																	
Total	English	2	1	0	9	1	1	9	14	0	3	0	0	1	17	6	3	6	73
	Science	0	0	0	35	0	0	0	25	0	17	0	0	0	6	0	0	1	84
p-value		0.411ns																	
GRAND TOTAL		2	1	0	43	1	1	9	39	0	20	0	0	1	23	6	3	7	157

*ns- not significant; * significant at 5% confidence level; ** significant at 1% confidence level*

V.   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 English and Science 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 English and Science 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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