

Oceans and Rivers Literacy in Fiji's Social Science Curriculum: An Analysis of Primary School Textbooks

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Abstract

Oceans and Rivers make all life on earth possible. The marine environment, however, is faced with increasing threats such as over-fishing, acidification, land and marine based pollution and habitat destruction as a result of the negative impact of human actions. Marine education is vital if Humanity has to tackle this problem. Marine educators and specialists across the world have identified several essential principles and concepts that define ocean literacy. School curriculum is an ideal way of promoting ocean and rivers literacy and sustainability. This paper presents an analysis of ocean and rivers literacy in the Fijian primary school Years 3-8 Social Science curriculum. Content analysis was done to determine the representation of oceans and rivers literacy in the Social Science prescriptions and textbooks. Analysis shows that the representation of ocean and rivers in the primary Social science curriculum is very weak.

Introduction

The ocean is an integral part of the Earth; our planet's atmosphere, climate, weather, temperature and productivity are all controlled by the long memory of the ocean (Ocean Literacy Project Planner, n.d). The world's oceans provide numerous habitats for sea organisms and also have a tremendous impact on human life within the domains of food, oxygen, climate control, fresh water sources, transportation, and the development of history and culture (Mayer & Fortner, 1985). Hence, ocean literacy - the understanding of the mutual influences shared by the ocean and humankind - is integral to the Earth's sustainability and the well-being of humankind (Cava, Schoedinger, Strang, & Tuddenham, 2005).

Ocean literacy is a topic which is greatly under-represented in many school curricula. This lack of subject coverage is exacerbated by the vastness of the topic, which could be studied in detail for many years. To create a more ocean literate society, 'Ocean Literacy Campaign' was initiated by a group of marine educators and scientists in 2002 in the United States; group developed the 'Essential Principles of Ocean Literacy' (EPOL) (Cava et al., 2005). Considering the fact that the EPOL illustrates the inextricable connectedness between the ocean and humans, students' awareness of their connectedness to marine plants and animals is critical to the development of their ocean literacy. As stated in Ocean Literacy Project Planner (2012), being Ocean literate gives young students the ability to understand the ocean's influence on them and their influences on the ocean. Moreover Ocean literacy, defined as 'an understanding of the ocean's influence on you, and your influence on the ocean,' (National Geographic Society, 2006) is a relatively new term coined by a group of dedicated formal and informal educators, scientists, government professionals, and others interested in promoting ocean sciences education. Fauville (2010, cited in EP intergroup on climate change) has stated that the concept of ocean literacy is not only knowledge, but it combines ocean knowledge with the ability to communicate about the ocean in a meaningful way and the ability to make informed and responsible decision regarding the oceans and its resources. Ocean Literacy is the concept of developing an ocean literate society; increasing national ocean stewardship and emphasizing the need to better educate people about the interdependence between humans and the ocean.

This paper examines ocean literacy in Fijian social science curriculum. It finds that the main constraint of ocean and rivers literacy in Fiji is that it is not included in Social Science Curriculum as an area of focus. At best one would find brief elements included amongst the broader global environmental issues covered in the curriculum.

Purpose of the Study

The ocean covers more than 70% of the surface of our planet. As a result, the ocean realm provides not only numerous habitats for marine organisms but also has a tremendous impact on human life. Oceans provide food, materials, oxygen, energy, a source of fresh water, transportation, and is a critical feature in the development of history and cultures (Mayer & Fortner, 1985). Over the past few centuries, oceans have facilitated international trade and exchange. The ocean provides many of the Earth's systems including the regulation of climate and the hydrological

cycle. However, the marine environment is faced with increasing threats such as overfishing, acidification, land and marine-based pollution, and habitat destruction as a result of humans' negative impact (UNEP, 2012). The ocean is constantly threatened by the consequences of human activities such as overfishing, pollution, and destruction of coastal and pelagic (open ocean) marine ecosystems. Consequences of human actions on the ocean include resource depletion, decreasing biodiversity, extinction of marine species, climate change, and habitat loss (World Oceans Network, n.d.).

Aiming to increase ocean literacy among learners of all ages, marine education has been implemented in both formal and informal contexts in the United States and few other countries (Ocean Literacy Network). Formal marine education is generally conducted within school curricula (National Oceanic & Atmospheric Administration [NOAA], 1998) through integration with other subjects such as science and social studies (Mayer & Fortner, 1985; Snively, 1989). In the US, informal marine education is conducted beyond the school system in various agencies such as governmental agencies, non-governmental agencies (e.g., Sea Web), public institutions (e.g., Mariners Museum) and aquariums, mass media (television programs and films), and social media (e.g., the internet) (NOAA, 1998). Yet ocean literacy in the US is rather limited.

Given the low level of ocean literacy among the public and students in the US - as illustrated by the number of limited studies in North America (Plankis & Marrero, 2010; Steel, Smith, Opsommer, Curiel, & Wagner-Steel, 2005) - this study examines one aspect of ocean literacy in the Pacific, in particular the coverage of oceans in Fijian primary social science curriculum. This was done in order to establish whether essential principles and fundamental concepts of ocean and rivers literacy are included in Fijian primary schools, in particular for years 3-8, and if included, then to what extent.

What is Ocean Literacy?

The term ocean literacy is defined by NOAA (2013) as an understanding of ocean's influence on people and their influence on the ocean. This definition of ocean literacy implies the need for each individual student's self-awareness about his/her connections to the ocean; hence, exploring metacognition about ocean literacy. Self-awareness is one of the key dimensions of metacognition (Anderson & Nashon, 2007) with a central focus on improvement of students' learning processes and outcomes (Anderson, Nashon, & Thomas, 2009).

Given humans' heavy reliance on the ocean, our understanding about the ocean is integral to the Earth's sustainability (Cava et al., 2005). This dependence provides justification for many marine educators to note that one purpose of marine education is to develop a general understanding of the integral role of the Earth's water systems and emphasize the consequences of human impact on aquatic environments (see, for example, Fortner & Wildman, 1980; Goodwin & Schaadt, 1978; Mayer & Fortner, 1985; Picker, 1980; Snively, 1989). This description underpins the term *Ocean Literacy*. Ocean Literacy, thus is explained as understanding the mutual impacts and connections between humans and the ocean realm (Cava et al., 2005).

The paucity of information regarding research on ocean literacy seems to indicate that the general public as well as students worldwide have a limited level of understanding about the ocean. Considering humans' heavy reliance on the ocean and the negative impact of our actions upon the ocean coupled with low levels of understanding among children as well as adults, there is a critical need to create a more ocean-literate society

Building an Ocean-Literate Society

To create a more ocean-literate society, the Ocean Literacy Campaign was initiated by a group of marine educators and scientists in 2002 in the United States (Schoedinger, Tran, & Whitley, 2010). The Ocean Literacy Project Planner developed seven principles of ocean literacy to help provide an academic framework for educators. The 7 Principles are:

1. The Earth has one big ocean with many features.
2. The ocean and life in the ocean shape the features of the Earth.
3. The ocean is a major influence on weather & climate.
4. The ocean makes Earth habitable.
5. The ocean supports a great diversity of life & ecosystems.
6. The ocean & humans are inextricably interconnected.
7. The ocean is largely unexplored.

These seven principles are applied to relevant topics, lesson plans and activities, whilst taking into consideration curriculum requirements and the ages/abilities of primary school students. It helps to provide a structural framework, which is designed to be flexible and give a 'bigger picture,' which can then be used and developed within different schools. The structure is not meant to be rigid or restrictive; it is intended to be a helping hand and to present Ocean Literacy as one coherent subject.

Ocean literacy is essential to solving ocean-related issues and to maintain sustainability of the Earth. However, the question of how to foster global ocean literacy is still unanswered and necessitates further research in the field of marine education. To date, relatively little research has been conducted to address this question.

This paper reports the results of a content analysis of curriculum documentation in Fiji. Krippendorff (1980) describes content analysis as 'a research technique for making replicable and valid inferences from data to their context'. Content analysis, sometimes also known as a document analysis, is defined by Seale (2004) as any technique for analyzing texts in terms of the presence and frequency of specific terms, narratives or concepts. Even though the data is qualitative, the analysis is quantitative, for charts and graphs can be used. Inferences can be made by comparing and looking for patterns and trends. A content analysis should include frequency, direction, intensity, and space.

Content analysis of curriculum would investigate the frequency with which particular terms and concepts appear in the curriculum materials. Such an analysis enables the materials of the curriculum to be examined for their alignment with the intended goals. Identification of the alignment of the intended curriculum, as analysed using the models of Kesidou and Roseman (2002), Webb (1997) and Chinn and Malhotra (2002) can be achieved using a document analysis approach.

In this study Years 3-8 Social science text book and prescription were taken for analysis. The books examined in this study are Curriculum Development Unit (1997, 2011a, 2011b, 2011c, 2011d, 2011e, 2011f, 2011g). All the textbooks and prescriptions were analysed by employing the content analysis method. The analysis applied in this research was a priori coding; the categories, which were the seven Ocean Literacy Principle and the corresponding fundamental concepts were established prior to the analysis. As far as the unit of analysis is concerned, the whole page containing either phrases or descriptions (drawings, photographs, charts and maps) of ocean and river literacy was used.

The following procedures were followed in examining the position of ocean and rivers literacy in the National Social Science curriculum. First, the number of subtopics in all the grades of social science curricula were counted and listed. Second, to ensure reliability of the rating regarding the relevance of the topics to oceans and rivers literacy, the researcher read all the subtopics several times at different intervals before the final rating into ocean and river category was confirmed

Findings

The primary Social Science year's 3-8 curriculum was subjected to quantitative content analysis to determine the scope and presence of ocean and rivers literacy education in year's 3-8 text books. The analysis was done in three ways. First of all the four important concepts in ocean and rivers literacy were identified in different grades (Table 1). Second, in order to assess the comprehensiveness of ocean and rivers education presence in school curriculum, numbers of subtopics in all the grades were identified where the number of citation under each grade was listed to work out the percentage coverage (Table 2). Thirdly the data was gathered for the number of fundamental principles' coverage for different grades in social science curriculum (Table 3).

As can be seen from Table 1, the significant concepts represented in different grades are varied. Year 6 represents the coverage of all concepts, while year 5 and 8 curriculum just covered 2 concepts. Years 3, 4 and 7 had the least coverage.

Table 1: Representation of 4 Significant Concepts by Grades

Year	Topics covered on oceans and rivers			
	Forms and Functions	Uses of River and Oceans	Human and Natural Hazard	Sustainable Use
3		√		
4		√		
5		√	√	
6	√	√	√	√
7		√		
8		√	√	

The percentage coverage for oceans and rivers also varied among different grades. Year 6 displayed the highest percentage (23%) coverage, while year 7 curriculum covers the lowest (7%) (see Table 2).

In terms of coverage of the seven fundamental principles in the textbooks, principle 6 (ocean and humans are inextricably interconnected) is present in the text books of all the years. Principles 2 and 3 are covered in year 6 test book and principle 4 is covered in year 8 textbook. Other than this, there is no coverage at all. Principles 1, 5 and 7 are not present in any text resource. Table 3 provides the details on this. Very few of the fundamental concepts are represented in detail, while most of the others are represented by almost abstract and fundamental pattern with many inconsistencies within the same textbook or among different grades.

Table 2: Ocean and Rivers Literacy Topics Represented in Textbooks for Year 3-8 Social Science Curriculum

Year	No. of Content Topics Covered	No. of Citations	No. of Topics Covered %
Year 3	29	5	17
Year 4	32	3	9
Year 5	31	6	19
Year 6	65	15	23
Year 7	72	5	7
Year 8	70	12	17

Table 3: Oceans and Rivers Literacy Topics Covered in Textbooks Under the Seven Fundamental Principles (P)

Textbook	P-1	P-2	P-3	P-4	P-5	P-6	P-7
Year 3						√	
Year 4						√	
Year 5						√	
Year 6		√	√			√	
Year 7						√	
Year 8				√		√	

The content analysis of Social Science year's 3-8 curriculum indicates that ocean and rivers literacy in these years is not considered as separate unit or topic but is presented in small measures under 'environment literacy'. In Social Science for example, year 8 curriculum covers the benefits of sea, rivers and human and natural hazards of ocean and rivers. This is seen as one step moving further from year 7 curriculum where only benefits of sea and rivers are covered. Likewise the years 3, 4, and 5 social science curriculum's covered only the benefits and uses of oceans and rivers but again, under the 'environment literacy' module. There is no indication of forms and functions or and sustainable use of ocean and rivers. While the year 3 text was written in 1997, the latest text for other years does not respond to changes that occurred within these periods.

The relatively recent year 6 social science curriculum, revised in year 2010, is much better in several respects than previous versions where forms, functions, benefits, human, natural hazards and sustainable use of ocean and rivers are covered, albeit indirectly as environment literacy. But these topics still lack ocean and river literacy. Even in the recently

produced material of year 8 the concepts of rivers and ocean is not directly present, referring to forms and functions of ocean and rivers.

Trans, Payne and Whitley (2010) support the view that in order to achieve an ocean and river literate society, ocean and river sciences must be valued and integrated into curricular and textbooks. In their review of Fiji education practices Sharma and Sadler (2000), highlighted that the nature of curriculum offered in schools in Fiji at all levels of education is fundamental to how well the system fulfils the expectations of individuals, groups and the nation. Therefore the Ministry of Education having the overall jurisdiction over the provision of education under the Education Act, has the critical responsibility of providing the curriculum framework, and policy guidelines. That to date, oceans and rivers literacy has not been included in Fiji's primary school curriculum, is worrisome, particularly given Fiji's stated and often proclaimed interest in championing global climate and ocean awareness and sustainability.¹

Conclusion

The study examined the content of years 3 to 8 social science curriculum in Fiji to assess the extent of coverage which can produce ocean literacy. The analysis revealed that oceans and rivers literacy in Fiji Social Science curriculum is generally scant and this, is in need of significant improvement. Even though most grades from years 3-8 generally approach oceans and rivers in social science curriculum as resources and economic activities, they are less consistent in addressing fundamental ocean and rivers literacy. Therefore primary education students receive little information about oceans and rivers and their importance not only to our own well-being, but to the welfare of the whole planet.

It should be noted that the current research has only attempted to analyse the amount of ocean and rivers literacy education appearing in the social science years 3-8 curriculum. It did not attempt to examine what type of ocean and rivers literacy is actually being taught and how it is taught. Future studies need to examine the effectiveness of the teaching of oceans and rivers literacy education as well as the competences and confidence of teachers in delivering ocean and rivers literacy education in Social Science.

The bigger challenge for Fijian education system is to address the disarticulation between Fiji's stated priorities and policies on the one

¹ Recently (June 2017), for example, Fiji chaired the World Oceans Conference at the United Nations. Fiji is also the chair of COP 23 in Bonn this year as well.

hand, and the educational curriculum. Fiji has taken centre stage in global climate change and Oceans. In June 2017, Fiji chaired the World Oceans Conference at the United Nations. Yet over the past many years, no attention has been paid to addressing oceans literacy in Fijian primary school curriculum.

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