

Localization and Institutionalization of Coastal Resource Management Education in the Basic Education Curriculum

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Introduction

The Philippines is the center of marine biodiversity in the world but it is also the center of biological diversity that is most threatened with destruction. Because of this, many initiatives have been done towards coastal resources management.

One of these initiatives is the project undertaken by the Marine Environment and Resource Foundation (MERF) of the University of the Philippines, with the support of the State of Netherlands. A component of this project involved the Department of Education inasmuch as the schools are in the best position to effectively promote the sustainable use and conservation of coastal resources.

This component, referred to as the "Localization and Institutionalization of Coastal Resource Management Education in the Basic Education Curriculum (LICRME-BEC)," was initiated with the aim of training the present and future generation of school children on how to be stewards of coastal resources in and around Lingayen Gulf.

Based on the stated objective, a sub-project was conceptualized and implemented by the Unlimited Professional Development and Technical Enhancement, Inc. (UPDATE), the consultancy firm contracted by the MERF under its main project Sagip-Lingayen Gulf Project- Information, Education and Communications Component (SLGP- IEC).

The sub-project was carried out in two phases: Phase 1, which was implemented from August to December 2005; and Phase 2, which was carried out from January 2006 to May 31, 2007. Phase 2 was the research component of the project where the author served as one of the researchers.

Objective and Conceptual Framework

This paper mainly aims to present the processes undertaken, and the output generated, in the LICRME–BEC component.

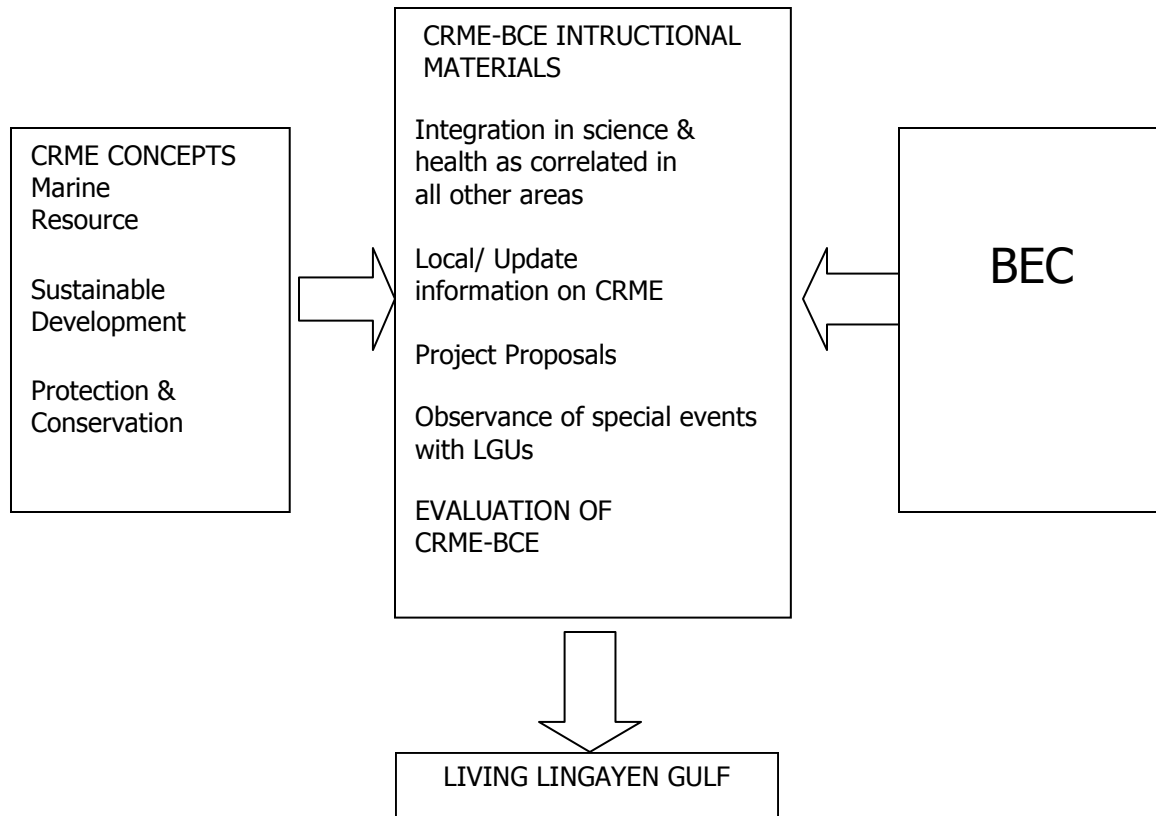


Figure 1.
Conceptual Framework of the LICRME-BEC Sub-Project

Figure 1 shows the key concepts of Coastal Resource Management Education (CRME) which include marine resource, sustainable development, and protection and conservation to be integrated in the Basic Education Curriculum (BEC) of the Department of Education through the development of instructional materials, evaluation of these materials, and teacher training on using them.

The instructional materials utilize different modes of integration in Science and Health in the elementary level and Science and Technology in the secondary level, correlation of topics in other learning areas, thematic approach, project proposal, and special events like the Pistang Dagat and the Coastal Clean-Up Project in coordination with LGUs.

The conceptual framework was operationalized with the development of a LICRME-BEC Model that served as a guide in implementing the sub-project. The Model covers all areas of curriculum enrichment: curriculum planning, design implementation, and evaluation.

CRME curriculum planning began with the conceptualization of the curriculum which was done jointly by MERF and UPDATE. The latter did a situational analysis of Lingayen Gulf vis-a-vis the goal of the project.

The framework contends that the content of any curriculum can be effective as far as it is supported by a particular method of planning and sub-project; hence, the method proposed in the Instructional Theory into Practice (ITIP) developed by Madeleine Hunter (1994) was adapted. This is a teacher-directed approach to instructions characterized by teachers deciding (a) what to teach within the context of the grade level student ability, and the lesson rationale; (b) what students will do to learn and to demonstrate what they have learned; and (c) which research-based teaching behavior will most effectively promote learning. These clear-cut elements were embodied in the suggested teaching strategies under three general stages of each plan: Preliminary Activity, Developmental Activity, and Post-Developmental Activity.

Another major aspect of planning the LICRME curriculum was legitimization; that is, how to make the curriculum clear and acceptable to people who have the means to provide logistical support and to all who are involved. Hence, a comprehensive work program or action plan for a BEC-CRE integrated curriculum, including curriculum design, strategies for full implementation, and evaluation was done. The sub-project framework and action plan were presented at the plenary session of the 2nd Philippine Educators for the Environment Conference (PEEC) 2005 held at the Bureau of Soils on December 10, 2005.

The next step was to design the curriculum which was done during Phase 2 of the sub-project and implemented from January 2006 to its completion in May 2007. This entailed (a) formulating the LICRME objectives; (2) integrating these objectives in the content or subject matter in elementary Science and Health and secondary Science and Technology, as well as determining other ways of achieving the objectives using other methods of integration;

(3) developing evaluation instruments and experiences that include instructional strategies and resources; (4) developing evaluation instruments to appraise the results of curriculum implementation; (5) organizing the components of the CRME curriculum into prototype instructional materials for Grade 6 and First Year based on the identified scope and sequence, using the appropriate mode(s) of integration; (6) identifying logistical needs; (7) implementing the curriculum by conducting seminar-workshops for administrators, supervisors, and pilot teachers on the instructional materials, and by formulating implementing guidelines for monitoring and implementing and developing feedback mechanisms that would identify implementation problems and provide support for addressing the problems; and (8) evaluating the curriculum with the use of achievement and attitudinal instruments.

Methodology

Research Design

In this ex-post facto research which is a systematic empirical inquiry, UPDATE did not have direct control of independent variables like educational qualification of teachers, their ages, the lesson plans, and the socio-economic status, and mental abilities of the students because their manifestations had already occurred and cannot be manipulated inherently. Inferences about relations among variables were made without direct intervention, from concomitant variation of the mentioned independent variables and dependent variables student achievement and attitude.

Sub- Project Sites

The sub-project sites were chosen based on two criteria: location and their track record of participation in previous studies. All schools chosen are located along the Gulf, with the exception of San Miguel Elementary School and Dacap North High School in Bani. They also represent big upscale schools like Bolinao Central School and La Union National High School, and those quite far from the center of population like Pilar National High School on Santiago Island and

Tondol Elementary School at a far-flung low-lying area. San Agustin Elementary School and La Union National High School are farther north of the project area. To the credit of the participating schools, they have maintained a very good track record of participation in previous studies, like the one undertaken by the Lingayen Gulf Coastal Management Commission (LGCAMC).

Data Gathering Instruments

The project used the following instruments to gather data:

Science Achievement Tests.

Right after the lesson plans for the research were printed, tables of specification were constructed in preparation for the achievement tests for Grade 6 and First Year high school. The tables were used to generate test items for the two tests.

Content validation was done in two phases by a professor of Marine Biology in the UP Marine Science Institute in UP, Diliman. He reviewed the correctness of the concepts in the test and checked whether they reflected the tables of specification. Revision was done to consolidate the suggestions given.

Pilot testing of Grade 6 Achievement Test was done among Grade 7 (equivalent to First Year) students of UP Integrated School, the laboratory school of UP College of Education. This was done because at the start of the school year, the Grade 6 pupils would not have taken up the test coverage because coastal environment concepts appear in the latter part of the syllabus. The same test was later administered to First Year students of the Lingayen National High School for further verification.

The First Year test was administered to Grade 8 (equivalent to Second Year) students of UP Integrated School for the same reason mentioned above. It was also administered to Second Year students of Lingayen National High School.

Both tests were piloted during the regular class hours. When students were asked to react to the clarity of directions, number of items, and level of item difficulty, they gave very positive remarks like "Just right," "Challenging enough," and "Average."

The Grade 6 test was reduced to 30 items and the First Year Test was trimmed down to 50. Finally the tests were printed and collated.

Attitude Tests. The attitude tests consisted of Likert type items—20 for Grade 6 and 10 for First Year. Both included an almost equal number of positive and negative statements about the use, protection, care, and conservation of coastal resources. The Likert method of summated ratings was used to quantify students' responses. Like the achievement tests, the attitude tests went through content validation and pilot testing before they were finalized.

Feedback Sheet on the Lesson Plan.

The lesson plans that were issued to the teachers had corresponding feedback sheets where the teachers could put their reactions, comments, and suggestions. Data from the feedback sheets were used to revise the lesson plans to make instructions more efficient and effective.

Observation Guide. A rating scale type of observation guide was used to record the degree of accomplishment of the different phases of the lessons.

Interview Schedule. To ascertain the involvement of the implementers in the project, interviews were held.

Other Steps Undertaken

An action plan was put in place after the legitimization of the curriculum. The LGCAMC instructional materials that were applicable to the LICRME-BEC plans were evaluated, revised, and became part of the instructional materials. Achievement and attitude tests were prepared, tested, and revised. Other tools like the feedback sheet, observation guide, and interview schedule were also prepared.

A seminar-workshop was held for the teachers to produce their own materials. The teachers were also trained on the process of integration. A demonstration teaching capped the workshops so the teachers had hands-on activities and enabled them to implement the lesson plans more fully. Parts of the demo teaching included activities that focused on the students' preparation of project proposals and the use of special events. This was one aspect of the project that needed support from the local government units.

The lesson plans were implemented from November to January 2007, the period when coastal resources education could be integrated in the lessons based on the DepEd curriculum. Posttests were administered and analyzed; assessment tools were also subjected to qualitative evaluation. To complete the evaluation, implementers, and monitors were interviewed and their comments and suggestions were recorded to serve as guide in the revisions.

To ensure sustainability of the efforts to localize and institutionalize CRME-BEC, a training on coastal resource management for the implementers,

other teachers, and their respective principals was held in the UP Marine Institute Laboratory in Bolinao on May 28 to June 1, 2007.

UPDATE spearheaded the revision of the plans and as a fitting climax of the activity; the trainees visited the mangrove plantations and other project areas.

Quantitative Analysis of Achievement Test Results

The answer sheets were checked and scored; the data were subjected to quantitative analysis. However, the schools which submitted the answer sheets of only one set (either pretest or posttest) were not included in the analysis.

Analysis of Data

Statistical Treatment

Frequencies and means were computed to summarize and describe the results of Achievement Tests and Attitude Tests. The impact of the integration of CRME was analyzed using t-test for paired samples. The significance level was set at $p < .05$. All statistical analyses were facilitated using a microcomputer with SPSS.

Part One – Grade 6 Lesson Plans

Tables 1 and 2 show the performance of Grade 6 students in the achievement test.

Table 1. Grade 6 Achievement Test Paired Sample Statistics

		Mean	N	Std. Deviation
Summary of Elem. Schools	Pretest	11.89	307	5.232.715
	Posttest	15.95	307	
Bolinao Elem. School	Pretest	9.91	162	3.435
	Posttest	19.14	162	3.867
San Miguel Elem. School	Pretest	18.92	72	4.433
	Posttest	11.24	72	3.721
Telbang Elem. School	Pretest	9.36	73	2.417
	Posttest	9.73	73	3.297

Table 2. Grade 6 Achievement Test Paired Sample t-Test

	Mean Difference	Std. Deviation	Std. Error Mean	t	Df	Sig. (1-tailed)
Summary of Elem. Schools	3.156	8.259	0.471	6.697	306	0.000
Bolinao Elem. School	9.2280	4.508	0.354	26.0530	161	0.000
San Miguel Elem. Sch	-7.681	5.134	0.605	-12.693	71	0.000
Telbang Elem. School	-0.37	3.186	0.373	0.992	72	0.163

The null hypothesis, H_0 Pretest = H_0 Posttest, was tested using the one-tailed paired samples t-test. As shown in Table 1, the Grade 6 CRE Concept Pretest Mean is 11.89, while the Posttest Mean is 15.95.

It can be noted that among the elementary schools, it was only in Telbang Elementary where no significant difference occurred between the pretest and posttest means. Further inquiry revealed that the teacher failed to implement the lesson plans due to personal reasons. San Miguel Elementary School had a negative mean difference. On the whole, however, the level of significance is .000. The null hypothesis is rejected and the alternative hypothesis, $H_1 = \text{Posttest} > \text{Pretest}$, is accepted.

Tables 3 and 4 show the attitudes of the students after the implementation of the lesson plans

Table 3. Grade 6 Attitude Test Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Pretest	3.9745	20	0.56602	0.12656
Posttest	3.9830	20	0.56977	0.12740

Table 4. Grade 6 Attitude Test Paired Samples t-Test

	Mean Difference	Std Dev	Std. Error Mean	t	Df	Sig (1-tailed)
Posttest Pretest	0.00850	0.02368	0.00530	1.605	19	0.062

As Table 3 shows, the Grade 6 Attitude Pretest Mean is 3.9745 while the Posttest Mean is 3.9830. The values were tested using the paired samples one tailed t-test. The Sig is .06 so that null hypothesis, H_0 Attitudinal Posttest = Attitudinal Pretest is accepted. No change occurred in the students' positive attitudes toward coastal environment concerns.

Part Two – First Year Lesson Plans

Tables 5 and 6 show the performance of students in different schools in the first year achievement test.

Table 5. First Year Achievement Test Paired Sample Statistics

		Mean	N	Std. Deviation
Summary of HS	Pretest	24.86	626	8.095
	Posttest	31.22		7.369
Alaminos City Nat'l HS	Pretest	25.4	222	6.434
	Posttest	27.7		6.445
Anda Nat'l HS	Pretest	24.59	61	7.013
	Posttest	26.54		1.043
Dacap Nat'l HS	Pretest	26.12	42	6.579
	Posttest	31.1		6.068
La Union Nat'l HS HS	Pretest	23.06	258	9.367
	Posttest	34.42		6.295
Pilar Nat'l HS	Pretest	32.05	43	5.64
	Posttest	36.91		4.79

Table 6. First Year Achievement Test Paired Sample t-Test

	Mean Difference	Std Dev.	Std. Error Mean	t	df	Sig (1 – tailed)
Summary of HS	6.355	8.235	0.329	19.307	625	0.000
Alaminos City Nat'l HS	2.302	5.367	0.36	6.391	221	0.000
Anda Nat'l HS	1.951	4.018	0.515	3.792	60	0.000
Dacap Nat'l HS	4.976	7.86	1.213	4.103	41	0.000
La Union Nat'l HS	11.357	8.853	0.551	20.604	257	0.000
Pilar Nat'l HS	4.86	4.668	0.712	6.828	42	0.000

The null hypothesis, H_0 Pretests = Posttests was tested using one-tailed paired samples t-test. As shown in Table 5, the First Year Pretest Mean is 31.22. The level of significance being .000, the null hypothesis is rejected and the alternative hypothesis, $H_1 = \text{Posttest} > \text{Pretest}$, is accepted.

Tables 7 and 8 show the attitude of the students after the implementation of the lesson plans.

Table 7. First Year Attitude Test Paired Samples Statistics

	Mean	N	Std. Dev.	Std. Error Mean
PreMean	3.6200	10	0.61246	0.19368
PostMean	3.6800	10	0.65794	0.20806

Table 8. First Year Attitude Test Paired Sample t-test

	Mean Difference	Std Dev	Std. Error Mean	t	Df	Sig (1 – tailed)
PostMean - ProMean	-0.06000	0.06992	0.02211	-2.714	9	0.012

As Table 7 shows, the Attitude Pretest Mean of the sample in the First Year is 3.6200 and the Posttest Mean is 3.6800. The values were tested using paired samples one-tailed T-test and the result were significant at .012. The null hypothesis, H_0 Attitudinal Pretest = Attitudinal Posttest is rejected. Therefore, the alternative hypothesis, Attitudinal Posttest > Attitudinal Pretest, is accepted.

Based on the foregoing analysis, it can be said that (1) there is a positive effect on the acquisition of concepts of the Grade 6 and First Year students, and this is proven further by the poor performance of the class that was not exposed to the lesson plans; (2) although no significant change occurred in the attitude of the Grade 6 pupils toward conservation of their environment, their positive attitude has prevailed; (3) definitely, there is an increase in the acquisition of concepts among the First Year students for whom Science and Technology teachers implemented the lesson plans; and (4) there is a positive change in the attitudes of First Year students toward their environment.

Qualitative Evaluation

Two instruments were used for qualitative evaluation: an Implementer's Feedback Form and a Monitor's Observation Guide. Copies of Implementer's Feedback Form were attached to the lesson plans so the teachers could write in their comments and suggestions on certain parts of the lessons. The observation guides were distributed to the principals and science supervisors.

Part One-Feedback on the Lesson Plans

Suggested time allotments for the plans were generally sufficient although class disruptions could not be helped. Suspension of classes occurred very often because students were

asked to participate in many regional and LGU activities.

The implementers unanimously commented that the objectives were SMART (specific, measurable, attainable, relevant, and time-bound). The road map for every lesson was therefore clear to the users.

Generally, there was a consistent congruence among objectives, materials, strategies, and evaluation. The suggested activities were varied, practical, challenging, learner-oriented, and enjoyable. One of the most enjoyable activities cited was the field trip of Dacap Norte High School First Year students to the 27.5 hectare mangrove plantation in Bani. The most impressive activity was the participation of students in project proposals that could be tried out in their own neighborhood.

Majority of the high school plan implementers found some lessons redundant or overlapping in scope. Some lessons were either introduced or taken up in previous lessons. Teacher's Background Information as well as the separate volume of Student Readings (for High School) should have been interspersed with photos and illustrations of various marine resources. There was lack of materials for research because of the dearth of library books and other materials.

There was only one comment on evaluation from several feedback forms: Evaluation was congruent with objectives. The teacher implementers were one in saying that the assessment tools were congruent with the objectives.

Part Two – Observer's Guide

The Observer's Guide could hardly supply information to help evaluate the lesson plans.

The most that it did was to make the tryout teachers conscious of their duty to use the lesson plans in teaching CRME concepts.

Problems Met

Red tape was the first problem to hound UPDATE at the start of the project. Every communication took much time to produce results so UPDATE had to cancel some major activities like a live-in write shop to produce instructional materials and pilot test them in school.

It was difficult to communicate with the project schools particularly with Pilar National High School because it was situated in a remote island and there was no telecommunication equipment available. The implementer in Tebang Elementary School did not have a Cell phone to facilitate communication.

Conclusion and Recommendations

The results of the t-test on the achievement and attitude pre-and posttest mean scores of the students indicate improvement in acquisition of concepts and attitudes toward taking care of their coastal environment and resources. But the following are still recommended:

In a country of about 7,150 islands, the lives of many Filipinos invariably revolve around the sea and its resources. Most Filipinos rely heavily on fisheries for food and a significant portion of our population depends on the industry for their livelihood. It is, therefore, the duty of the Department of Education to institutionalize CRME-BEC in schools along the seacoasts. To support this move, (1) the DepEd should establish an organizational structure for the development of CRME-BEC and institutionalizing it in each region concerned; (2) superintendents should spearhead curriculum development for Coastal Resource Management Education in the Basic Education Curriculum at all levels of schooling; and (3) the DepEd policy-making body should endorse moves for popularizing curriculum localization and institutionalization for a more meaningful education for all.

The results of the project, especially on the evaluation of the lesson plans used, have profound implications on teachers' pre- and in-service training. Since the teacher has far-reaching influence as an agent of constructive change in society, teacher training of any magnitude should include hands-on lessons on how to localize curricula.

The results can also serve as rationale for appeals to fund teacher trainings and/or production of teaching materials. The proposals that the students submitted as entries to the UPDATE Project Proposal Contest can be fine-tuned and submitted to LGUs and NGOs for funding. The young proponents have always been hopeful that an official or agency would be willing to support their simple, but doable projects.

Administrators and supervisors should be more conscientious about monitoring teachers in the implementation of lesson plans. Likewise, teachers should be more committed to implement the activities and be more resourceful in substituting comparable teaching aids.

This study can be replicated in other coastal communities to further improve the process, learn from the outputs generated, and enhance teacher capabilities and participation in decision making and curriculum planning.

Furthermore, the local government should be more proactive and spearhead a comprehensive program for the management of coastal resources that would continue the work started by MERF. Such program should involve all sectors of society with the schools as major component. There should be an organizational structure for this program that should include the schools around the coast. Strategic planning should be done so that the projects of all sectors (schools, barangay, etc.) would be selected, synchronized, coordinated, and sustained.

The students have enthusiastically prepared proposals to save Lingayen Gulf. The local government can take a closer look at the proposals, see which ones are worthy of implementation, and support their sustainability.

It is also imperative for UP Marine Environment and Resource Foundation to be deeply involved in coastal resources management. Since it has an established network for sourcing funds, it can continue providing technical assistance to all initiatives of government and non-government organizations, especially the schools, so that coastal resources education would always be a part of the curriculum.

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