

## Developing Local Curriculum Framework on Water Resource and Disaster Course in the Basic Educational System

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**[Abstract]** To administer and prepare teachers for teaching their learners, a curriculum course framework encompassing water resources and disasters was compared to their different school sizes using a sample size of 56 trainee teachers in lower secondary education schools in Thailand. The control teacher group, composed of 28 teachers, was to manage their teaching on 68 learners in 3 classes; 79 learners in 3 classes at grade level 9 were compared as a group taught by-an experimental teacher group composed of 28 teachers. A developed curriculum framework, unstructured selection interviews, and a conservational guidebook were used. For trainee teachers, a new curriculum consisting of learning units and a training curriculum were built; teachers' satisfaction was assessed with pre- and post-test questionnaires. It found the following problems: developing this curriculum was at a medium level, and high responses on the introduction were needed, and a purpose for recapitulating development of learners. Teachers passed the assessment test; their abilities were very high, so the quality and the satisfaction for making learning units were added to their responsibilities. Statistically significant, learners' achievements were different between the controlling and experimental groups at the level .01, correlatively, but the school size was not found to be significantly different.

**[Keywords]** basic education; school size; course; curriculum; disaster; environment; framework; local; management; resource water

### Introduction

The most critical environmental problem that Thailand is currently facing is water pollution. Despite the annual southwest monsoon, Thailand is subject to drought, particularly in its northeastern region. As of 2002, Thailand had less available water per person than any other country in Asia, and nearly one third of its water was "unsuitable for human consumption." Inconsumable water was also a result of an increasing amount of untreated domestic sewage, industrial wastewater, and solid hazardous wastes (ThailandOutlook.com, 2007).

Water is essential for human activities, food security, healthy ecosystems, and efficient national economics. Water should be thought of as an exhaustible resource. Unplanned uses of water can have a considerable negative impact on humans and the environment. Water resources are sources of water that are useful or potentially useful. Uses of water include agricultural, industrial, household, and environmental activities. The majority of humans require fresh water. As much as 97 percent of the water on earth is salt water, and only three percent is fresh water; slightly over two thirds of this is frozen in glaciers and polar ice caps (United States Geological Survey, 2005). The remaining unfrozen fresh water is found mainly as groundwater, of which only a small fraction is present above ground or in the air (GreenFacts Website, 2008).

In a rare public appearance on Monday, December 5<sup>th</sup>, to mark his 84th birthday, Thailand's King Bhumibol Adulyadej called for an end to political conflicts and asked his subjects to work together to help the millions affected by floods that have devastated the country. After floods inundated Bangkok in 1995, King Bhumibol proposed the building of a large network of canals that would lead to huge holding areas for water runoff, called "monkey cheeks," on the outskirts of the capital. The project was never followed through by successive governments. Prime Minister Yingluck has recruited some water experts who advised King Bhumibol to serve on a committee tasked with devising a new water-management

system for the country to ensure the current disaster would not be repeated. The Prime Minister noted that all of Bangkok will be dry by the beginning of 2012 but that many factories will not be up and running for a few months after that. Economic growth for 2011 had been forecast at over 4%, but is now expected to be only between 1.2% and 1.5% (Time News, 2014). Managing the risks in water resources is essential to alleviating damage, the consequences of natural disasters, such as flooding and drought, and to increase agricultural production so as to ensure food security for the country. Understanding the types of risk in each area helps planners to select the appropriate policies and actions to apply in the right circumstances in order to reduce risks and mitigate damage. Thailand has frequently suffered from flooding during the monsoon season, from droughts in summer, and even from both cases in particular areas.

In Thailand, major disasters over the past three years (2011-2013) provided stark reminders of the risks of the natural disaster that affect human well-being and future development in Asia and the Pacific, such as the tropical cyclone sweeping Haiyan in the Philippines in 2013, floods in China and India in 2013, earthquakes in Pakistan and the Philippines in 2013, the Great East Japan Earthquake in 2011, the crippling tsunami that followed, and the severe flooding in Thailand in 2011. In 2011 alone, the economic losses from global disasters reached 366 billion USD, with 80 per cent of those losses occurring in the Asia-Pacific region (Centre for Research on the Epidemiology of Disasters (CRED), 2012). The trend of increasing exposure and greater losses associated with disasters demands a better understanding of their complex nature and common causes, namely hazards, exposure, vulnerability, and the resulting risk. Many disasters have occurred in Thailand, leading to loss of life and economic damage. Most natural disasters that have happened in the country are storm- and flood-related, while man-made disasters have also caused great losses. This page lists by date those accidents and disasters which have caused significant losses, or have been the focus of national public attention; they are grouped into natural disasters, promoting investments for resilient nations and communities (ADPC's News, 2014).

Focused on the Northeastern region of Thailand, the great flood spread throughout the 20 provinces of Thailand, such as in the Khon Kean province where there were extensive flooding of the plains area of Chi and the Nam Phong watershed rivers. Water streams overflowed and covered wetland district areas, such as Muang, Ubon Rattana, Chonnabot, Wang Yai, Wang Noi, and Manjakili. This destroyed the rice fields and agricultural areas that were covered by water. The people and their families who live at the back of Ubon Ratana Dam were forced to move into the hills or to higher places temporarily, and many schools were closed.

The last decade, in particular, has seen the development and reform of the education system in Thailand, with the government changing the core curriculum in 2008. The schools were to revise their curriculum to teach learners more about the natural resources of their surrounding environments, namely their local water, mineral, and forestry sources (The Center of Khon Kaen News, 2011). Normally, learners follow a core curriculum and are able to select additional curricular components. The local curriculum was used to manage and arrange for additional learning in some schools. This local curriculum is based on relevance to community and local needs, and confirmed to indicate that all learners are taught proper resource management. A new local curriculum framework was administered and integrated for the needs of the local community by the educational institutions in their areas. However, the schools faced too many problems trying to integrate the local curriculum into their learning management framework because some teachers' knowledge was insufficient for teaching and understanding.

In formal education, a curriculum constitutes the planned interaction of pupils with instructional content, materials, resources, and processes for evaluating the attainment of educational objectives. This process includes the use of literacy and pedagogies that are interwoven through the use of digital media and/or texts that address the complexities of learning. Other definitions combine various elements to describe curriculums as all the learning that it's planned and guided by the school administrators (Kerr, 2009). The skills levels, performance abilities, attitudes, and values of the pupils are expected to rise from schooling. The schooling includes the content of the courses (the syllabi), the methods employed (the strategies), and other aspects, such as norms and values, which relate to the way in which the school is organized. The courses are arranged in a sequence to make learning a subject easier. In schools, a curriculum spans several grades. The curriculum can refer to the entire program provided by a classroom,

school, district, state, or country. A classroom is assigned sections of the curriculum as determined by its school (Nairs & Fisher, 2001).

However, 2000 was a year of learning and teaching reform in Thailand. Secondary education was aimed at improving the quality of life of learners and serving as the basis for further education. Such education should: (a) help learners discover their own abilities, aptitudes, and interests; (b) provide a general education as the basis for securing honest occupations or further education; and (c) respond to the needs of the localities and the nation as a whole. Based on these aims, the curriculum is designed by the Ministry of Education for learners to develop the following characteristics: knowledge and skills in general education subjects, as well as the ability to keep up with academic advances; the ability to maintain and enhance personal and community health and hygiene; the ability to analyze community problems and to choose suitable alternatives for solving them, taking into account various limitations, pride in being Thai, the ability to live in peace with others and to willingly help others within the limits of one's capability, creativity, and the ability to devise and improve (Ministry of Education, 2008).

A flood plain includes the floodway, which consists of the stream channel and adjacent areas that actively carry flood flows downstream, and the flood fringe, which are areas inundated by the flood, but which do not experience a strong current. In other words, a floodplain is an area near a river or a stream that floods when the water level reaches flood stage (Goudie, 2004). The most important problem here is how to change learning and teaching behaviors that occur on natural flood plains, and the effects of drought disaster. According to the curriculum orientation guidelines, teachers ought to be focusing on the following: (a) integrating content from daily life; (b) making greater use of activities, rather than textbooks; (c) using different learning materials in a variety of ways; (d) making learners the centre of learning activities; and (e) reducing explanation and helping learners. These take more time to prepare and teach according to the designated teaching/learning curriculum orientations. It is anticipated that these problems will be solved in the forthcoming process of reforming curriculum and learning activities (Ampra & Thaithae, 2008).

In terms of local curriculum framework, regional trends in the development of curriculum policy have been changing to include a particular focus on the greater participation of stakeholders in policy formulation throughout of the world, notably, in Thailand and South Africa in particular. This only strengthens the political rationale for the decentralization of education of governance and management. A second important rationale is a concern for improving the quality of education. A crucial dimension of quality education is that of relevance of curricula content in the form of the diversity of local (sub-national), cultural, and socio-economic realities. The promotion of local curricula is a strategy to ensure such relevance and is an important component of the decentralization of education, governance, and management. When looking at the situation caused by flooding and national disasters as they continue to escalate worldwide, governments, schools, teachers, learners, and local response, must respond as necessary to meet the country's needs. For this reason, learners in Thailand or South African should be taught using a local curriculum framework in their school.

Focusing on the development of the methodological curriculum orientation guidelines on water resource and water disaster courses, the purpose of this study is to emphasize the way in which administrators handle their water resources and their readiness and ability to confront natural disasters when learners are effectively trained to respond to them. The curriculum is designed to permit learners to develop to knowledge and skills in general education subjects and the ability to keep up with academic advances in lower secondary school classes. For these important reasons, researchers have developed the learning unit so as to investigate the problems and needs for developing local curriculum frameworks that include basic education emphasizes water resources and disasters coursework that integrates content from daily life, makes greater use of practical activities, uses different learning materials in a variety of ways, makes learners the center of learning activities, and reduces explanations, and helps learners achieve a high quality of learning that is sustainable (Department of Basic Education Commission, 2009).

## Methodology

### *Research Objectives*

1. To investigate the learners' problems and needs for developing local curriculum frameworks that meets the needs of the basic education commission.
2. To develop the local curriculum frameworks of the basic education commission.
3. To plan for interaction of learners with the instructional content of training teacher curriculum frameworks learning units.
4. To compare the effects of using the curriculum of training teachers' frameworks and conventional learning curriculum.
5. To compare learner achievements by comparing the curriculum group and a conventional learning curriculum group with the curricular content concerning water disaster management according to different school sizes: large, medium, and small.

### *Sample Sizes*

**Step I: Research Process and Development.** This study was administered in a randomly selected sample of 217 school directors and teachers, 12 professional scientists specializing in water resource management and water disaster, 9 professional educators specializing in curriculum and instruction with the purposive sampling technique for planning the new local curriculum framework for teachers' management for teaching.

**Step II: To Tryout of the Curriculum Framework.** To select the tryout sample size with the 5 secondary education teachers who were teaching on the science learning and social sciences groups, the religious, and cultural learning group to their learners at grade level 9 in the Khon Kaen Primary Educational Service Area Office 4, and the Secondary Educational Service Area Office 25.

**Step III: To Investigate the Curriculum Framework Efficiency.** The curriculum framework efficiency was administered to a sample size of 56 secondary education teachers in 2 separated groups: 28-control-group teachers and the 28 -experimental teachers group. A multi-stage sampling technique, and 56 learners in a control group in 3 classes and an experimental group of 79 learners in 3 classes at the same grade level 9 in the Khon Kaen Primary Educational Service Area Office 4 and the Secondary Educational Service Area Office 25.

### *Research Instruments*

1. The questionnaire on teachers' and learners' perceptions of their responsibilities to their problems and needs when it comes to developing a curriculum framework on water resource management and water disaster content for learning and teaching.
2. The unstructured selection interview instrument used for teachers' and learners' interviews.
3. The conservational guidebook instrument was used for reporting data records.
4. Training teacher curriculum document.
5. Practicing documents for training teachers.
6. Pre- and post-training teacher tests.
7. A training-teacher satisfaction questionnaire for teachers' perceptions on their satisfaction with the training teacher curriculum framework.
8. A quality assessment document assessed the learning units of the curriculum trainees.
9. The pre- and post-evaluations of students' achievements were assessed.

## Results

Teacher' and learner's perceptions of this curriculum framework on the 4 scales of school personnel, learning activities with teachers, innovations and learning sources, and assessment and evaluation scales, were of medium level quality. Teachers indicated that this curriculum framework held few problems. The learning methodologies, instructional technique, teaching and learning process were to the satisfaction of the learner groups. The local curriculum framework included participations in sequential steps, introduction, recapitulation of learning purpose, the 7 Learning plans, such as water resources, water

basin resources, water resource management, natural disaster management, approach strategy policy on natural disaster management, local folk wisdom of water management, and specified keywords of water resources and natural disaster management learning groups. The quality of learners' outcomes and using the curriculum framework of the water resource and natural disaster management has to be successfully transferred to the basic education commission.

The purpose of the teacher training curriculum framework was to develop the knowledge and ability of teachers to plan a learning unit on water resources and natural disaster management. An experimental practice and training plan theory was used over 2 days with a training session over 3 days. Training instruments were composed of training curriculum documents, including a training guide document, a trainee document, learning unit sampling; pre- and post- assessment tests, the teachers' satisfaction questionnaire, and the quality assessment on learning units. This study found that teachers' perceptions were confirmed by the guideline of the professional curriculum framework and an Index of Item-Objective Congruence value (IOC) of 1.00 and an appropriate average value of 1.00. The quality assessment of the learning unit confirmed the Item-Objective Congruence value (IOC) of 0.96, and the teacher's achievement throughout pre and post assessments had an Item-Objective Congruence value (IOC) of 0.97.

These results indicated that the problems of four respective levels of school personnel, learning and teaching activities, learning media and source, and assessment and evaluation scales, were to some degree variable in efficiency. In terms of the learning and teaching problem scale, the results indicated that teachers' often need to teach using alternatives or to a high level of the learning unit on water resources and water disaster to achieve high-quality teaching; they also needed to format their technique, or methodology, to achieve the satisfaction of their learning group.

Focusing on developing the local curriculum framework includes an introduction, learners' goals for their development, the seven-learning sub-content categories, such as water resources, water basin sources, natural disaster administration, the approach strategy to natural disasters was administered and included local folk wisdom in water management, and key words for water and disaster management sub-contents. The important factors of the local curriculum framework for water resource and disaster content were used in educational institutes.

In terms of the training and practice, the curriculum framework for the course for learners' learning units about their developing knowledge of learners' content and abilities were trained. Researchers used the experimental workshop and training contents for learners on 2-3 days with the 3 training topics, such as; training instruments, training texts, training guidebook, training trainee document, learning unit samples, pre- and post-assessment tests, the questionnaire on teacher satisfaction, and the questionnaire on teacher's curriculum unit quality. It was found that this curriculum framework conformed to the professional guidelines of the curriculum, where the index of Item-Objective Congruence value (IOC) was 1.00; appropriately average values were 1.00; the quality assessment of the learning unit making conform to the Item-Objective Congruence value (IOC) was 0.96; the teacher's achievement throughout pre- and post- assessments with the IOC value was 0.97, and the questionnaire on teacher satisfaction indicated that the average IOC value (IOC) was 0.94.

Using the curriculum framework for training and practicing teachers, the 28-training teacher scores were more than 70%. Teachers were able to build the learning unit of the curriculum framework, water resource and natural disaster courses; this was completed by 5 teachers who trained the learner groups, and 23 teachers who built the high-quality curriculum framework. Focusing on teachers' perceptions of the questionnaire on teacher satisfaction, it was found that, overall, their perceptions were too high.

Learner achievements were analyzed in the 3 school sizes (large, medium, and small schools), in terms of using the local curriculum framework, which included the learning unit about water resource and natural disaster content, to examine the experimental learning and normal or control-group learning. It was found that the experimental learners' group had far greater learning achievements than the control group, and statistically significant differences were found at level .01, and learners' controlling group at the 3-school sizes indicated that there were no significant differences between different school sizes.

## Discussions

### ***Discussion I: Research Accordance***

The results of this study indicates that the teachers' and learners' responses of the problems and needs for developing their local curriculum framework of the basic education commission was in accordance with their view points, especially, administrators of teaching and learning activities with the intervening information of learners' water resource and natural disaster learning units. Teachers used innovative learning media and learning source to emphasize learners' outcomes. The data of personnel, learning and teaching activity methods, learning sources, assessment and evaluation, and teachers' problems and needs were reflected in teachers' teaching methods. Learners improved on their knowledge and abilities in terms of their self-development, community, family, and local, conditions, learning that could be use of their life forever. The Thai government should introduce water resources and disaster content into the basic curriculum at the lower secondary level, because Thailand is located on at monsoon continent and will likely face continuing floods and water-related disasters every year, just as in its greatest flood so far which occurred in 2011.

### ***Discussion II: Research on Developing Local Curriculum Framework***

In terms of the developing a local curriculum framework on the management of water sources and disasters for the basic education commission, it was found that the factors determined for school, community and local community's needs of this local curriculum were the introduction, goal and emphasizing development of learner, informative learning, learners' assessment quality, the new local curriculum framework on water resource and disaster inclusion were used and commented on by professional scientists and educators in the local area as to the correctness and accuracy about the crisis , learners' abilities to learn crisis management, the importance of the content and the concern about the crisis (Utthanan, 2009). This local curriculum framework is the first curriculum that satisfies the basic educational learners at Grade levels 1–12, where the educational institutes apply for use and development to teaching and learning managements that followed the contexts, problems of learners' needs, communities' needs, and local wisdoms. This result was confirmed with the study of Padsin (2008), who reported the development of a learning unit on the Lam Pao Flood Plain Environment school group.

### ***Discussion III: Research on Developing Local Curriculum Framework***

Focusing on the training and practicing of teachers in a local curriculum framework with learning units on the management of water resources and disasters for the basic education commission, this study indicates that the new local curriculum framework composed of understanding knowledge development for teachers who are the leaders in the development of this curriculum, teachers' satisfaction and use produce greater quality that conform with the core intentional curriculum government. Fullan and Stiegelbauer (1991) reported that teachers and connected personnel were the foundational factors, propelling educational innovation and the curriculum successfully. Teachers should adjust their thinking and teaching so as not to obstruct modernizations.

### ***Discussion IV: Research on Efficiency for Using Local Curriculum Framework***

These results indicate that the efficient use of a local curriculum framework for the management of water resources and disasters for the basic education commission for teachers and trainees, who are able to learn and create the learning units. Teachers completion of their assessment of their training processes of the curriculum that follows the dissemination of their thinking, the importance and necessity of learning a management framework for teachers and school administrators, the direct emphasis of thinking of teachers' acquiescence, it was confirmed by Chaiyapan (2005) and Sittisomboon (2003), who reported the volunteer and network trainers' efficiencies produced greater satisfaction and friendliness of the curriculum unit for learners who sat at Grade level 6 and practiced the curriculum processes.

***Discussion V: Research on Learners' Achievements***

To compare the 2 learner groups (the experimental learning group and the normal learning group) for assessing learners' achievements in the different school sizes (large, medium, and small schools). Of statistical significance were differences in learning achievements between the two group; the experimental group was higher than the normal group at level .01, with learners solving problem projects for which they presented academic solutions on water resources and disasters and satisfactorily exhibited to the communities using local folk wisdoms. For example, Drought in Our Home Project, Drought at Ubon Rattana Dam Project, Modernised Children on Nam Phong River Conservation Project. These learners' projects confirmed the studies of Silanoi and others (2005), who reported on learners' being conscious of environmental conservation. In the last decade, previous research reported that the learners' achievements in their learning at the post-assessment were greater than pre-assessment; learners' training and use of the curriculum were more understanding learning activities than the conventional teaching. (Australian Qualifications Framework, 2011; Fullan & Stiegelbauer, 1991; Nuttrawong, 2010; Utthanan, 2009; World Bank, 2003).

**Suggestions*****Suggestion I: Policy Suggestion***

Organizations, institutes, the Primary Educational Service Area Office, and the Secondary Educational Service Area Office ought to specify policies that support and promote the propagation of the local curriculum framework that is concerned with management of water resources and disasters as the basic education commission to manage a local flood or flood plain or drought for cultivating moral traits in primary and secondary educational learners who are able to utilize their acknowledge and appreciation to include experiencing skills. Learners should be used for the water responses and water management by adapting them to their daily life. Learners and their families and communities are able to apply this curriculum for the quality and sustainability of their life. Teachers should be trained and should practice in this local curriculum so as to promote the investigation, improvement, and adaptation of their teaching within the core curriculum system. Educators and professional occupations should investigate a local curriculum framework for suitability and possible learner achievements. Using the curriculum framework policies should apply suitably to the natural disasters and drought situations for local area and regional contexts, including human resources and communities' contributions necessary for protecting and affecting the natural disasters by learning types of disasters, by training professional participators and assessors from specific supervisors.

***Suggestion II: Applications on Using Curriculum Framework***

In terms of the applications for developing and using a local curriculum framework on management of water sources and disasters, such as this for the basic education commission, the Primary Educational Service Area Office, along with the Secondary Educational Service Area Office ought to plan and administer the curriculum for educational institutes to cover sub-content of the core curriculum. The use of curriculum framework documents ought to conform to the needs of the school and the community. Human resources ought to be developed continually and seriously to improve their knowledge, skill, and experience in teaching and learning management following the local curricular framework of this content. The administration supports the curriculum prototype, understands the point of this curriculum, participation of learners, revises data assessment, and learns from personnel suitability by the organization or educational institute to solve the problems and obstructions of learners' School administrators should build a friendly school environment to cooperate and plan towards sufficient budgets for developing school curriculums on management of water resources and disasters on behalf of the basic education commission.

***Suggestion III: Further Research Suggestion***

It is suggested that the further research lead this local curriculum framework to be administered throughout all educational levels, and it ought to develop continually. The suitability of this curriculum

framework may change to modernize and adapt as content demands. The new curriculum should be studied for its effects and determinants on following this curriculum. This study should be adapted and improved through the curriculum results by further studying the learning and management of the curriculum/community process as it is applied to other learning groups.

### ***Suggestion VI: South African Research Suggestion***

This research concern of developing local curriculum frameworks for courses on water resources and disasters in the basic education system is focused in Thailand. The comparative study also seeks to develop and apply a curriculum with which to describe different forms of South African pedagogy and similar curriculum types for learners' learning and understanding of the local curriculum to improve learners' knowledge of natural disasters in both South Africa and Thailand. Similarly, this research applies to scholars beyond South Africa to all emerging economies.

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