

2013

The effects of STEM inquiry practices on English language acquisition in a first grade classroom in Thailand

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The effects of STEM inquiry practices on English language acquisition in a first grade classroom in Thailand

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Abstract

This mixed-methods teacher action research project describes and interprets the effects of one American teacher's bicultural critical inquiry praxis on Thai first grade students' English language acquisition. The observations were conducted for one full academic year for 37 students enrolled in a bilingual, multicultural STEM pilot program. The results are based upon participant observation and narrative inquiry from a qualitative standpoint. However, quantitative methods were used to analyze 1) students' questioning, answering techniques and physical activities based on video recordings of STEM lesson activities; 2) students' growth in critical thinking skills as measured by their writing in relation to their exposure to STEM activities and increased participation in democratic education practices; 3) students' performance on formal assessments; and 4) the major themes identified from foreign teachers' feedback regarding their experiences teaching in Thailand. The author considers her own power of position in relation to markedly different Thai cultural practices, customs and values from her own, in order to determine which variables potentially yield the highest effect in promoting student acquisition of STEM knowledge, skills and dispositions. The results of this study indicate that Thai students' English literacy is developed at an increased rate when instruction is based on STEM inquiry practices that encourage dual language communication in a democratic, multicultural, collaborative, community of learners setting. The study concludes with a critique of the English Only Movement's potential influence on Thai identity.

THE EFFECTS OF STEM INQUIRY PRACTICES ON ENGLISH LANGUAGE
ACQUISITION IN A FIRST GRADE CLASSROOM IN THAILAND

A Graduate Action Research Paper

Submitted to the

Department of Curriculum and Instruction

In Partial Fulfillment

Of the Requirements for the Degree

Master of Arts

UNIVERSITY OF NORTHERN IOWA

by

Rebecca J. Fuhrman-Petersen

May 5, 2013

This Action Research Paper by: Rebecca J. Fuhrman-Petersen

Titled: The Effects of STEM Inquiry Practices on English Language Acquisition in a First
Grade Classroom in Thailand

has been approved as meeting the research requirement for the
Degree of Master of Arts.

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INTRODUCTION

“Really, teacher?! Really?” I can’t get over how Nung, my six year old Thai student and newly elected class leader, has that statement down pat; complete with one hand on her exaggerated hip protrusion, the other hand raised with the palm up chest-high; the pause before the second ‘really?!’ is dead on and she’s saying the ending ‘r’ in ‘teacher’ flawlessly. (Field Notes, Becky, 01-17-13). Those letter Rr’s can be quite tricky if you’re Asian, yet saying them perfectly like an American broadcaster is a status symbol; it indicates that you can afford such a foreign teacher. I’m not sure if I’m more impressed that she’s speaking a second language (complete with body and facial gestures that contradict her customary Thai mannerisms), or the fact she’s applying critical thought to question my statement. I’m a teacher in Thailand after all, and it’s not Thai culture to question much of anything in the classroom.

Trying to figure out the best instructional practices to implement in Thai classrooms is like working in Kinja from the novel *Don’t Stop the Carnival* (Wouk, 1965). Kinja is a paradise that turns into captivating insanity for the protagonist, Norman Paperman. Foreign teachers in Thailand are the Norman Papermans. And the Thais are the Kinja islanders saying, “Mr. Paperman, go home. Listen to me. Pretend you had a nightmare, and woke up. This island is a hoodoo,” (Buffett, 1998). But if teachers working in foreign lands stay long enough, they will soon discover the hidden message: “Forget about da tings you learned in school, we use a different box of tools, and you gotta play by Kinja rules,” (Buffett, 1998).

In an attempt to bring validity to what seemed like opinionated rants and raves from frustrated Norman Papermans just trying to make an easier life for themselves here in the Thailand tropics, I conducted teacher action research in an attempt to outline those Kinja Rules: how best to provide culturally relevant pedagogy in Thailand for twenty-first century primary

students. The majority of foreigners who have ever taught in Thailand will swear they know these Kinja rules. I did. After teaching first grade in a Thai elementary government school for over seven years, along with the added responsibility of supervising and training foreign teacher staff, all I know for certain is that it's really hot here. As hot as the tempers that flare on any given day from the foreign and Thai teachers consequentially ramming headstrong into each other with their cultural biases on what constitutes "best practice".

My supervisory position afforded me a unique position in trying to unravel these cultural biases – including my own. I had full access to not only all of the foreign teachers' lesson plans and feedback, but to all of their mental breakdowns and soul-searching revelations – and then, the Thai teachers' opposite explanations of such. I painstakingly started to collect, document and analyze these interesting mixtures of multicultural interpretations and their effects on students' learning. Although most of us foreigners who have taught in Thailand feel our stories are unique, the longer you stay here and the closer you look at the endless layers of cultural mystery, you begin to see that we all come together somehow as vital ingredients in the "strange callaloo; mysterious and curious roux," (Buffett, 1998).

On one hand you have Thai school culture, which I believe to be stemmed in what Freire calls 'banking education'; authoritarian, predetermined knowledge dispensing, which "provides no pedagogical space for critical students," (Macedo, 2010, p.190). On the other hand you have western-style democratic education, which I believe to be stemmed in student-centered learning, which some argue is just an instrumentalist approach to functional literacy which "emphasizes the mechanical learning of reading skills while sacrificing the critical analysis of the social and political order that generates the need for reading in the first place," (Macedo, 2010, p.189). It therefore became my unnerving goal to improve Thai students' critical thinking skills by

merging the two in a mutually respected multicultural and multilingual learning environment - and to do so without reducing literacy to the “pragmatic requirements of capital,” (Giroux, 1983, p.87). I needed to find the “Middle Way...a transcendence and reconciliation of the extremes of opposing views,” (Soka Gakkai International, 2001).

Teaching in Thailand: Personal Narrative

I remember ever so clearly my first day of teaching in Thailand. I walked into this open-aired room; the sweltering heat was suffocating me, sweat was dripping, and the elastic band around my required skirt itched beyond belief. I looked around and saw these 40 amazing brown eyed, black haired children all lined up in perfect rows of old wooden desks. Most of them were missing a tooth here and there. They were all dutifully sitting straight and staring forward with their heads bowed as they greeted their new foreign teacher – me. Despite the mandatory uniformity; from the ironed white shirts with their names embroidered in blue thread on the front pocket, to the white bows in the girls’ ear-length hair, to the belts on the boys with their crew cuts - all the way down to their white socks barely peeking out from under their desks – their individuality was still apparent in their smiles (or frowns, or tears; as is customary all over the world for students entering the big wide world of first grade). All that was going through my mind was the huge responsibility I had to provide culturally relevant teaching, without bias or judgment, in a world so foreign to me. Ah, those smiles. Those smiles that beckoned me to devote my life to teaching Thai children. A life teaching abroad where I now ask myself quite regularly how best to develop independent and critical thought rather than “manufacture consent,” (Macedo, 2010, p.186).

Personal narrative, such as this, is a discipline within the field of qualitative research, and is one of the primary methods used in this study. In “remembering moments I strive to achieve

the most internally consistent interpretation of the past-in-the-present, the experienced present, and the anticipated-in-the-present-future,” (Sandelowski, 1991, p.165). I take a constructivist view that:

There is no true meaning of an event; there is only the event as experienced or interpreted by people. People will interpret the event differently and often multiple interpretations provide a depth of understanding that the most authoritative or popular interpretation does not (Stake, 2010, p.66).

This research seeks to present multiple interpretations of a story; the journey of one American teacher’s implementation of a Science, Technology, Engineering and Math (STEM) pilot program for Thai-speaking English Language Learners (ELLs) at a government elementary school.

Statement of the Problem

In order to help Thai students - and myself - to begin to “read our world,” (Freire, 2012), I initiated a STEM pilot program in my first grade classroom using inquiry-based instruction and critical literacy as primary guiding forces. Paulo Freirean philosophy asserts that “collective power and collegiality protect the individual far more than authoritarian and hierarchical modes of organization,” and that individuals should strive for critical consciousness by rejecting passivity and using dialogical forms of life,” (Heaney, 2012). Embracing this, I wanted to figure out how I could get my Thai students to engage in critical dialogue with me - their American teacher, as well as with the multicultural members of their immediate community, when: 1) English is not their native language; and 2) it was their first exposure to a classroom environment significantly different from what they were accustomed to.

I want my students to begin to wonder, to question, to investigate - what language they do it in was not important to me. But it is to their parents. They pay what is considered high tuition to enroll their children in an English Program (EP). I therefore, had a duty to ensure the students were communicating with me and their world in English, while at the same time supporting their literacy development in their native Thai language. However, according to a recent study supported by a grant from the National Science Foundation, "...second language learners cannot afford to postpone learning subject content, such as science, while they learn the second language," (Clark, Touchman, Martinez-Garza, et al., 2012, p.1207).

This is precisely the concern expressed by policy makers, administrators, and teachers of Thailand's bilingual programs - that comprehending subject matter content is unnecessarily sacrificed at the expense of English language instruction. In these types of government programs, teaching spelling and pronunciation of key vocabulary words in Science, for example, is emphasized over applying critical thinking skills. Students may be able to read and spell the English word "photosynthesis", but most likely have difficulty understanding what the process truly entails; or more importantly, let's say, understanding the effects of pollution on plants in their community and coming up with possible solutions.

According to Professor Emeritus Dr. Montri Chulavatnatol, chairman of the board of the Institute for the Promotion of Teaching Science and Technology (IPST), "Having our students learn mainly in classes where educational resources are inadequate, we won't be able to succeed or go further. We must have them learn beyond classrooms," (Khaopa, 2012). How was our bilingual instruction falling short; how could we improve learning in both Thai *and* English language?

Research Questions. So as to gain a better awareness of what variables positively affect the development of higher order thinking skills in Thai-speaking ELLs, this teacher action research investigates how English language acquisition is affected by the implementation of culturally sensitive, inquiry-based STEM practices in a Thai first grade classroom within a democratic community of learners' environment. Specifically, what role, if any, do the following variables have?

- Culturally relevant pedagogy
- Multicultural co-teacher relationships; teachers' attitudes
- Teachers' knowledge and experience with inquiry practices
- Democratic practices
- Class Facebook Page; community of learners

This study describes how within seven months, the majority of students in one Thai classroom became critically literate and self-disciplined members in a democratic bilingual classroom.

Theoretical Frameworks

In addition to the concepts of Freirean education (Freire, 2012), my participant observation and critical analysis expands upon Collier and Thomas' multitude of research regarding the "astounding effectiveness of dual language education," (Collier 1989, 1992a, 1992b, 1995a, 1995b, 1995c; Collier & Thomas, 1989, 1999a, 1999b, 1999c, 2002, in press; Thomas, 1992; Thomas & Collier, 1997a, 1997b, 1999, 2002, 2003, in press; Thomas, Collier & Abbott, 1993). However, this is only one aspect of the 'language based theory of learning' of which I ascribe. Wells wrote a thorough study comparing the compatibility of Halliday (linguistics) and Vygotsky's (psychology) theories, both entailing aspects of constructivist

inquiry which”... starts with the experience and asks how members construct it,” (Black, 2009, p.84):

Learning is a semiotic process for which the prototypical resource is language. But it involves learning to do as well as to mean - to expand one’s potential for meaningful action as well as one’s potential for meaning through language. Discourse, both spoken and written, plays an essential, mediating role in these processes, as do other semiotic tools. However, the object of all this learning is not just the development of the learner’s meaning potential, conceived as the construction and linguistic articulation of discipline-based knowledge, but the development of the resources for acting, speaking, and thinking that enable the learner to participate effectively and creatively in further practical, social, and intellectual ability (Wells, 1994, p.84).

Another theorist I build my hypotheses on throughout this research is progressivist, Antonia Darder. I agree with Donaldo Macedo’s description of her when he stated, “The brilliance of Darder’s proposals lies in her courage to indict both conservative and liberal educators who fail to recognize that the “common culture” considers the term descriptive rather than anthropological and political,” (Darder, 2012, p.ix). Darder challenges me to think about my own role as a multicultural educator and whether I might just have a “fossilized pedagogy that is devoid of any discussion of power relations...,” (Darder, 2012, p.ix) - a challenge that my research questions begin to help me overcome.

Setting the Context

“The impact of native culture, religion and politics in one society in one place inevitably influences the make-up of the educational aims and arrangements in the region,” (Pe Symaco,

2013, Loc228). As such, it is necessary that some background information on the Thai educational system within which this study took place is presented.

Thailand / ASEAN Overview. Thailand is a constitutional monarchy with a population of 69.52 million people, 98% of whom are Buddhist. It is classified as upper-middle income by the World Bank (2011). It is a member of the Association of Southeast Asian Nations (ASEAN), which was established in 1967. The ASEAN Economic Community, with the goal of regional economic integration, will begin in 2015. This is one of the primary reasons there has been a recent push forward in educational reform; to ensure Thai citizens have an equal footing with their Asian neighbors in the globalized market.

Overview of the Thai Educational System. Thailand's Constitution declares an equal right to receive free and good quality basic education for a minimum of 12 years (since 1999), with compulsory education set at nine years. However, there are concerns about the disparity between quality and equity amongst schools, as access is different between the socio-economic groups. Corruption plays a role as parents compete to gain access to the top schools. The rich spend eight times more on education than the poor. Even though there are efforts to decentralize school management, in general, it remains highly centralized. Thailand's total spending on education is 20% of its national budget; one of the highest education spenders in the world (Pe Symaco, 2013, Loc5976).

PISA and ONET Scores. However, Thailand performs in the lowest ranks in the Programme for International Student Assessment (PISA). The PISA 2009 results show that Thailand is ranked number 50 out of 65 countries. "In other words, Thailand stands right at the top of the poorest performers in the bottom 25%" (Saiyasombut, 2012). Table 1 (Organization

for Economic Co-operation and Development website) shows the breakdown of the scores for 15-year-old Thai students for the years 2003, 2006, and 2009.

Furthermore, “in 2011, Thailand ranked 51st out of 57 countries worldwide in a competitive education proficiency assessment by the International Institute for Management Development, compared to 46th place in the 2007 rating,” (Khaopa, 2012). Thailand’s recent Ordinary National Educational Test (ONET) results from Grade 12 students show that the average falls below 50% in most subjects. Thailand’s Education Minister “...personally attributed the failure to the unchanged teaching style which focuses on memorizing rather than understanding, making students unable to analyze, which is the objective of ONET exams,” (Thai Financial Times, 2011). Therefore, I had to first understand this “unchanged teaching style” before I could recommend new ones.

Table 1
Thailand’s PISA Scores

Subject	2003	2006	2009
Reading	420	417	421
Mathematics	417	417	419
Science	429	421	425

** Students in three quarters of participating countries score between 400 and 600*

Educational Reform in Thailand. Historical and political context is often overlooked when evaluating educational reform. A synthesis report prepared for the Office of the National Education Commission and the Asian Development Bank in 2002 provides excellent background information (Fry, 2002).

In general, the Thai situation reflects "reform energy" not "reform fatigue...[but] despite the impressive quantitative expansion of Thai education and relatively good formal

educational qualifications of Thai educators, serious quality problems exist (Fry, 2002, p.7, p.22).

The report continued by identifying the following persistent challenges related to reform:

- lack of unity and coordination of diverse and fragmented education efforts;
- extent of commitment to genuine decentralization, particularly in the areas of budget and personnel;
- neglect of science and related research and development;
- persisting equity and access issues;
- overemphasis on bricks and mortar relative to investing in people (teacher learners; researchers);
- inadequate utilization of information communication technologies (ICT) for improving human resource development; and
- inadequate development of international capabilities (Fry, 2002, p.58-65).

These were all aspects I had to take into careful consideration while implementing our STEM pilot program.

STEM Education Initiatives in Thailand. Only about 30% of Thailand's university students pursue a career in science and engineering fields - much lower than other ASEAN members. "Since science and mathematics are core subjects related to technology development, which directly affects innovation and productivity, this is an important and serious issue," (Fry, 2002, p.29). As such, one aspect of educational reform has been a push to implement STEM programs.

I had the privilege of being invited to the ASEAN++ STEM Education Roundtable Meeting 2013. It was hosted by IPST in Bangkok on January 19, 2013 and attended by

representatives from 11 ASEAN countries. Their concept paper states “The [STEM] concept is one of inquiry-based learning, critical thinking, problem solving and team working and breaks down some of the artificial boundaries between subjects,” (IPST, 2013). The panel spoke about what is happening with regards to STEM education in each of their countries, the challenges it creates regarding their current curriculum and their ideas about possible plans for improving in the future. The prominent theme that emerged was the need for an integrated curriculum; to unite teachers in subject areas in order that they may plan more seamless project-based lessons stemming from real-life problems.

IPST has been taking an active role in promoting STEM Education in Thailand. The Chairman of the Governing Board of IPST, Dr. Montri Chulavatnatol, presented their two year plan at the 2013 International Science, Math, and Technology Education Conference (ISMTEC). In short, this plan dedicated 2013 as the year to market, network, reform curriculum and teaching styles, and to begin with some pilot projects in selected schools (the school in this study is a volunteer pilot project). 2014 is dedicated for evaluation and adjustments, creating a master plan, providing input to national policy on STEM education, passing legislation and then expanding into other schools.

As a follow-up to our STEM pilot program during Academic Year 2012, and subsequently the findings of this research, I have been appointed STEM Manager of our 18 bilingual classrooms from grades one through six (three classrooms in each level) for Academic Year 2013. The average number of students in a class is 35. We, the foreign teachers, have been given a dedicated STEM project room, as well as full management of our newly equipped Science Lab. STEM is a primary initiative at our school and educational reform is being taken

seriously. As such, researcher interest should be considered in the evaluation of the qualitative findings.

Inquiry in a Thai Elementary Classroom. One of the first cultural differences a foreign teacher encounters in a Thai classroom is that students usually do not ask questions without forceful prodding – even in their native language. A British teacher in Thailand writes about this:

I have lost count of the times when I asked the class if there were any questions and I received nothing but blank looks. Only students that have been encouraged and trained to ask questions for clarification have a chance of truly excelling. This may go against some elements of Thai culture, but once these students leave university, they will be part of a competitive world and will need an inquiring mind to succeed (Graham, 2007).

Furthermore, “Thailand is a high power distance culture. This is reflected in its strongly hierarchal and bureaucratic society. People expect to be told what to do and how to do it,” (Hallinger & Kantamara, 2001, p.391). This is a cultural obstacle I would have to overcome for an effective STEM program to flourish – but how considering that “passive obedience to authority is elevated to the level of moral obligation,” (Goodman, 1992, p.100) and “schools quickly become places in which dominant culture is passed on to students,” (Bourdieu, 1990). So I then found myself asking, what *is* the dominant culture - and what *should* it be - in a multicultural and multilingual school based in Thailand.

In an attempt to answer these questions, I needed my students to indirectly understand that “we rarely question the limitations placed on our lives by the cultural stories we learn at home and in school,” (Johnson, 2010) - but that we ought to. Teaching about the inquiry process seemed like a good place to start in providing my young students with the life skills needed to

figure out their place in the world. I would start by giving my students a voice in order to break their silent attentiveness in a system where they wait for the teachers to simply “make deposits which they patiently receive, memorize and repeat,” (Freire, 2012). Creating a democratic classroom environment is a small aspect, yet a very important and crucial step in teaching students critical thinking skill. This study explores how increased critical thinking then brings about increased second language acquisition.

Significance of Study

Even with my best efforts in developing a high quality, integrated STEM curriculum in three Thai first grade government classrooms, students’ performance, outcomes, and behavior, greatly varied between them. In order to make our STEM program sustainable, we needed to figure out why. Why wasn’t providing a turnkey package (i.e. detailed curriculum, the same supporting materials, and ongoing staff training) enough to obtain comparable results? Why did one classroom significantly outperform the others in communicating critical thought in English; measured by their class participation, writing progression over a period of one academic school year, and various exam results? What were the variables affecting English literacy?

My gut instinct was telling me it was foreign and Thai teachers’ lack of adaptation and/or knowledge in working within each other’s culture; forcefully sticking a round peg (instructional practices and discourse considered ‘western’) into a square hole (‘eastern’ classroom culture). Research from 12 years ago suggested that “Thailand’s combination of cultural characteristics might represent a less conducive environment for innovation and change,” (Hallinger & Kantamara, 2001, p.406). Were things different in Thailand now? This study attempts to answer that by unraveling those cultural characteristics; because our STEM pilot program requires innovation and change – and lots of it.

Declaration of Bias: Negotiating the Norms of Traditional and Global Culture

This study begins the conversation about the ways foreign educators can negotiate the norms of traditional and global culture in light of the following:

With respect to teacher development....their teaching and curricula need to be more closely aligned with both Thai local educational realities and international best practices. They must seek to achieve an important balance among international, national, and local approaches (Fry, 2002, p.67).

Multiple interpretations are needed in any study pertaining to the understanding of cultures. Research written in English with regards to implementing inquiry-based instruction in primary classrooms in Thailand, however, is minimal. “Asian literature on school improvement is even less mature than in the West” and “the empirical literature on educational change in Thailand is sparse,” (Hallinger & Kantamara, 2001, p.386, 390).

Philip Hallinger is an American national with over 10 years in Thailand’s educational systems. He has worked quite extensively with Thailand’s Ministry of Education and has published hundreds of articles regarding managing change, leadership development, and educational reform. However, his pertinent research articulates the overall cultural challenges faced with Thailand’s educational reformation efforts – and mainly at the high school and university levels. Considering Hallinger and I are not Thai, and that I do not have Thai coauthors to balance the bias meter, I clearly recognize that the “negotiations” discussed herein are weighted heavily to one side. As such, I agree with Hallinger when he stated:

We are cognizant of the fact that we have only begun to scratch the surface of the most intriguing aspect of this topic: the interaction between the traditional cultural norms that shape behavior in Thai schools and external change forces. We assert that future leaders

in all nations will need to be adept at negotiating the norms of the traditional culture and the global culture. The extent to which the norms of the local culture differ from the global norms will determine the types of adaptation. Our experience in Thailand suggests that this dual set of skills is in short supply. This suggests an important challenge for the future for those engaged in school improvement research and practice (Hallinger & Kantamara, 2001, p.406).

There is considerable research yet to undertake when we examine this much larger issue of biculturalism. Anthony Ward articulates the dilemma quite significantly when he asked the following questions:

How can one have biculturalism without first establishing [a] sense of parity between cultures? And how can one accomplish this parity in ways which are already “loaded” with dominant culture values, practices, pedagogies, rules, bureaucracies, time frames and traditions? Indeed, is it at all possible to do this? And what role might education play in this process? (Ward, 1993, p.5).

This teacher action research does not purport to have the answers to these difficult and important questions. However, I correlate how my findings herein begin to touch on these much more complex issues of power structures, the need for democracy in the classroom as a crucial role in developing critical literacy, and the importance of self-discipline and autonomy while maintaining a community of learners...all of which need to be addressed before the increased rate of acquiring a second language can be seen. By separating these variables – focusing mainly on the impact of inquiry practices on Thai-speaking ELLs - I begin to understand which practices work best where, and how they might be applied to *any* classroom – not just in Thailand - where students are learning in a second language.

Terms

There are some terms that will be used throughout this paper, and therefore need to be defined.

1. Academic Year: for public elementary schools run by the Thai government, it begins in May and ends in March, with a one month break during October.
2. Association of Southeast Asian Nation (ASEAN): established in 1967 to strengthen the economic, social, scientific and technological development of said region. Thailand is a member. English is the official working language. In 2014, the ASEAN Community will be formed. (Definition taken from: <http://www.asean.org/asean/about-asean>.)
3. ASEAN STEM Education Roundtable: the Roundtable Meeting to Promote the Collaboration on Science, Technology, Engineering and Mathematics (STEM) Education Throughout the ASEAN Region, which was held in Bangkok on January 19, 2013 as part of the International Science, Math, and Technology Education Conference (ISMTEC).
4. Bicultural inquiry praxis: the deliberate instructional practices aimed at creating an inquiry-based learning environment within a bicultural classroom; in the context of this study it is specific to an American teacher's inquiry methods tweaked for Thai student culture.
5. Bilingual Program: in this study it is specific to Thai nationals receiving instruction via a co-teaching relationship with both a Thai and a foreign (non-Thai) teacher in both Thai and English language.
6. Callaloo stew: the name for both a spicy Caribbean soup or stew and the edible leaves of several tropical plants that are used to make the stew. (Definition taken from: <http://www.wisegeek.org/what-is-callaloo.htm>.)

7. Class Facebook Page: a free social networking site, where I have created an open page entitled 'Teacher Becky's Global Classroom'
[\(https://www.facebook.com/groups/211303228907291/\)](https://www.facebook.com/groups/211303228907291/).
8. Community of learners: refers to the social context of students and their environs conducive to learning. (Definition taken from: <http://www.educause.edu/research-and-publications/books/learning-spaces/chapter-4-community-hidden-context-learning>.)
9. Critical literacy: the skill of questioning; thought given to any message conveyed via any medium.
10. Date formats: field note dates are in month-day-year format; 00-00-00.
11. Democratic education: the deliberate instructional practices aimed at empowering Thai youth to regulate their own behavior and learning.
12. Director; School Director: in this study and in the context of Thailand, "Director" is synonymous with "Principal", as referred to more popularly in US schools.
13. **English Language Learners (ELL)**: students whose native language is not English yet are receiving instruction in school in the English language in their home country.
14. English Only Movement: efforts to make English the single official language of a government or other group (commonly, of the nation and states of the U.S.A.).
(Definition taken from: <http://www.education.com/definition/english-only-movement/>.)
15. English Program (**EP**): the name assigned by Thailand's Ministry of Education (TMOE) for the official authorized, approved and monitored programs that are taught by foreign teachers. Certain policies apply to EP programs; such as no more than 3 classrooms allowed per each grade level at a maximum of 18 hours by a foreigner. The school in this study, however, refers to this as their Bilingual Program.

16. Foreign teachers: individuals teaching in a Thai school who are not native Thai nationals.

An important clarification to make is that the word ‘teacher’ in Thailand is automatically afforded to individuals who provide instruction in a Thai classroom, whether they have teaching certifications/qualifications from their home country or not. In my seven years of teaching in Thailand, I have supervised and/or trained individuals from the U.S.A., Philippines, U.K., Germany, Russia, Canada, Ghana, Kenya, South Africa, Sri Lanka, India, Ireland, Italy, Vietnam, Malaysia, Singapore, Laos, Bhutan, and Netherlands.

17. Multicultural education: an emerging discipline whose major aim is to create equal educational opportunities for students from diverse racial, ethnic, social-class, and cultural groups. (Definition taken from:

<http://www.ncrel.org/sdrs/areas/issues/educatrs/presrvce/pe3lk1.htm>.)

18. **Ordinary National Educational Test (ONET)**: Thailand’s national exam in eight core subjects administrated by Thailand’s National Institute of Educational Testing Service. It was introduced in 2001 and is taken by 6th, 9th and 12th graders (Definition taken from:

<http://thaiwomantalks.com/tag/niets/>.)

19. **Organization for Economic Co-operation and Development (OECD)**: an international organization established in 1961, headquartered in Paris, with the mission to promote policies that will improve the economic and social well-being of people around the world. It currently has 36 country members (Definition taken from <http://www.oecd.org/about/>.)

20. Prathom (**P1, P2...P6**): P stands for Prathom in Thai language and means grade level.

Therefore P1 means first grade, P2 means second grade, etc.

21. Power distance: the extent to which the less powerful members of institutions and organization within a country expect and accept that power is distributed unequally (Definition taken from: http://philiphallinger.com/old-site/papers/cultural_context_%20school_imp_Thailand.pdf.)
22. **Problem-Based Instruction (PBI)**: an instructional strategy in which students actively resolve complex problems in realistic situations. As an instructional model, it demonstrates that any learning can be accomplished through “learning prompts,” which serve both to intrigue the learner and ensure high quality learning outcomes. It can be used to teach individual lessons, units, or even entire curricula. PBI is often approached in a team environment with emphasis on building skills related to consensual decision making, dialogue and discussion, team maintenance, conflict management, and team leadership. (Definition taken from: <http://web.cortland.edu/frieda/id/IDtheories/46.html>.)
23. **Programme for International Student Assessment (PISA)**: an international study which aims to evaluate education systems worldwide by testing the skills and knowledge of 15-year-old students. (Definition taken from: <http://www.oecd.org/pisa/aboutpisa/>.)
24. Pseudonyms: all participants’ names in this paper are pseudonyms except for the author’s.
25. **Science Technology Engineering and Math (STEM)**: an acronym for the curriculum movement to integrate the disciplines of science, technology, engineering and math in a more seamless fashion with the objective of enhancing twenty-first century skill development of students. Another variation is STEAM, which includes the discipline of the Arts.

26. Thai culture: referring to the generalization of this study's school's community, behavior, attitudes, beliefs and practices.
27. Thailand's **Ministry of Education (TMOE)**: the Thai government body for overseeing education in Thailand. (Definition taken from: [http://www.en.moe.go.th/.](http://www.en.moe.go.th/))
28. The **Institute for the Promotion of Science and Technology (IPST)**: an independent authority under Thailand's Ministry of Education, responsible for the development of the national STEM curriculum. (Definition taken from: <http://164.115.23.205/eng/index.php/about-us/profile.>) IPST hosted the ISMTEC 2013 Conference held in Bangkok on January 17-20, 2013.
29. The **International Science, Mathematics, and Technology Education Conference (ISMTEC 2013)**: an international conference attended by more than 3,000 primary and secondary educators, professors, and researchers from Thailand and countries around the world with the aim of promoting STEM Education.
30. **Twenty-first century skills**: the fusion of skills, knowledge and expertise students must master to succeed in work and life; it is a blend of content knowledge, specific skills, expertise and literacies. (Definition taken from: http://www.p21.org/storage/documents/P21_Framework.pdf.)

REVIEW OF LITERATURE

Democratic Education

Many educators doubt that democracy in the classroom is a good thing, but it could be argued that few foster the habits of ongoing critical thinking and innovation for solving societal issues via a transdisciplinary lens – specifically in Thai government classrooms. John Dewey, a well-known advocate of democracy and educational reform, addressed some of my perplexities of teaching in Thai classrooms with his following pontifications:

True individualism is a product of the relaxation of the grip of the authority of custom and traditions as standards of belief. A society based on custom will utilize individual variations only up to a limit of conformity with usage; uniformity is the chief ideal within each class. A progressive society counts individual variations as precious since it finds in them the means of its growth. Hence, a democratic society must, in consistency with its ideal, allow for intellectual freedom and the play of diverse gifts and interest in its educational measures (Dewey, 2011, p.167).

As an American educator, it could be considered a natural tendency for me to approach democracy with an emphasis on the individual. Here, Darder (2012) quoted the work of Grande regarding independence:

Children are expected to be self-reliant, to complete school tasks on their own, and accept responsibility for their behavior. The value of independence is so highly regarded that students themselves become suspicious of cooperative efforts as potential impediments to their own academic and personal success (p.34).

But I live and work in Thailand – a collectivist society. According to Hofstede (1980, 1983), the US has a mean individualism index of 92, whereas Thailand's is 20 (Ward, Bochner, &

Furnham, 2003, p. 12). Based on this inherently significant attitudinal difference, how could I find, and then model and teach, a culturally relevant approach to democracy – yet another complex question I begin to answer in this study.

TMOE’s Indicators. Thailand addresses democratic education throughout its Basic Education Core Curriculum, which has five overall goals. The fifth one explicitly states that students should develop an “awareness of the need to preserve all aspects of Thai culture and Thai wisdom, protection and conservation of the environment, and public-mindedness with dedication to public service for peaceful and harmonious co-existence [sic],” (Thailand Ministry of Education, 2008, p.12). Furthermore, under the discipline ‘Foreign Languages, Strand 4: Language and Relationship with Community and the World’, it states one of the learning types as ‘Activities for Social and Public Interest’:

These activities are aimed at encouraging learners to devote themselves and provide voluntary services for the benefit of society, their communities and local areas in accord with their interests, thus manifesting commitment, virtue, sacrifice for social causes and public-mindedness. They include voluntary services in various fields and those for public interest and concerns (Thailand Ministry of Education, 2008, p.29).

This aspect of Thailand’s curriculum can be compared to the aim of America’s National Council for the Social Studies, which is the “promotion of civic competence – the knowledge, intellectual processes, and democratic dispositions required of students to be active and engaged participants in public life,” (NCSS, 2012).

Citizenship. Although our STEM program provides students with opportunities to engage in projects rich in project-based learning, it also needs to meet these important citizenship goals of Thailand’s basic curriculum. Active and responsible democratic citizenship is a lifelong

skill needed on the global stage; students need to develop the "...skills, motivation and confidence to be active citizens for life," (Cowhey, 2006). I want to prepare my students not only with STEM skills for future leadership roles in the ASEAN community, but also with the emotional intelligence to work collaboratively as global citizens – considered by me, the most important ingredient needed in the future workforce. A part of citizenship is when we remove ourselves from the protected walls of our classroom and are exposed to other people in our community. The more multicultural, the richer the experience and our perspectives are broadened. Developing a sense of empathy in my students is a subversive objective of mine because I believe "empathy supports equity" (McNulty, Davies, & Maddoux, 2010).

Developing empathy begins with the understanding that multiple perspectives exist; media messages and outward behavior may or may not be interpreted equally by all. Teachers need to consider multiple perspectives in teaching and discussing matters so students will be able to learn and apply critical thinking skills – a primary component of our STEM program – and a challenging one considering our young Thai-speaking ELLs. I take great care to include multicultural literature in order to break down "...stereotypes, roles of women and minorities and tokenism," (Burstein & Hutton, 2005). This attitude moves past merely memorizing subject-specific vocabulary, which is typical of English instruction in Thailand government schools and more on to "...structuring opportunities for talk to build students' positive social relationships and to participate in creating a dynamic of social harmony..." (Angell, 2004, p.99).

Classroom Meetings. To help my first grade Thai students begin to learn about active citizenship, I implemented purposeful daily classroom meetings – lead together with the democratically-elected monthly class leader - during the first week of the second term of Academic Year 2012 (November). By this time, the students had developed basic English skills

required to participate modestly in group discussions. However, Thai co-teacher bilingual support was utilized to ensure students understood that expressing ideas was more important than focusing on English vocabulary - that would come later. It should be noted that I can speak basic Thai language, and did so about 40% of the time during my instruction for the first two months of the academic year.

It is important to consider that my class size of 37 is a large group. Public school children use large group situations first and foremost as simple social gatherings – not necessarily aware that it is also a place where decisions are made and conflicts are resolved. Research shows that public school classes have a harder time with decision-making and making action plans (Angell, 2004). Therefore, I knew I needed to equip my Thai students with some basic understanding of parliamentary procedure. I addressed this by conducting our classroom meetings stemmed in the teacher modeling, and the students learning: (i) how to voice opinions about matters important to them; (ii) how to problem solve to develop solutions which are a) based in righteousness; b) economically feasible; c) environmentally responsible; and d) aimed at promoting well-being; and (iii) how to work peacefully and creatively in teams in order to better their lives and the lives of the people in their society. The goals of conducting these daily classroom meetings were to:

- serve “as a public forum to acknowledge member contributions, for information sharing, for event planning, and for resolving conflicts,” (Angell, 2004, p.102);
- bring together “students of diverse backgrounds and different social perspectives to talk to each other in a safe setting,” (Angell, 2004, p.102);
- “..facilitate instruction based on students’ interests and needs, and integrate student choice throughout the curriculum,” (Wade, 2001, p.25); and
- inspire action.

This set the overall tone of our learning environment. They were the desired building blocks of our classroom mindset. I consider this mindset a very crucial and necessary component of a quality STEM program, discussed further herein.

Community of Learners

I believe it is important to be a kind and empathetic person in globalized communities of learners (Rogoff, 1994). That requires comprehension in a much more important sense than getting an answer correct on a paper and pencil test. This sort of comprehension – the dynamics of social interaction – is the meat of our lives. I wanted my students to do more than just ‘know’ – I wanted them to *do* and to *be* – to interact in order to construct meaning. Yet school systems seem to minimize participation more and more with all its limiting constraints – especially Thai government ones rich in cultural traditions that view and respect the teacher as the “external boss or dictator,” (Rogoff, 2010, p.213). But I adhere to the sociocultural-historical learning theory which “defines the child as an active member of a constantly changing community of learners in which knowledge constructs and is constructed by larger cultural systems,” (Larson & Marsh, 2005, p.100). And I agree that ‘literacy events are dynamic activities and that people are active participants,’ (Barton & Hamilton, 2005, p.21). So that begged me to inquire just how active are my students in *constructing* knowledge? Are my practices based in Paulo Freirean philosophy which, in part, states that “the process of liberatory education is dialogical, affirming the mutual and coequal roles of teachers and learners,” (Heaney, 2005). And can I do all this and still be culturally relevant?

According to a report organized by the Office of the National Education Commissions, Office of the Prime Minister, Kingdom of Thailand “educational reform in Thailand will require...a considerable amount of untiring effort on the part of parents and families as the core

closest to child rearing and development...of community and local religious leaders as the forerunners in pioneering grass roots educational initiatives..." (Fry, 2002, p.16). Another recent report, this one for improving teaching for English learners, concluded that incorporating community members in class work and/or homework gives students "...the opportunity to discuss a topic in their native language before discussing it in English. This gives the student time to make home and school connections and it engages the parents in the student's learning," (Casteel & Ballantyne, 2010, p.74). As a foreign teacher in Thailand for ELLs, I had to find ways to draw upon the cultural knowledge of my students and the families they come from in order to maximize learning.

Dewey's concept of inquiry, which I ascribe to, relies heavily on this sort of collaboration. I hypothesized that by strengthening the home-school connection, my students would increase their opportunities for applying their inquiry skills. Good inquiry practices require authentic contexts; getting the students interested in what's going on in the world around them – not in their textbooks - and then discussing why they think things are the way they are. And then, better yet, discussing possible solutions and carrying out social action projects in their classroom, homes, neighborhoods, and local community. I therefore needed to find an easy and effective way to engage the parents of my 37 students, as well as our local community members - in *and* out of the classroom.

Class Facebook Page. I initiated such engagement by creating a Class Facebook Page to serve as a place for my students and their families (current and past) to come together. I posted about one to five times per day, seven days a week. I posted weekly objectives, homework, important announcements, class and school news, request for parent volunteers and/or materials and fun photos. Contrary to recommendations, I also posted items related to my personal life;

my travels, my dogs, my family, etc. As I am an international teacher, I felt strongly that this was an important aspect of sharing cross-culturally. For example, I also saw improvement in my ability to be a culturally relevant educator, as parents also posted things that enlightened my perspective about the culture in which I live and work.

The Page was a place for continued and extended learning, as I posted links to educational materials and articles that supported what we were learning in class. The Page also served as a safe social place for students and parents around the world to get to know one another, make new friends, learn about other cultures and share ideas. I posted in English, but several times my Thai co-teacher translated. Users did, however, have the ability to use Google Translate quite easily and effectively.

Using social media in and for the classroom has been controversial, but I agree that two major things are accomplished by doing so;

One is you engage your students in their space (social media, Facebook) and you teach them how to use it academically (for their own personal gain) and secondly, it allows students to drive the content of the course through collaborating and pursuing information, all the while driving one another to learn and better articulate their opinions in open academic discussion (Green, 2011).

I stand on the side that social media is beneficial to learning – especially bilingual and bicultural classrooms, such as mine, which contain 100% English language learners. Those students who performed exceptionally well had parents who were regular visitors on our Class Facebook Page. This is discussed in more detail herein.

Parent Volunteers / Mini Field Trips. Via our Class Facebook Page, I invited parents into our classroom on a regular basis; many times successfully impromptu. Freire considers

dialogue “at the heart of learning and that teachers and students should participate in dialogic discourse if meaningful learning was to occur. In this model, students and teachers are partners in the learning process, rather than participating in hierarchical models of power,” (Larson & Marsh, 2000, p.41). With 37 students and only two teachers, parents were a much welcomed resource for carrying out our project-based STEM activities – in and out of the classroom. Each of our mini-field trips, for example, had on average 12 parent volunteers. This helped make our classroom a “real community, not a contrived one in which teacher and student are performing for each other,” (Winter, D. & Robbins, S. 2005, p. xi).

Mini field trips were typically viewed by Thai parents and management alike, as questionable settings for academic learning. Engaging in activities outside of the classroom was certainly not what Thai teachers and students were accustomed to. I needed to demonstrate that “informal learning is often superior to formal learning,” (Wenger, 1998). I explained that my instructional practices encourage and support students’ social interaction with one another as much as possible - and how that is a good thing.

Barton & Hamilton (2005) iterates that students do not just act within the classroom; they act within a range of contexts:

Social practices differ greatly across the diversity of contexts and social interaction has different characteristics. It varies in terms of the degree of fluidity, of social relations of power and authority, the types of historical structuring and change, the degree of formal framing or scripting and the degree to which its boundaries are agreed or contested.

This got me to thinking about what it means to be participatory in culture; specifically the classroom and community culture of my Thai first grade bilingual students during field trips and other interactions with students’ parents. “If we are in favor of a language arts pedagogy that

will empower students, then it makes sense that their cultural rhetorics should take center stage” (Kynard, 2008). This research begins to explore whether I was addressing this.

Inquiry-Based Instruction

Dr. Audrey Rule, one of my graduate professors at the University of Northern Iowa, USA, defined inquiry here quite thoroughly:

Inquiry is a complex activity that involves the following actions: making observations; posing questions; examining books and other sources of information to see what is already known; planning investigations; reviewing what is already known in light of experimental or observed evidence; using tools to gather, analyze, and interpret data; proposing answers, explanations, and predictions; and communicating the results. Inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations (personal communication, March, 2012).

Thailand is not any different than many other countries that wonder how and where inquiry practices can fit into their already packed day of rushing through content in order to cover it for the mandated assessments. Many Thai educators, including the one in this study, are starting to look at Singapore’s 2005 ”Teach Less Learn More” strategy, which is about “... teaching better, to engage learners and prepare them for life, rather than teaching more, for tests and examinations,” (Ministry of Education, Singapore, 2005). In essence, Singapore promotes the Freirean concept that critical thinking and reasoning – gained from meaningful, real-life engagements - should take the place of knowledge dispensing and memorization. Our school’s Director, thankfully, agrees.

Critical Literacy / New Literacies. As such, increasing critical literacy was one of the goals of our STEM pilot program, which was being initiated in our first grade English Program

(EP1) classrooms. I view critical literacy as sense-making; specifically in my situation, how my Thai students learn and use the English language to make meaning out of *their* world. Our STEM program is geared to help students become “constructors of meaning vis-à-vis questions they seek to answer, while our role as teachers is to provide assistance and support in their problem-posing and meaning-making,” (Shultz, 2007). This is a challenge in any classroom – let alone ones that are instructing and learning in two or more languages and cultures.

I believe meaning-making is a life-long process, and is best taught by modeling – and providing many opportunities for applying – critical thinking and inquiry skills using an integrated curriculum approach. This is supported by Standard 10 of the joint publication by the US National Council of Teachers of English and the International Reading Association which encourages “students whose first language is not English to make use of their first language to develop competency in the English language arts and to develop understanding of content across the curriculum” (NCTE, 2012).

Therefore, the initial approach I took for developing our STEM curriculum was to view Thailand’s existing indicators via intradisciplinary integration and new literacies’ approaches. I went through each and every P1 indicator horizontally through each of the subject matters, and then vertically through the grade levels (Drake & Burns, 2000). And then I made connections:

I believe inquiry and our approach to inquiry has a way of relating subjects in ways we don't always necessarily think about. Reading and mathematics rules the classroom now with standardized tests. But think about why literacy and mathematics exist in the first place. It's all about communicating life which is...science and social studies. We are driven to figure out relationships and patterns in our physical, biological, and social world as we know it. In our quest to figure it out, we read and write and figure to

communicate what we understand and what we are struggling with. So - why do we feel compelled to kick science and social studies totally aside when it is the soul of the act of reading, writing, and figuring? (B. Van Meeteren, personal communication, March 5, 2012).

This advice, especially the part about “communicating life” allowed me to approach educational reform in my classroom quite simply – I started with myself. I modeled to my Thai-speaking ELLs on a minute-by-minute basis what it looks, sounds, feels, smells and tastes like to wonder...to imagine...to be curious...to be critical consumers of information. We learned together how to start asking questions, and lots of them; to ourselves, each other, students and teachers in other classrooms, our parents, and members in our community. For example:

- How is the English letter “Pp” similar to the Thai letter ‘พ’? Why is that frog sitting in mud? Why don’t you see a Thai person with blue eyes? Why does Chon Buri have more kinds of fruit trees than Iowa?

And then onto questions requiring deeper thinking such as:

- How can we help students who are falling behind in their homework? Why does the Director make you cut your hair short – do you like it? Do you think it’s ok that your school is better than the temple school down the street? Do you think it’s ok that the teacher hits you?

My own change in using inquiry as a way to discover the world around us, served as the springboard for setting the tone for our entire academic year. Inquiry became our main tool for learning how to learn.

Second Language Acquisition

My six and seven year old students had a unique challenge; they were learning about their world in two languages at the crucial onset of their school-based literacy development. The US National Assessment Governing Board (NAGB) assesses foreign language acquisition through three modes of communication:

- Interpersonal mode: two-way, interactive communication;
- Interpretive mode: understanding of spoken or written language; and
- Presentational mode: creating spoken or written communication (Lindholm-Learty, 2000, p.9).

I use this framework for evaluating the school-based literacy development of my students.

According to a report from the U.S. Department of Education's Office of Bilingual Education:

Students need to reach a certain level of native language proficiency to promote higher levels of second language development and bilingual proficiency. Once students have sufficiently developed both languages, they will benefit from the cognitive advantages that accrue with bilingualism; more creative thinking, greater mental flexibility, ability to think more abstractly, and superior concept formation (Lindholm-Learty, 2000, p.18).

The report continued by stating that "immersing ELL students in their native language will produce not only higher levels of their native language but also higher levels of English proficiency," (Lindholm-Learty, 2000, p.19). Yet in Thailand, English is considered one of the least favorite subjects among students.

The average English test scores between 20-30% in the national standardized ONET over the past three years mark English as the worst performed subject among primary and secondary Thai school pupils. The score distributions show even more deplorable

performance with large groups of pupils getting only 10-20% in the national ONET...Thai university applicants scored an average 28.34% in English in the recent university entrance exams. In a recent IMD World Competitiveness Report, Thailand was ranked 54th out of 56 countries globally for English proficiency, the second-lowest in Asia (Saiyasombut, 2012).

This is why I am a proponent of calling our school's program a 'STEM Bilingual Program' instead of an English Program. In the Findings section below, I discuss how dual language – instructing in English and Thai *intermixed* throughout the entire day rather than an on-again, off-again mentality – is more conducive to not only developing students' critical thinking skills, but to their literacy development as well.

METHODS

Overview of Study

This study began as individual teacher evaluation research to analyze an educational reform initiative that was occurring during Academic Year 2012 at our Thai government primary school located in the city of Chon Buri. Our school's Director afforded me the leadership role and academic and managerial freedom to implement a STEM pilot project in our three EP1 classrooms. Data from the EP1 STEM pilot was collected and analyzed during a nine month period, commencing May 2012 and ending March 2013 - omitting the month of October (winter break).

The original goal of this study was to gather evaluation research data to support decisions about how best to fully implement a bilingual STEM program (project-based learning via an integrated curriculum rooted in inquiry practices) aimed at developing higher order thinking skills in all of our elementary classrooms; grades one through six. Data was also intended to support the IPST department of Thailand's Ministry of Education; as one of their initiatives is training Thai teachers on how best to provide math and science instruction in English to Thai students. As an administrator, I am using this "teacher action research...for school renewal and other improvement efforts," (McMillan, 2012, p.110).

Due to the bilingual and multicultural nature of our STEM pilot program, I originally planned to focus solely on the aspects of culturally relevant pedagogy. "Most teachers in intercultural classrooms in Thailand are native English-speakers who come from different cultures and have different perspectives. These teachers' roles, teaching styles and relationships with their Thai students all impact instructional success and achievement in an intercultural classroom," (Kerdchoochuen, 2011, p.9). I was therefore interested in improving training for our

new hire foreign teachers to increase their cultural awareness about teaching in Thai classrooms, and thus their effectiveness as an educator. As such, back in December 2011, I started to gather weekly feedback back from our foreign teacher staff about their experiences, attitudes and perceptions about working at our school.

Interestingly, while data was being collected and analyzed during the STEM pilot project, I realized that the speed and enthusiasm with which English was being used by my Thai students was faster than my previous six years teaching experience in a Thai first grade classroom. My interest then changed to action research regarding language acquisition; I now wanted to identify what was causing this acceleration of English literacy, both orally and written. However, separating the influential variables was a distinct challenge of achieving this goal. Observational studies from teacher action research, therefore, could help me better “understand my students’ world from my students’ point of view rather than that of my own culture. Students are the informants in teacher-research, helping us to learn both the recipes for behavior in their cultures and the learning strategies that they employ,” (Hubbard & Power, 2003, p.1). It was time to start listening more carefully to what my students had to say.

Designing the Research Methodology

My overall design of this non-experimental, descriptive study took a mixed-methods teacher action research approach. There is a small dabble in ethnography, as Thai culture is the most perplexing, and potentially the most influential, variable; especially if one considers Gramsci’s argument that “educators need to understand how the dominant culture structures ideology and produces social practices in schools, for the purpose of shattering the mystification of the existing power relationships and the social arrangements that sustain domination,” (Darder, 2012, p.32).

My research questions served as my compass point more than a standardized procedure (Stake, 2010, p.10) and I considered my eye and view of my classroom life my most important tool as a researcher in this study (Hubbard & Power, 2003, p.38). However, as I wanted to make sure I got multiple views and perspectives of our classroom life, I used formal, objective, systematic processes where quantitative data from video recordings, students' writing, and exam scores were utilized to analyze how English language acquisition was affected by inquiry practices. Also, considering that this study takes place in a multicultural learning environment, I used quantitative methods for analyzing foreign teacher feedback. Their teaching experiences in Thai classrooms were needed in order to address the recurring cultural challenges that were affecting student learning.

In essence, I relied mostly on qualitative data from my field notes that were "cooked" while gathering and analyzing each of these data sources. "*Cooking notes* is the process of reflecting on what you are seeing shortly after you first wrote your notes...moving from scripting to thoughtful analysis," (Larson & March, 2003, p. 45). This mixed-methods approach to my data collection and analysis are then presented in personal narrative form throughout.

Study Setting / Participants

City. The school in this study is located in the city of Chon Buri in the country of Thailand. Chon Buri is located on the Gulf of Thailand with a population of about 35,000. "The eastern seaboard is heavily industrialized and underpinned by shipping, transportation, tourism, and manufacturing industries, and second to only Bangkok in economic output," (Wikipedia).

School. The school is the largest elementary government school in Chon Buri province; approximately 3,500 students, 120 Thai teachers (majority women), and 50 foreign teachers (majority women). There are two campuses separated by a busy road with a pedestrian walking

overpass. The English Program (EP) – consisting of three classrooms each for Kindergarten 1, Kindergarten 2, and first through sixth grades – is on one side, while the remaining programs are on the other. Both campuses are surrounded by a tall metal gate, usually manned by traffic guards/greeters stationed at the main entrances. School hours are from 8am until 4pm Monday through Friday. There are thirty-five 50-minute class periods in a week; with two 10-minute breaks and a 50 minute lunch break daily.

Classrooms. Each EP classroom is air-conditioned and equipped with a desktop computer with internet access connected to a large screen projector and sound system, as well as an overhead projector, whiteboard, and wireless hand-held microphone. Rooms are relatively small for housing 35+ wooden desks and cubbies, two teacher desks, a computer table and bookshelves; rendering small group work quite difficult. As the EP classrooms are all air-conditioned, the large wooden latched windows remained closed with curtains drawn. There is no natural lighting in the classroom except for two class sliding doors located at the front and rear of the classrooms, which lead out into a small grassy courtyard. Our EP classrooms, school grounds and teaching staff are considered high quality compared to other Thai government schools.

Participants. There are 37 Thai students; 19 girls and 18 boys in the EP1 classroom primarily focused on in this study, all of who were reviewed and analyzed via field notes, video recordings, exam scores and some of their written artifacts. Their ages are six and seven years old. Their native language is Thai. One boy has been diagnosed as learning disabled and takes medication, another boy is considered to be, making a total of five students that perform academically far below average. One hundred percent of the students are Buddhists. They attend the English Program; as such they are considered to come from economically advantaged

households. School uniforms are compulsory with the student's name, number, and name of the school embroidered on the shirt.

Instruction. Parents pay approximately \$1,300 yearly tuition for the EP program. The EP students receive 18 hours of instruction from a foreign teacher per week in all subject matter. This means 45% of their lessons are instructed in English. Fifteen hours were from me, a white American female teacher aged 43, a graduate student at the University of Northern Iowa, USA's Elementary Education Curriculum and Instruction cohort, also possessing a Thai Teacher's License; another is a Filipino male aged 26, with a B.A. in Physical Education from the Philippines, who teaches one hour of Health and one hour of Physical Education, and the third is a Filipino female aged 41, with a Doctor of Optometry degree, who teaches one hour of Computer. All three foreign teachers can speak basic Thai language common for classroom situations.

A Thai co-teacher is supposed to be present in the classroom during the foreign teachers' instruction. However, her presence and subsequent role, as well as English literacy, varies greatly and is contingent on her will. "Many [Thai teachers] don't speak the [English] language well enough, or have sufficient English knowledge and instruction skills to guide students in their learning," (Saiyasombut, 2012). According to my data collection of foreign teachers' feedback, Thai teacher support is predominantly low, and as such, affects student learning negatively. However, in my case with my EP1 classroom, Thai teacher bilingual and managerial support was present and strong the majority of the time this study took place. My Thai co-teacher is a female, aged 54, with a B.A. in Education from Burapha University, Thailand, and is considered better-than-average for communicating in English. This important and crucial confounding variable - Thai co-teacher support - will be discussed further herein.

Role of the Researcher / Limitations. It should be noted that I was a homeroom teacher in the classroom being studied; I was physically in the classroom the majority of the day, whether actively involved or as an inactive observer, during all data collection efforts mentioned in this study. Therefore, my role as researcher was close; involved, trusting and evolving (McMillan, 2012, p.13). I have assumptions that may have influenced results for “no researcher can enter into a study without bias,” (McMillan, 2012, p.339).

Data Collection and Analysis

Data was collected and analyzed via mixed-methods from the following five sources:

- Foreign teacher feedback
- Researcher’s field notes
- Video recordings of classroom lessons
- Samples of students’ writing
- Students’ formal assessments

How each of these were collected and analyzed is described in detail below.

Foreign Teacher Feedback. In addition to my first grade teaching position, I also served as foreign teacher manager, curriculum specialist, and trainer. Due to the high turn-over of teaching staff, as is typical in Thai government schools, I used my managerial position as a means of gathering feedback that could help make decisions aimed at improving teacher retention. My gut instinct was telling me that if I improved cross-cultural training, that foreign teacher retention would improve. Culturally relevant pedagogy is an important aspect considered in this study in light of the following:

Competence in cross-cultural communication requires diving below the surface to see the rest of the iceberg, and it involves onion peeling, too: acquiring a corpus of deeper

cultural information that might affect how a teacher instructs and how a student learns. While the iceberg and onion metaphors speak to the complex nature of culture, they also evoke an array of feelings. Running into an iceberg can cause an unexpected jolt, and an onion, as it is peeled, can cause the eyes to tear; likewise--to go from metaphor to analogy--the process of becoming culturally competent also comes with new challenges and experiences that might, initially at least, surprise, shock, or even offend. In the classroom, being culturally competent also involves an understanding of how cultures differ under the surface and how cultures respond differently to similar situations (Pratt-Johnson, 2006).

In the foreign teachers' feedback I was primarily on the lookout for ethnocentrism and overall cross-cultural disparities. Darder (2012) defines ethnocentrism as "a notion that one's race, nation, and culture are superior to all others as most often manifested by the establishment of standards of behavior by which everything is judged and compared," (p.37). I wanted to triangulate foreign teacher's feedback with their and their students' performance, behavior and attitudes. I felt their perceptions would give me insight to how Thai students and teachers were negotiating culture and power in their classrooms, and how that potentially affected the foreign teachers' instruction and thus their students' rate of English language acquisition.

Gathering Foreign Teacher Feedback. Foreign teachers' weekly lesson plans were collected every Friday for the week just completed. There is a 'teacher evaluation' section on the bottom of the form (see Appendix A), where the teachers write brief notes about the effectiveness of that particular lesson. The majority of these comments were collected and categorized in a Microsoft Excel spreadsheet (no entry was purposefully chosen over another; rather the number of entries entered into the spreadsheet was based on my available time during

a given week). Data was also collected from foreign teachers in any outside areas where I encountered them such as trainings, seminars, and school functions.

Coding Foreign Teacher Feedback into Themes. The Microsoft Excel spreadsheet contains 357 entries of feedback from 29 foreign teachers from 4 different countries, as well as researcher field notes and a small handful of Thai teachers, collected from December 2011 to July 2012 (see Appendix F). The column fields in the spreadsheet are:

- Data Type (article, blog, cover page, email, Facebook, field note, lesson plan, discussion board, memo, text message)
- Created by (author of the data)
- Date (date the data was created)
- Comments (verbatim data copied from the data source)
- Theme (40+ subtheme themes were identified and then bucketed into 18 umbrella categories)
- My thoughts ('cooking' the data by including my reflections about it)

The filter function in Excel, particularly in the 'Theme' column, allowed for easy retrieval of this data during my triangulation efforts with my other data sources. As Hubbard & Power (2003) write, "The richer your database, the more possibilities you have for triangulation" and "when you use multiple sources to support your findings, you can build a compelling case for what you have discovered," (p.124). It should be noted that although open coding the data was the intended method for deriving the themes, it is possible that it was more an overview approach due to my novice teacher-researcher status at the time of this paper (Strauss, 2003, p.28, p.31). Nonetheless, the constant comparative method played an ongoing integral part in coding the data into major themes

Field Notes. “Many teacher-researchers rely on brief, intense periods of note taking during their teaching day...and as Vygotsky noted that there is a world in a word,” (Hubbard & Power, 2003, p. 42). I heeded to the following consideration that, “you record carefully what your attention has allowed you to see, knowing that you will not see everything and that others will see differently, but recording whatever you can so it will be part of the cumulative picture,” (Glesne, 2011, p.80).

Taking Field Notes. I kept a journal at my desk where I wrote quick notes throughout the day to serve as a mental jog for further detailed follow-up descriptions. The environment in which I collected my field notes was solely my first grade classroom via a spiral bound notebook I kept at my side (see Appendices B and C). The journal entries were about my observations of students’ behavior and oral exchanges in various situations during class. I paid particular attention to students’ questioning practices in conjunction with their English literacy development.

Turning Field and Personal Notes into Theoretical Ones. I used after-the-fact journal entries which expanded on my field notes; some were typed up in memo format to move “from scripting to thoughtful analysis,” (Hubbard & Power, 2010, p.46). I did a few research memos in narrative form, including metaphorical descriptions, in an effort to ask myself what my observations meant. “Glaser defines a memo as the theorizing write-up about codes and their relationships as they strike the analyst while coding,” (Hubbard & Power, 2003, p.110). I then indexed my notes by recurring themes via the same method used with foreign teacher feedback.

Video Recordings of Lessons. “Collecting data though video tapes presents some unique opportunities...by recording the actions as well as the sounds of classroom life, you will have a record of nonverbal interactions, which adds an often neglected element to your data,”

(Hubbard & Power, 2003, p. 84). With a class size of 37, I knew I needed an extra set of eyes and ears to gather the wealth of engagement, participation and verbal exchanges.

Capturing Our Classroom Life. The environment in which I video recorded instruction, and classroom life in general, was solely in my first grade classroom. A self-standing video camera (Contour Roam) was placed in various corners of our classroom. It captured the majority view of the room and students during instruction, as well as 100% of the classroom sounds/dialogues. However, at certain times the teachers and/or a few of the students walked out of view for brief periods of time, but with no apparent affect. The length of the videos ranged from 11 minutes to a full 50-minute period.

I video recorded several lessons throughout the research period. Although I was advised that “transcription involved in video analysis is time consuming and many layered,” (Hubbard & Power, 2003, p. 84) due to time constraints and teacher-researcher naivety, only seven were crucially reviewed and documented.

Defining What I Was Looking For. These seven video recordings were quantitatively analyzed via a cataloging sheet I developed (see Appendix D), which significantly lessened the painstaking work usually associated with this type of data collection (Hubbard & Power, 2010, p.78). As with the field notes, my area of interest was focused on the questioning practices occurring in the classroom between students and teachers, as well as their physical movements during a particular activity type. I focused on the events and talk of the group collectively, rather than analyzing particular individual students. The data points (rows in the rubric) are as follows:

- Lead and co-teacher teacher/nationalities
- Length of video
- Subject(s) being taught

- Instructional method(s) being used
- Number of times:
 - Thai teacher orally handles a classroom management issue
 - Lead teacher orally engages an off-task student
 - Lead teacher asks students to repeat chorally as a group
 - Thai teacher translates; either on their own or as requested by lead teacher
 - Lead teacher asks the large group a question and various students respond
 - A student randomly asks the teacher a question
 - A student stands up without permission; off task and unattended to by teachers

Narrative qualitative notes were also allowed for and carried out on the sides of the rubric for each of the videos and then later typed up into Microsoft Word documents.

Students' Writing Samples. “An important data source for any teacher-researcher is student work,” (Hubbard & Power, 2003, p. 59). As this study focuses on the acquisition of English literacy via a STEM program, I chose the end of the year writing exam as a litmus test of students' critical thinking skills.

End of Year Writing Exam. Purposeful, criterion sampling was used to select 15 students' writing samples from their writing final exam for Academic Year 2012 from two of the three EP1 classrooms; for a total of 30 artifacts (see Appendix E). Based on my knowledge of all the students in the two classrooms, a judgment was made to include cases which were representative of the wide range of abilities, not including those students with learning disabilities and taking behavior modification medication. This type of sampling is “considered

complete when no new information is forthcoming from additional cases,” (McMillan, 2012, p.110), which is the reason I stopped at 15 samples.

To limit my bias in selecting participants from each of the three classrooms, I made five piles of the students’ exams according to their perceived yearly cumulative writing ability, ranging from lowest to highest. Then the students’ names were concealed in each of the piles and three samples were randomly chosen from each of the five piles, for a total of 15 artifacts from each classroom. Although this type of purposeful sampling provides results which can be generalized to similar situations, it should be noted that a weakness is that one must be careful not to generalize to other subjects. The results are dependent on the unique characteristics of the sample (McMillan, 2012, p.111). This is the reason why the third EP1 classroom was not included in the writing results; although they took the same final writing exam, their topic was different than the other two classes. I felt this skewed the overall scoring in the grading rubric I created, and so therefore chose to not include it in the quantitative comparisons results.

Scoring Students’ Writing. Samples of students’ writing were quantitatively evaluated according to a grading rubric that I created in Microsoft Excel (see Appendix G). This tool was chosen for the ease of graphing and analyzing data in multiple ways. The grading criterion was based on my knowledge and seven years experience with literacy development in Thai-speaking ELLs. The grading rubric is as follows:

- 1 point per word (communicating)
- 2 points per unique word (depth of vocabulary)
- 2 points per word in the average sentence length (ability to better construct meaning)

- -1 point per unique error (i.e. spelling, grammar, punctuation, incompleteness, mechanics of writing sentences, etc.)
- 10 points for each sentence containing critical thinking (although this is subjective, I limited it by using strict guidelines, such as usage of quotations, questions words and other indicative words like ‘because’ and ‘how’)
- 5 points for each instance of deeper expression of thought (as above, to limit subjectivity I abided by strict guidelines of word usage)
- 1 point for each sentence about ‘my world’ (does not include sentences about ‘I’ or ‘me’).

As even the mechanics of writing English vary greatly from Thai language, let alone grammatical construction, I felt items such as spacing, capitalization, and punctuation were important to take into consideration despite the participants being only six to seven years old and just beginning their school-based literacy development. This is because, according to several cross linguistic theories, “many Asian...learners learning English...have shown that learners rely on their knowledge of an L2 (second language) related to the TL [target language] much more than on their unrelated L1 [native language],” (Ringbom, 2004, p.2).

Formal Student Assessments. I also wanted to take a quick snapshot of our entire school’s academic performance in order to gain yet another perspective. I felt a quick and easy way to do that was to gather and chart students’ Midterm test scores in all subjects.

Midterm Exams All Subjects / Grade Levels. I reviewed the scores on five subject tests (English Grammar, Phonics, Reading/Writing, Math, and Science) from the second semester midterm exam during Academic Year 2011 (January 2012) of the total population of students not enrolled in our EP programs – 1,935 students. The scores were retrieved from management,

which were taken from the government grade books. To clarify, the number of exams students took (not exceeding five) depended on their grade level. The total number of tests I tallied was 5,448. All students who took these exams received instruction from foreign teachers on a regular basis as dictated by our school's programs; only 2% of which were under my direct instruction at that time.

Percentage of Students Failed. I tallied up all students who failed said exams. Any score under 50% is considered failing per Thailand's government grading system. I then calculated the total percent of students who failed said exams by each grade level and subject matter.

Quality of Exams. It should be noted that the quality of the exams were not grade-level appropriate to begin with, as suggested by my following field notes:

- I was taking way too much time to review the foreign teachers' tests. Despite me telling Thai management last semester that we needed a seminar to train our teachers on test writing (and a grammar refresher for the Filipinos and a MS Word basics course!) - it never happened. So I'm seeing the same types of errors and low quality this time around. I sent a text to management saying I didn't have time for this; that we needed a seminar to train them all at once (Field Notes, Becky, Feb. 2012).
- I can't believe the sloppy work on creating the Midterm tests by the teachers. For the new ones, ok, understandable. But the Filipinos have been here a long time and are qualified teachers. Can't believe how many math and grammar errors (gasp!). Tests have poor layout (lack of computer skills) and are confusing for the students (Field Notes, Becky, Dec. 2011).

Chrissie, an American foreign teacher, emailed to me the following, which gave further insight into the possibility that largely unprepared teachers were writing exams:

Here are my two revised midterms. I was wondering if you could look over them and give me any final feedback before sending them to Thai management. I really appreciated the feedback on the first go around. I have never actually been "taught" how to make a test, and no one seemed to care much last semester...it has basically just been me trying my best based on no formal training or guidance (personal communication, Jan. 2012).

Considering our school will continue with research pertaining to our STEM program in the years to come, quality control of our formal assessments will need to be addressed accordingly to provide reliable quantitative and comparative data. For the purpose of this initial study, nonetheless, the test scores are still presented herein in order to create a snapshot of the existing situation from which improvement efforts can be considered.

Validity Threats to Data Collection and Analysis. Author bias needs to be considered being I was the initiator and manager of our EP1 STEM pilot program. I was the lead teacher in six of the seven videos reviewed. Other validity threats to the field notes and videos are the variances in the subject matter being taught and the time of day/term data was collected. Students and other teachers at times were aware of being video recorded. Only a small portion of the total number of video recordings was analyzed. As such, many end-of-the-year recordings, which would have theoretically shown the most academic growth, were not included in this study, and there was a lack of recordings of other foreign teachers as the lead teachers. Maturation of the students is also a confounding variable as is the nationality, qualifications, years of teaching experience, years of working in Thailand and status of the individual teachers.

Formal student assessment, in this case, quarterly exams, lacked quality control so may or may not have been grade-level appropriate.

For this study, however, action research is defined as supporting my “deliberate, personally owned and conducted solution-oriented investigation” (Goswami & Stillman, 1987, p.8) and is intended solely to support my further research on the implications reported herein.

Methods Conclusion

“Enhancing process validity requires that action researchers take measures to ensure that their data collection methods are effective and appropriate for obtaining the information needed to answer the questions regarding the study,” (MacMillan, 2012, p.355). The methods utilized to answer the research question of this study - how is English language acquisition affected by the implementation of culturally sensitive, STEM inquiry-based practices in a Thai first grade classroom within a democratic community of learners’ environment – were considered in light of the following criteria, (MacMillan, 2012, p.355-356):

Motivation and Involvement of the Researcher. I have a vested interest in this study as I am the manager who initiated the EP1 STEM pilot project, as well as one of the homeroom teachers. I have also been appointed as the manager for the rollout into our other 18 EP elementary classrooms for Academic Year 2013. I am also collaborating with other educators working on similar efforts in Thailand and in the ASEAN region. Although researcher bias should be considered, it is in my and my school community’s best interest to have accurate and representative data to make sound decisions for achieving optimal student performance as we move forward.

Consistency between Research Question and Methodology. In order to gain a deeper understanding of the multiple variables and their effects on learning involved in this study, a

mixed-methods approach was most appropriate. As research in English is only recently surfacing about educational reform efforts Thailand, I felt my own narrative descriptions were needed in addition to quantitative data regarding my classroom's inquiry practices, evaluation of my students' writing, exams scores and foreign teacher feedback. However, qualitative data is at the heart of this study and most relevant, in my opinion, for beginning to understand the complex nature of the language-based theory of learning.

Multiple Methods of Data Collection. Foreign teacher feedback, field notes, video recordings, students' writing, exam scores and personal narratives are all appropriately utilized in this mixed-methods approach. This study includes *experiencing* data, which refers to my direct observation of participants; *enquiring* data, which refers to my use of lesson plans to solicit feedback from foreign teachers; and *examining* data, which refers to my evaluation of students' writing and performance on exams (MacMillan, 2012, p.352-3530). Data analysis of these various types is carried out using Glaser and Strauss' (1967) constant comparison method (MacMillan, 2012, p.114-116). Namely, weekly coding of notes, comparing the emerging categories amongst the various data, and continually weighing it all against existing literature was a pivotal process of this study.

An Emergent, Circular Process of Research, Action and Reflection. The research process is not linear. This study originated in October 2011 and 17 months later is it still being dissected, tweaked and expanded upon. As a novice teacher-researcher, I am committed to finding strategies to develop more principled classroom practices; specifically I am going out looking for change rather than waiting for it to happen. But I have much to learn. I empathetically understand that "you usually do not know what you're looking for until you find it," (Hubbard & Power, 2012, p.70). That was a major challenge in this study – minimizing

researcher bias by letting the data speak for itself rather than trying to prove my preconceived assumptions. It is only through disciplined self-reflection (the purpose of my research blog), as well as my collaboration with policy-makers, fellow educators in Thailand, and colleagues in my university cohort, that I began to make sense of the mountain of data I have and continue to collect.

External Monitoring and Feedback. Such ongoing sharing of this study's methodology, results and reflections with other educators familiar with the implementation of my STEM pilot program and teaching in Thailand, is a collaboration effort necessary to maintain quality control. Weekly collaboration was a welcomed mandate as part of my two year graduate cohort. I am also a regular trainer and speaker at various events throughout Thailand, where I have had several opportunities to share the components of this study and receive feedback from both foreign *and* Thai educators. This was particularly useful in providing checks and balances for potential researcher bias in the qualitative data.

FINDINGS

My findings are presented mainly in narrative form from a participant observational standpoint.

The telling of stories helps us to make sense of our lived worlds. Not only do they help us to cope with and better understand these lived worlds but they also help us to shape those lived experiences, generate meanings, and they even offer us the potential for agency and change (Ferguson, 2011, p. 26).

The story of my Thai-speaking first grade ELL students slowly unfolded itself in this research. Their story spoke of issues relating to culture and power and culture and language in the classroom. My data shows that these are powerful hidden forces in multicultural education requiring bilingualism. It is a story which manifested in a safe and caring community of learners' environment as they embarked on a year-long journey with STEM instruction – a radically different classroom life than what they knew of and were expecting. It is not the amount of resources or a well thought out enriched curriculum, or even the expertise of the teachers; but rather attitudes, perceptions, and tolerance between the individuals' customs - and then, finding the “Middle Way”.

Overview

Students' engagement and participation in authentic tasks in a collectivist learning environment appear to be the leverage points that trigger the rate of English language acquisition in Thai elementary schools. Using constant comparison and triangulation methods between my quantitative and qualitative data presented herein, my summative findings can be grouped into the following overarching themes:

1. Culture and Power: culture informs everything we do under the auspices of schooling (Ladson-Billings, 2012). When the power distance between and amongst our school employees and students was lessened, school-based English literacy increased.

2. Culture and Language: people use language to exercise power. By using critical literacy methodologies as a basis for STEM lessons - giving the students a voice - the construction of meaning in my young Thai students' world was enhanced. When their critical thinking was enhanced, their rate of English language acquisition was accelerated.

3. Extended Community of Learners: "learning occurs through participation in social, cultural and historical contexts that are mediated by interaction," (Larson & Marsh, 2000, p.105). The rate and quality of my students' English literacy increased as the home-school connection increased.

These three ideas, interwoven with support from my five data sources (i.e. foreign teacher feedback, field notes, video recordings, and students' writing and formal assessments) indicate that effective bilingual programs demand culturally-relevant pedagogy from the co-teachers, as well as their awareness, respect and intermingling of their diverse, and often times opposing, teaching methodologies. Working together happily and effectively – the Thai teachers, foreign teachers and Thai students – however, requires that the power distance between them to be lessened. This can still be accomplished while at the same time maintaining Thai identity and many of the customs unique to Thai classrooms. When this is achieved, students' engagement and participation naturally increases while they partake in STEM lessons in a democratic classroom environment. Democratic contexts set the stage for inquiry, and inquiry is heightened even further when learning is extended beyond the classrooms walls and out into the community with their parents' support. All this was demonstrated by their critical thinking skills

communicated to me in English. This is explained in detail and supported by my five data sources below.

1. **Culture and Power in the Classroom**

According to my spreadsheet of the thematic issues of foreign teacher feedback (see Figure 1), 64% were catalogued under the umbrella of power and control; broken down as follows:

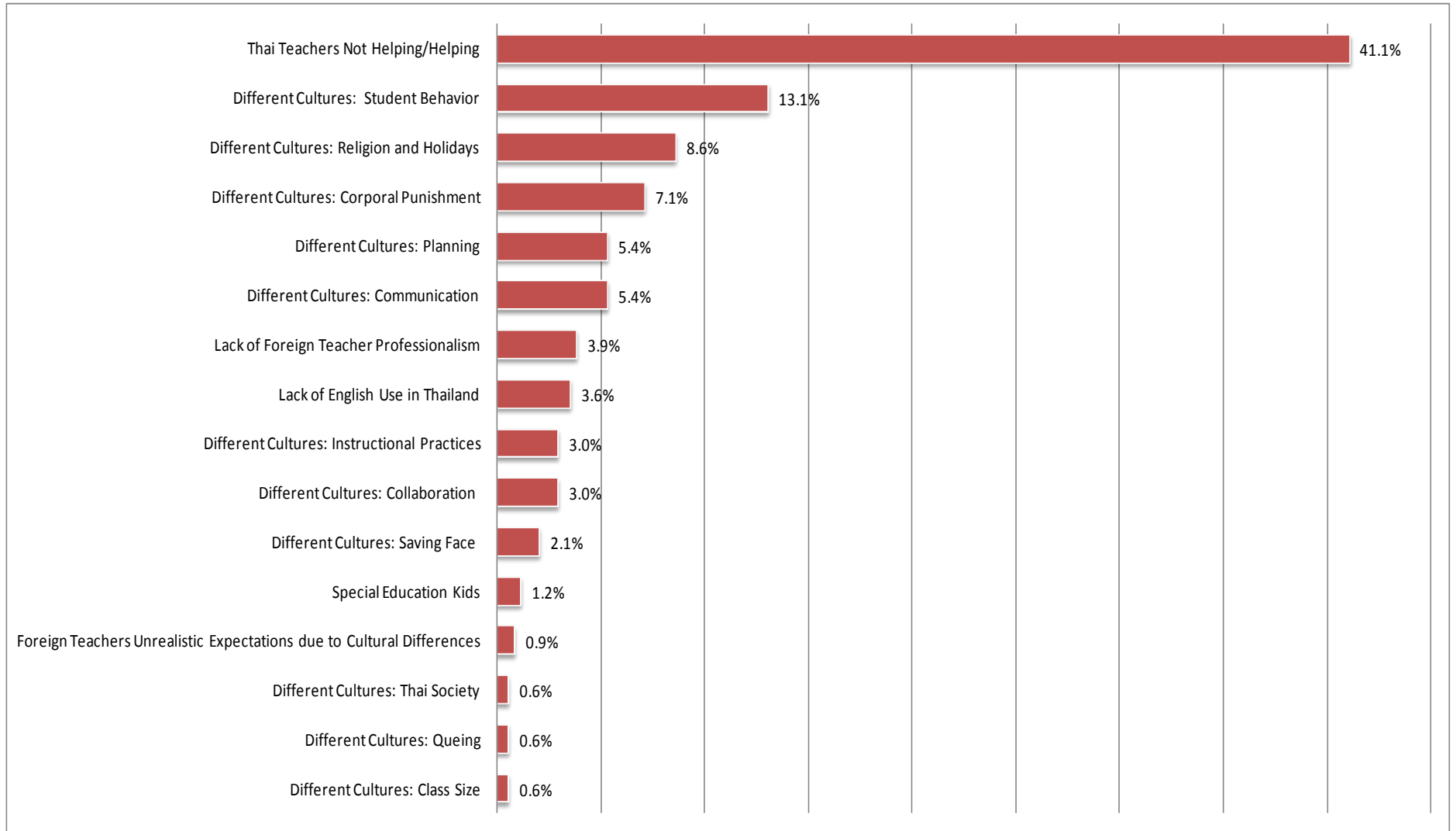
- a. The co-teaching relationship: 41%
- b. Students' behavior in the classroom: 13%
- c. Use of corporal punishment: 7%
- d. Instructional practices: 3%

These four power and control themes are discussed as follows.

a. **The Co-teaching Relationship with Thai Teachers.** Figure 1 shows that 41% percent of foreign teacher issues were related specifically to whether they felt the Thai teachers were helping them adjust to their new teaching environment or not. Below are a few examples of this type of feedback:

- The class was again incredibly difficult to manage despite having three other teachers present in the back of the room (Field Notes, Lacey, Dec. 2011).
- No sign of Thai teacher; very stressful. I spent most of the lesson hitting desks with rulers and chasing kids back to their chairs (Field Notes, Georgia, Feb. 2012).
- It is becoming increasingly apparent that when the class' Thai teacher is in the room and even mildly helping to control, the lesson goes much more smoothly. I'm not meeting objectives in several of my classes because of management issues, and their presence would greatly help (Field Notes, Lacey, Dec. 2011).

Figure 1
Foreign Teacher Feedback Regarding Issues



The tension of the foreign teachers is quite apparent in these examples. From the surface, it appears that they attribute their frustration to a lack of support from their Thai co-teachers. But one must dig deeper and consider whether it was the teachers' lack of formal educational training, teaching experience and/or life abroad (as previously explained as a potential data validity threat) – or, indeed due to Thai teachers not wanting to relinquish control.

Although it is difficult to uncover the root causes of why and when Thai teachers chose to provide support (or not) to foreign teachers, it clearly is showing a negative effect. For instance, one foreign teacher texted me and said “Hey Becky, this is Karen. Today my teacher’s aid was terrible to me. She tried to belittle me and get me in trouble when I did not have any direction. I wasn’t sure what to do so I walked out,” (Field Notes, Karen, Nov. 2011). Again, if we dig deeper, perhaps this example could indicate a personality difference more so than a cultural one. However, Hallinger’s multitude of research on educational reform and empirical studies of Thai culture in general, suggests the following:

The impact of high power distance on leadership and school improvement processes in Thailand is enormous... This dimension, perhaps more than any other, creates the most difficult and unique challenge for Thai school leaders today: fostering participation and gaining the whole-hearted commitment of their followers (Hallinger, Chantarapanya, & Kantamara, 2000, p.391).

This high power distance impacts the way Thai students behave, the effectiveness of the co-teaching relationship and ultimately whether lesson objectives are met. For example, Teacher Georgia reported the following on one of her lesson plan reviews:

More help from the Thai teachers would be really great; as the weeks go on, I’m finding that the lessons that go well are those taught in a class with a Thai teacher who helps

manage. Those that don't go so well are those in which I get little to no help (Field Notes, Georgia, Dec. 2011).

Clearly, Teacher Georgia is noting the negative impact of the lack of a collaborative co-teaching relationship. The negative impact is further supported by student assessment data. Results from the second semester midterm exams for students during Academic Year 2011 indicated that 9% of the total tests taken were failed (see Table 3) (refer back to the validity threat to test quality, however).

Table 3
Students' Semester 2 Midterm Exams, per Subject/Level for Academic Year 2011

Grade Level →	P1	P2	P3	P4	P5	P6	Combined Total	% Failed per Subject
Total No. of Students	318	314	296	294	375	338	1,935	
Each student took this many tests	4	5	2	2	2	2		
Each grade had this many tests	1,272	1,570	592	588	750	676	5,448	
English Grammar tests failed	4	19	6	16	29	106	180	9.3%
English Conversation tests failed	No Test Given	42	3	1	120	73	239	14.8%
English Phonics tests failed	74	4	No Test Given	No Test Given	No Test Given	No Test Given	78	12.3%
Math tests failed	2	10	No Test Given	No Test Given	No Test Given	No Test Given	12	1.9%
Science tests failed	2	0	No Test Given	No Test Given	No Test Given	No Test Given	2	0.3%
Totals No. of Tests Failed →→	82	75	9	17	149	179	511	
Percent of Tests Failed →→→	6.4%	4.8%	1.5%	2.9%	19.9%	26.5%	9.4%	

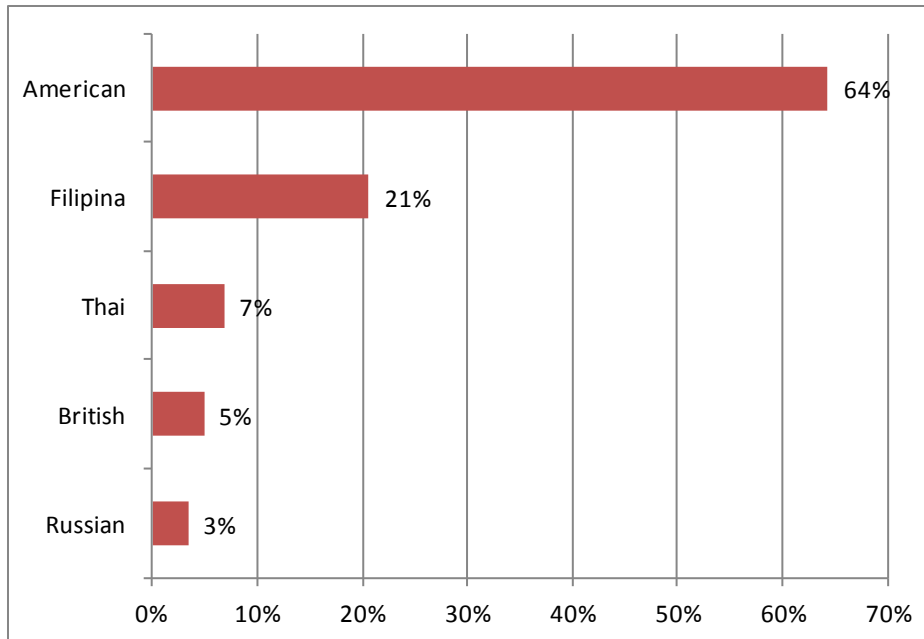
b. **Thai Students' Behavior in the Classroom.** Referring back to Figure 1, we can see that 13% percent of foreign teacher issues, as identified in their lesson feedback and my field

notes, were related specifically to classroom management issues. In essence, the foreign teachers expressed that Thai students behave and respond differently than what they expected, as compared to their past experiences in schools in their home country. Their known classroom management techniques, which tend to rely on the students' reflecting on their own behavior and carrying out self-discipline, were not effective in our Thai classrooms. Thai students are not accustomed to this sort of disciplinary action (i.e. time-outs), and perhaps considered it very lax and whimsical by Thai standards. Either way, the lack of Thai students (Thai teachers?) acknowledging foreign teachers as authority figures, was not conducive to learning, as evidenced in the following field notes:

- About half of the students' quality of work is poor due to their disruptive behavior (Field Notes, Nancy, Feb. 2012).
- This class was terrible. Students were very loud, talkative and disrespectful. Students fooled around in groups. Students could not stay focused while other groups presented (Field Notes, Cindy, Feb. 2012).
- On a serious note, not that this will change, but why can't the Thai teachers teach the students to respect foreign teachers? For the past three or four days they are teaching students how to bow properly at the morning assembly, so why can't they just teach the students to show us respect in the classroom? (Field Notes, Sam, Feb. 2012).

American Teachers' Limited Exposure to Different Cultures. Conflicts and tensions naturally arise where diverse cultures meet (Kerdchoochuen, 2011, p.9). Our American teachers particularly had difficulty in this regard. Not including myself, of all the feedback I collected from foreigners, 64% were from Americans (see Figure 2).

Figure 2
% of Foreign Teacher Feedback by Nationality



American teachers tended to be the ones who openly and frequently voiced their dissatisfaction with the classroom environment and their life in Thailand in general. According to the US National Alliance of Business in 2000, “US students still remain too isolated from people who are different from them, too insulated in their own cultures and languages,” (Lindholm-Learty, 2000, p.14). I believe that having limited multicultural exposures results in a rigid mentality. This fixed mindset renders many American teachers as inflexible; unable to find the “Middle Way” of effective classroom management techniques. This is illustrated very clearly by Alice, an American, in her feedback from one of her lessons, “classroom management was an issue while trying to explain the study guide again. I walked out of the class and gave up,” (Field Notes, Jan. 2012). Could this be due to the lack of awareness, tolerance and know-how to effectively deal with the insurmountable cultural differences, or is it yet again that the teachers are simply just inexperienced and unqualified.

The following field notes from an American teacher, however, clearly indicate it is a lack of cultural knowledge and/or tolerance of religious and festival traditions so important and integral in Thai society:

The lesson went hectically; the middle of my class was unexpectedly interrupted by some sort of meeting for the students to practice for a religious festival. There was nothing but sheer chaos in the halls. All we ended up doing was walking downstairs where they made the students line up and rearrange about 50 times (boys on one side of the “tunnel” and girls on the other). They stood in that pointless line for about ten minutes and were then drug back upstairs where, again, they tried to kill each other in the hallway. They were so engaged at the beginning, but to try to reel them back into my lesson was insane. There was a part of me that just wanted to get through the lesson – silly me. Their work was terrible, and barely anyone was able to concentrate enough to finish due to the intensity of the festival practice (Field Notes, Molly, Dec. 2011).

An issue of importance to note here is that Thai schools, parents, and students usually have a higher preference and regard for American teachers, yet Americans have been noted to have the most difficulty in adapting to Thai culture, and thus are deemed by me as less effective at providing quality instruction – especially in any of the STEM subjects.

c. **Thai Teachers’ Use of Corporal Punishment.** Although Thai students’ behavior, as observed and noted in my various data sources, showed a lack of respect towards foreign teachers’ authority in the classroom, they certainly recognized the power and control yielded by the Thai teachers. Figure 1 shows that 7% of foreign teachers’ feedback was related to their distraction by their Thai co-teachers’ use of corporal punishment. Below are a few examples: *It should be noted that corporal punishment is unlawful in schools under Thailand’s Ministry of*

Education Regulation on Student Punishment (2005) and the National Committee on Child Protection Regulation on Working Procedures of Child Protection Officers Involved in Promoting Behaviour of Students (2005), pursuant to article 65 of the Child Protection Act (2003).

- Just saw a Thai teacher hit two students very hard on their back with a closed fist for not paying attention during class (Field Notes, Becky, Jan. 2013).
- They participated in class discussion, very quiet because they were afraid to [sic] the Thai teacher. Sometimes it's not good also [sic] because they cannot express their own feelings (Field Notes, Jackie, Feb. 2012).
- A father came and shouted at Rue this morning. Kali explained that it's because she hit a student so hard that she fractured the boy's thumb. This is the same teacher that beat Fong that one time (Field Notes, Becky, Feb 2012).
- Thai teachers presence is helpful to keep students quiet, however she sometimes distracts them and me by loud reprimands/hitting during my teaching - often for things that are not an issue for me ex: students' handwriting, giving wrong answers, etc. (Field Notes, Darlene, Feb. 2012).

I consider this percentage quite low based on my first-hand experience in witnessing this on a daily basis; no exaggeration intended. I have received several posts from other foreign teachers at our school, such as the following, that were not part of my data collection efforts:

- I'm not sure if there are any "rules" about hitting, but I've seen her [Thai Teacher] hit 2 students in the face. There are times when I have to literally, physically stop myself from going over and interfering. I hate seeing them [Thai students] terrified and abused when the worst they ever do is chat until I count down from

5. They are 8 years old and trying to learn. I'm afraid of this woman [Thai Teacher] and so are they. This is not just a cultural difference; this woman needs to either be fired or secretly filmed (Jackie, personal communication, Feb. 2012).
- When my Thai teachers hit them - that's a big reminder [that I'm in Thailand] (Lori, personal communication, Aug. 2012).
 - Bluntly put, Thai teachers are very physical with their students. By Western standards, it is abuse; by Thai standards, it is fundamentally necessary, expected. Teachers will strike kids on the head, the neck, or the hand with a ruler or an open palm. They hit hard and they hit often. The list which warrants such punishment is never-ending: students are hit for talking, or sitting improperly in their desks, speaking out of turn, getting an answer wrong, or for keeping their fingernails or hair too long (Julie, personal communication, Jan. 2013).

It could be argued that the renunciation of corporal punishment as a means of classroom discipline is seen by Thai teachers as a reduction in their own authority (Mitchell, 1998, p.30), thus a possible reason there is still wide-spread usage in their government schools. What is important to note here for the purpose of this study, is not the act of corporal punishment itself, but rather how it affects foreign teachers' attitudes and students' behavior, and ultimately critical thinking and learning. Although many would label this as oppressive education, it could also be simply labeled as a cultural difference – who gets to decide? Whatever the answer, however, one thing is for certain based on detailed and careful analysis of my video recordings and field notes – students do not take risks to explore while learning when the threat of corporal punishment is real and present. Taking risks, asking questions, speaking up, being willing and accepting of failure as a learning process, etc. are all absolutely crucial ingredients in a STEM curriculum.

Effects of Corporal Punishment on Participation and Engagement. Corporal punishment is still widespread in many Asian classrooms. Needless to say, students who are fearful tend to take fewer intellectual risks. This is supported by my data from my video recorded lessons. While reviewing the video recordings, I used a cataloguing sheet to quantitatively track the questioning practices occurring in the classroom between students and teachers, as well as their physical movements. The video recordings were then categorized into two groups: teacher-centered and student-centered based on the level of student participation and engagement (see Table 2).

Table 2
Rubric and Scores of the Video Recordings

Video Findings:	Student-Centered Instruction	Teacher-Centered Instruction
Thai teacher orally handles a classroom management issue	6.9	8.0
Lead teacher orally engages an off-task student	5.1	2.0
Lead teacher asks students to repeat chorally as a group	5.8	39.9
Thai teacher translates; either on their own or as requested by lead teacher	9.4	0.0
Lead teacher asks the large group a question and various students respond	102.5	18.0
A student randomly asks the teacher a question	31.0	0.0
A student stands up without permission; off task and unattended to by teachers	10.3	33.9

In student-centered, inquiry-based lessons stemmed in democratic practices (carried out by me, an American), students on average ask 31 questions in a 50-minute teaching period – compared to 0 in a teacher-centered lesson (carried out by a Filipino). Interestingly, however, Table 2 also shows that students were off task and unattended in the teacher-centered lesson 34 times, compared to only 10 times in the student-centered one. Perhaps this is due to the amount of freedom I gave students in disciplining themselves, as well as giving them a respected voice

during our class meetings. However, the teacher orally engages off-task students 5 times on average in a 50-minute period in a student-centered lesson, while it is only 2 times in a teacher-centered one.

The number of times classroom management issues occurred in a teaching period, however, is about the same; 7 times in student-centered lessons, whereas 8 times in teacher-centered. According to triangulation efforts with my video recordings and field notes, what is important to note here is that inquiry practices were more effective for quickly *solving* classroom management issues. For example, in the video recording of the Filipino's teaching, the class gets completely out of control and lacks focus 18 minutes into the lesson. I am then observed pulling the class leader, Fern, aside and asking her various questions about what is going on and what we can do to help the lead teacher. "She tries to help control the class, and by her asking questions to the other students about why they are behaving so poorly, the class starts yelling at each other to be quiet and order is restored...by the students doing, not the teachers," (Video Notes, Oct. 2012). This sort of self-disciplining that occurred on a regular basis in my class, as well as the daily emphasis I placed on the important role each of us had in our classroom community, perhaps resulted in the increase in student participation and engagement, and thus English literacy, as evidenced in the following field notes:

- Bam finished early and came and told me she would help the other students clean up. In other words, when students finished, they didn't cause disruptions, rather they tried to find ways they could be helpful in the classroom community. Wow – love it! (Field Notes, Becky, Oct. 2012).

- This activity provides that crucial one-on-one time I desire with each of my kids...even if it's less than one minute each. I think this is how our community is developed so well (Field Notes, Becky, Oct. 2012).
- This lesson seemed more like social hour as we got off topic quite a bit just sharing conversation. I can't get over how well their English is developing (Field Notes, Becky, Nov. 2012).
- We started to play a random spelling game like "goat minus g = what?" (answer = oat). The kids loved it. We digressed as students were so engaged making up their own. Some kids started using plus instead of minus; lots of extended thinking going on here (Field Notes, Becky, Jan. 2013).

The video recordings and field notes cumulatively indicated that the students were much more engaged and happily participating in the STEM lessons compared to the teacher-centered ones typical of Asian teachers. The purposeful execution of inquiry practices brought about higher engagement and participation levels, which in turn provided more opportunities for the students to practice their ongoing, newly acquired English skills in authentic contexts.

d. **Teacher-Centered Instruction and Rote Learning.** Inquiry practices rich in critical dialogue are a strong contrast to rote learning. One of the major findings from triangulating all my data is that I frequently engage in a dialogical process with my students. A Thai national on an internet blog articulates her view on the prevalence of rote learning in Thai schools as follows:

We all know how archaic rote learning kills curiosity and creativity. Thai students are pitiable victims of this stifling learning tradition. Still, even without rote learning being forced down their throats, Thai culture has not encouraged them to be active and

inquisitive. Assertiveness is not rated highly in Thai culture, especially in younger persons (Saiyasombut, 2012).

The Thai and Filipino teachers on the other hand, frequently engage in Freire's 'banking' concept of education. The videos and field notes regarding the Asian teachers, demonstrated that:

Education thus becomes an act of depositing, in which the students are the depositories and the teacher is the depositor. Instead of communicating, the teacher issues communiqués and makes deposits which the students patiently receive, memorize and repeat. This is the "banking" concept of education, in which the scope of action allowed to the students extends only as far as receiving, filing, and storing the deposits. It is true that they do have the opportunity to become collectors or catalogues of the things they store (Dos Santos, 2009, p.365).

In contrast, due to the ongoing nature of my problem-based STEM lesson plans, my instructional methods utilized "...the dialogical process, [where] subjects meet in cooperation to transform the world. The dialogical process focuses on reality that, posed as a problem, challenges persons," (Dos Santos, 2008, p.30). This is contradictory to what my students were already accustomed to from their experiences in Thai classrooms.

Referring back to Table 2 pertaining to the video recordings, on average, I ask 103 questions in a 50-minute teaching period, compared to only 18 times in a teacher-centered lesson. This is a considerable difference and one I believe as a direct result of controlling language use in a community of learners' environment. For example, in one of my video recordings, the lesson was 37 minutes with the activity described as "working at their individual desks with freedom to socialize and move about with others," (video notes, Oct. 2012). Yet the

Thai teacher was observed as orally reprimanding the students to be quiet 10 times beginning at 18 minutes into the lesson. She continues to threaten them to be quiet at 1 to 3 minute intervals. My notes further state, “She gathered them in their chairs (didn’t like them moving about and talking with each other) at minute 27:13.” It was then noted that the students’ participation decreased, then so did their dialogue with each other. This clearly impacts language learning and perhaps even their critical thinking about the task at hand.

The STEM inquiry practices in my lessons were primarily based in real-life context and culturally relevant to Thai students as much as possible. This supported their desire to communicate meaning. So not only was critical thinking occurring more frequently, so was their desire to speak in English. Meaning-making is what we are seeking, after all, not just the un-purposeful communication of English vocabulary in grammatically correct sentences. Chorally – the act of the large group repeating facts for memorization – is a common teacher-centered practice in Thailand. Again, referring back to Table 2 of the video recordings, it is shown that in my lessons I used choralling on average 6 times in a 50-minute teaching period – compared to 40 times in a teacher-centered lesson carried out by an Asian teacher. Considering my students’ accelerated rate of English acquisition discussed herein, this difference in instructional methods – student-centered versus teacher centered - could be considered as influencing the rate of students’ English literacy.

Effects of Passivity on Students’ Moral Development. Considering maintaining “Thainess” is a driving force in government curriculums, it behooves us to look deeper into what rote learning has in culture and what it means to be “Thai”. One study stated that, “we must seriously consider the possibility that heavily academic, teacher-centered programs may hinder children’s development of interpersonal understanding and sociomoral competence,” (Devries &

Zan, 1994, p. 24). As shown in the following example, foreign teachers have been eager to express their strong opinions about this:

Stop wasting these people's time by dragging them to rallies, poisoning them with round the clock propaganda, filling them with false hope for singing tomorrows built on "democratic values" that have never existed. Instead give these people the skills they need to physically shape the world around them with science, engineering, design, and technology and let them use their time, energy, and resources to solve their own problems (Field Notes, Tom, Dec. 2011).

In my first grade Thai classroom, however, where I was able to lessen the power distance amongst the members, my students not only out-performed, but were considered better behaved than the other two EP1 classrooms, as evidenced in the following email, “Just dropped by your class to give you the lesson plans. Man, your kids are amazing! They’re so polite and respectful of foreign teachers, yet talkative – more than my P5 students! I can’t get over all they were asking me,” (personal communication, Laci, Feb. 2013). This decrease in power distance in my EP1 class was further evidenced in my detailed, close analysis of my video recordings and field notes as follows:

- Thai teacher bilingual and managerial support was present and strong the majority of my instructional time this study took place; the co-teaching relationship was one of mutual respect and trust;
- Classroom management was not a negative issue in our classroom due to my seven years of learned experience with Thai-speaking ELLs, my formal educational training in culturally relevant pedagogy, as well as the strong presence of my Thai co-teacher;

- Corporal punishment was carried out less frequently and with less severity. This could possibly be due to the democratic environment that was established via classroom meetings; which in turn empowered the students to achieve autonomous self-control. Or, it is possibly due to the open-minded attitude of my Thai co-teacher in respecting Thai laws pertaining to corporal punishment; and
- My STEM pilot program was based on problem-based and critical literacy instruction. Group work, engagement, and active student participation were the norm. This provided a safe environment for the students to practice having a voice and the courage to be heard. The following video notes support this:

Students' actions: About half the class time they were sitting in their chairs, and half the time they were standing up and interacting with the class. This was free choice, so only about 5 students did not get out of their chairs. The students were talking amongst themselves pretty much non-stop during the entire lesson, but low-to-moderate noise level as a whole in the classroom (non-disruptive to the tasks at hand) (Video Review Notes, Oct. 2012).

Power and culture has multiple perspectives and underlying agendas, none of which I purport to understand fully about in Thai culture. But it is indeed a conversation that we must continue to engage upon in order to ensure Thai students are prepared for their future roles in a competitive ASEAN community.

2. Culture and Language in the Classroom

According to my spreadsheet of the thematic issues of foreign teacher feedback (see Figure 1), 20% were catalogued under the umbrella of culture and language; broken down as follows:

- a. Differences in communication styles: 5%

- b. Differences in planning: 5%
- c. Lack of English use in Thailand: 4%
- d. Different approaches to collaboration: 3%
- e. The concept of ‘saving face’: 2%

These five aspects are discussed under one thematic umbrella; language as a tool for communicating knowledge. “It is critical that educators recognize the role language plays as one of the most powerful transmitters of culture,” (Darder, 2012, p.36). As our multicultural school has, on average, a mix of seven teacher nationalities, it behooves us to look closely across the nationalities to examine how language is perceived and used in communication between students and teachers. This section begins to explore the differences in communication due to culture, and whether language is used to exercise power.

Cultural Differences Regarding Communication. Foreign teachers’ communication with their Thai co-teachers and students takes on a unique Thai-flavor due not only to language differences, but cultural ones. For simplicity of discussion, let us assume that the following stereotype between East and West is generally true; that Westerners talk direct and to-the-point, whereas Easterners will zigzag, avoiding conflict at all costs in an attempt to ‘save face’. This is suggested in the following example:

The lack of communication is still rocky. Some people get told one thing and others another or not at all. The events going on this Friday were discussed last minute and I was given no time frame to arrive while others were. It is inconvenient and will cause problems if you are unknowing (Field Notes, Emily, Dec. 2011).

This supports what is written in a popular ‘Survival Guide for Teaching in Thailand’ reference book, “All the Thai teachers and students know what is happening, but for some strange reason,

no one thinks to inform the foreign teachers,” (Thompson, 2009 p. 36).

Collaboration and Planning. Another area where communication seemed to break down frequently had to do with collaboration and planning. Foreign teachers tend to want information given to them individually in advance, with their expectations of them clearly spelled out, as shown in this example:

The curriculum that I received from the Department Head is not the same as what my Thai co-teacher is teaching. I prepare every week but it’s useless. I try to adapt by asking my Thai co-teacher about what lesson to teach but he can’t speak English, so he writes the topic in Thai and then I have to run around and ask someone to translate it in English, (Field Notes, Anna, Feb. 2012).

Thai teachers, on the other hand, do not expect information to be openly shared from the top-down. As such, they rarely show any outwardly frustration regarding not knowing until the last minute. Perhaps it is due to their culture; it is simply their tradition not to plan in advance; so, no one questions whether communication was effective. Working an entire teaching career in an authoritarian system renders it risky to ask the boss for information before he hands it to you. This has to do with the ‘saving face’ phenomenon so prevalent in Asian cultures. “The biggest booby-trap is ‘face’. It relates more to self-image than to what others actually perceive; and losing face – either yours or someone else’s – means game over,” (Cornwell-Smith, 2008, p.10).

Saving Face. Thai school management and Thai teachers not only seemed to guard information from each other and the foreign teachers, but from the students as well. Thai teachers were regularly observed via detailed analysis of video recordings and field notes as giving commands of what students should do, without any discussion as to why; whereas the foreign teachers engaged in dialogue to provide rationale behind their requests. It is difficult to

understand why asking questions of your teacher are not encouraged, unless you consider again the phenomenon of ‘saving face’. Put more simply, Thai students would not dare ask their teacher to clarify their confusion (because it would make the teacher ‘look bad’ for not explaining well the first time around), or make a statement that contradicts their teacher (because the teacher needs to appear as ‘all-knowing’). If language is being controlled indirectly via their culture, we must investigate how this affects English acquisition in an inquiry-based STEM curriculum *while* still maintaining Thai-ness.

Thais Limited English Skills. So, do we chalk these examples up as simply cultural differences regarding time management and preferred channels of communication? Or, is it perhaps that information is guarded by management and Thai teachers alike as a method of exerting control? Or, is it that they simply cannot communicate with their foreign co-teacher, as expressed in this online news editorial:

Paron Israsena, who sits on the boards of Chulalongkorn and Chiang Mai universities, was unfortunately correct in his interview with this newspaper on Sunday. "Most Thai students coming out of universities cannot communicate in English," he said. The reasons are clear. From Prathom 1 (first year) through university, government-run language teaching is almost universally rote, unimaginative and presented with no motivation. In most schools, the distinct lack of qualified language teachers is another ingredient in the mix for failure (Bangkok Post, 2012).

I do not have the answers to these difficult questions that potentially disrupt students’ and teachers’ whole ways of being and interacting. But I do know that our STEM program requires that Thai youth question authority, media messages and the various cultures surrounding them in order to develop critical thinking skills.

3. Extended Community of Learners

The video tapes of my lessons triangulated with the field notes indicate that I valued and encouraged small and large group social interactions in order for the students to be able to construct their own meanings. It seemed like a good cultural fit to increase the amount of group work considering Thai people's collectivist nature. The pedagogical approach I mainly used, which fostered communities of learners, was "a humane way to teach literacy" (Larson & Marsh, 2005). My instructional approaches were also culturally relevant as they supported my Thai students' active participation in their cultures. "In many other communities, children participate broadly in the full range of community activities" (Larson & March, 2005). Asian children are expected to be contributing members of their households at such a young age; be it washing dishes and clothes, helping prepare and sell items at the local market, taking care of the young and elderly and tutoring siblings in school, etc. During my lessons it was evident that I built upon and nurtured this natural sense of community because of the freedom I allowed for my students to interact with one another.

Interestingly, even allowing freedom of choice on activities, Thai students will fall into the roles they are accustomed to, due to their culture – which vary significantly from the ways I conduct myself and the class on a daily basis. For example, in one video I had to leave the room for about 10 minutes. The students were left alone with no teacher. Figure 3 contains the detailed write-up of what I witnessed when I later reviewed the video; the class leader took over in Thai fashion as the only one with power and control, while the students engaged in alphabet choralling exercises.

Figure 3
Video Recording #6 Notes; Sample

I had to leave the room for about 10 minutes so Leader Ploy was appointed to take over the class. In the teachers' absence, Ploy automatically assumed position as the one "in charge" – complete with picking up the rubber ruler as an indicator the students would get hit if they didn't behave according to his will. In other words, they were mimicking Thai teachers' behavior, despite being exposed to my classroom management techniques – interesting!

But what was more interesting to see was how attentive the students are when a student leader is acting in a teacher's role: all heads, eyes and ears are on the leader. When Ploy finished this choralling activity, I'm still not back yet, so he decided to go around and look at students' notebooks, and provide stern commands to those whose writing was messy. I had to laugh at the dead-on impersonation! There was not one peep from the students, and the weird thing is, they seemed to be enjoying themselves???

Power, Culture, Language, Community: Effects on English Language Acquisition

How power, culture, language, and community are used/valued in the classroom has an effect on students' literacy development; in the case of this research – English acquisition. A large part of this study's quantitative data looked at the students' performance on their Academic Year 2012 final writing exam to measure critical thinking via their English literacy skills. Writing tests from two of the three first grade classrooms were compared in such categories as: the total number of (i) words in a sentence; (ii) unique words; (iii) descriptive words; and (iv) grammatical errors (see Figure 4). If the students perceive the teachers as the only authority capable of constructing meaning using language, then the students take a passive role in their English acquisition. However, if students' voices are respected and encouraged, we can clearly see the increase in literacy development, as shown in Figure 4.

Figure 4
EP 1/10 Final Writing Score (My Class) Compared to EP 1/9: Second Semester Academic Year 2012

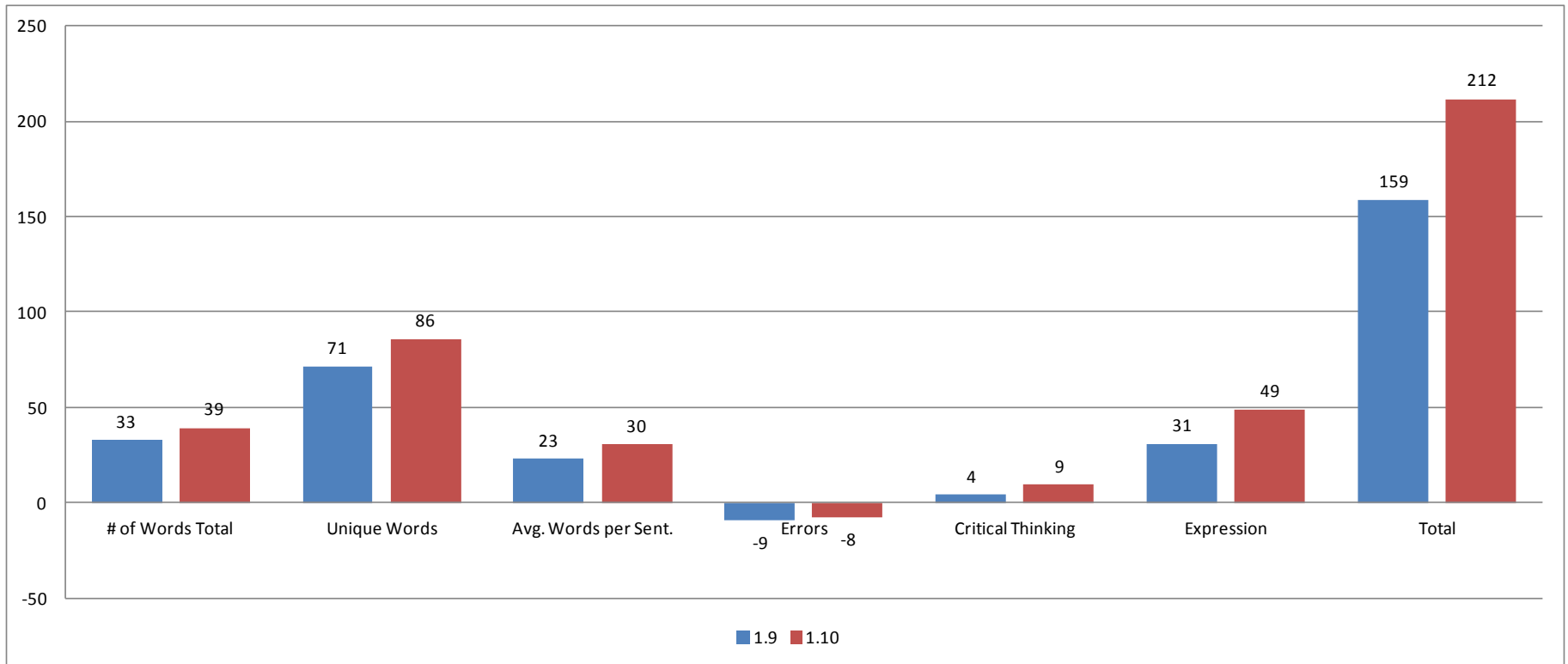


Table 4 below shows us another way of looking at the same data above. Table 4 shows us that students in my class (1/10) scored 33% higher in their total score when compared to another first grade class (1/9) in the same STEM pilot program. Matter of fact, my students outperformed in all categories. Table 4 shows, for example, that my students averaged 32% more words in a sentence than the other classroom.

Table 4
Student Achievement in My Class as Compared to Other First Grade Class by Category
Second Semester Writing Exam Academic Year 2012

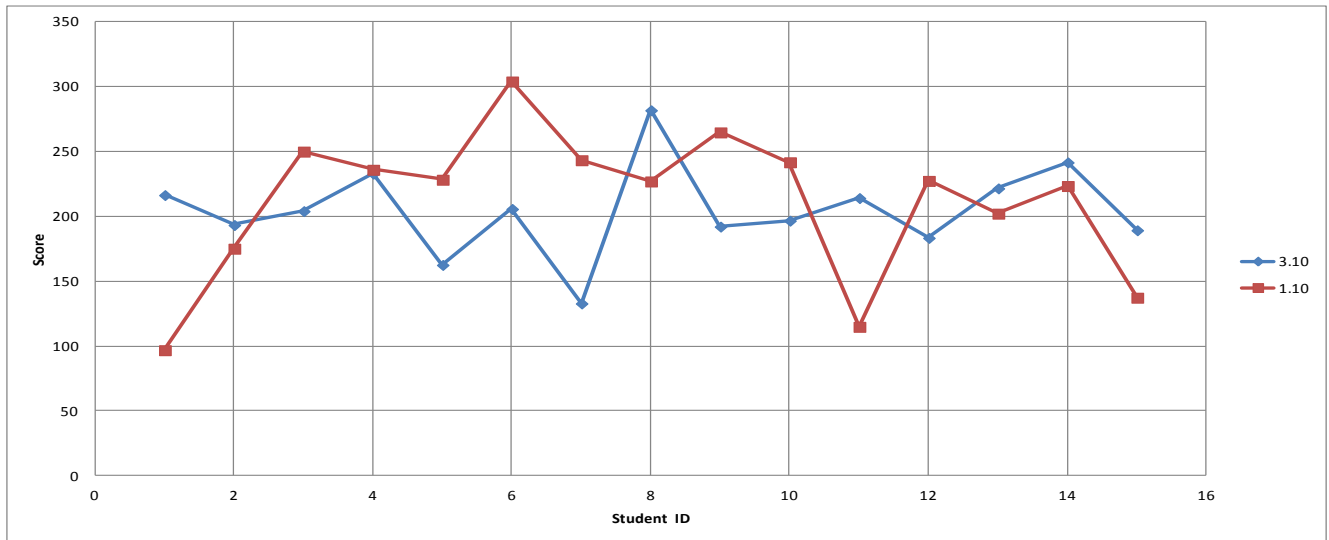
Length	Number of words (max 100)	19,7%
Vocabulary	Number of unique words used	20,2%
Eloquence	Average number of words per sentence (max 100)	32,3%
Errors	Spelling/grammar/punctuation/capitalization	18,6%
Thinking	Number of times critical thinking / reason used (answers because, how, why or answers a direct question, uses quotes for dialogue)	133,3%
Expression	Number of adjectives/adverbs/proper nouns/-ing/unique vocab/contractions (considers each time, unless said twice in same sentence)	58,1%
Total	Total	33,2%

Table 4 also shows that my students demonstrated critical thinking 133% better than the other class – which is a primary objective of our STEM program. I would like to posit that my students’ ability to express themselves – 58% better – is, among other things, a primary result of maintaining a democratic and safe environment (corporal punishment was minimized) where students were encouraged to take intellectual risks by engaging in critical dialog within their communities, as explained throughout.

Figure 5 below goes on to show that my first grade students even scored higher compared to a *third grade* class who took a similar writing exam (caution is needed in making

comparisons, however, due to the quality of tests as previously discussed in the Methods section).

Figure 5
EP1's Final Writing Score Compared to EP3's: Second Semester Academic Year 2012



This data suggests that the rate of English acquisition is possibly accelerated by implementing a STEM program; perhaps because inquiry – the heart of STEM – provides continuous opportunities for the students to engage in dialogue as a community of learners. This idea is further supported with detailed notes from one of my video recordings (see Figure 6).

Figure 6
Video Recording #3 Notes; Sample

I was modeling to the students that when they don't understand something, they should raise their hand and ask the teacher to explain it differently or more slowly. That sitting back and accepting things was not a solution. Because Teacher Jack was explaining everything on the Final test, and I knew the students had no clue. That the information he had was something beneficial to them. That it was their responsibility to get it from him in a way that was more acceptable to them.

I explained that teacher Jack was a new teacher and that maybe he needed help with some ideas on teaching our class. The students were eager to offer suggestions, like play a game, sing a song, do activities etc. – that were related to what he was trying to teach them. They had lots of ideas on how Teacher Jack could engage them!

I was also sure to point out that we didn't want Teacher Jack to feel bad. So we needed to be polite when we gave him our ideas. I feel confident the students were following along with most of what I was saying, but as is customary for my practices, I asked my Thai co-teacher to translate...just in case. She took a very strict and loud tone, her head was bent down and she was "talking down" to them. What I picked up from what I know of Thai language, she was basically yelling at them for misbehaving. She said they needed to be quiet and respectful to the teacher and to not play. That it was their duty to sit quietly and pay attention.

Figure 6 clearly shows an incident where although I was promoting democratic practices and critical thinking, that it was easily disrupted, however, by the Thai teacher's influence. This situation demonstrates that cultural norms can quite quickly and easily overpower foreign teachers' instructional practices. Here is another way of analyzing that situation: both I and my Thai co-teacher saw an opportunity in a teachable moment; it was my desire to use it as a launching pad into an open discussion for empowering students to take control of their learning; and it was my Thai co-teacher's desire to use it for a one-way lecture about their duties and obligations as Thai students to be respectful, quiet and yet attentive. As my Thai co-teacher and I *both do agree* that critical thinking needs to improve, we need to find the "Middle Way" in these types of situations in order to implement an effective STEM program

Conclusion

This research set out to identify what variables positively affect the development of higher order thinking skills in Thai-speaking ELLs in our STEM pilot program, as they began their first grade journey of becoming literate in English language. In essence, when East and West met in our EP1 STEM pilot program, a “Middle Way”...a transcendence and reconciliation of the extremes of opposing views... was discovered, embraced and respected. The following overarching themes were evidenced as trigger points:

- Culturally relevant pedagogy: foreign teachers need to be quite knowledgeable in the local culture in order to mix the East and the West instructional methods and teaching materials. They also need to understand and adhere to the powerful underlying influences of power and culture that permeates Thai society.
- Multicultural co-teacher relationships; teachers’ attitudes: if the foreign teachers become more aware of the cultural forces at play, they will then learn techniques for how to adapt within those power structures. Learning to adapt will help them gain respect from their Thai teachers, which in turn will lessen the power distance between them. This, then, will help create a happier work environment which will allow for student-centered instruction to be possible via a mutually respected bilingual and bicultural teacher partnership.
- Teachers’ knowledge and experience with inquiry practices: student-centered instruction based on inquiry yields higher student engagement and participation; as this increases, so does students’ performance.
- Democratic practices: the students being exposed to more democratic educational practices - and less corporal punishment - was conducive to establishing a

learning environment where inquiry practices flourished. When inquiry practices increased, so did students' critical thinking.

- Community of learners; using an intra disciplinary approach in STEM curriculum requires real-life context. This is made possible via collaborative efforts between home and school. An example of this collaborative effort could be found in our Class Facebook Page. Exploring the impact of this digital aspect of collaboration will be one of our areas of future research during the STEM program roll-out in Academic Year 2013. Our school's Director has approved the purchase of iPads for all STEM homeroom teachers in order to build upon the benefits already shown.

The primary underlying issue is the power and control structure of Thai society. Thai government teachers have a rank, not a title, and they run their classes similar to an army camp. This is good for making an obedient and dutiful army, but in the future we will most likely have robots to do that. Our future demands thinking and empathetic people instead. Providing dual language and culturally relevant instruction supported my students in becoming critically literate and self-disciplined members in their democratic classroom; a good start for their future contributing roles in the ASEAN and world communities.

CONCLUDING REMARKS

It is no wonder that Science, Technology, Engineering and Math (STEM) programs are taking center stage in many countries considering that “the exponential development of technological power has reached the point where the magnitude and speed of change is altering modern life so radically it makes it difficult to keep up,” (Jukes, McCain & Crockett, 2012, p. 9). Implementing effective STEM programs however, requires a radical shift in our view of the teacher’s role. Teachers will need to relinquish control and accept that their students are already bringing a wealth of information, academic knowledge, and expanded world views to the classroom. Students’ technological savvy most likely surpasses that of the teachers. Educators will still have an important but different role as “guide on the side” for creating new learning environments atypical of today’s classrooms. STEM programs focus on *skills* such as the 4 C’s: creativity, critical thinking, collaboration and communication (Partnership for 21st Century Skills), more so than knowledge dispensing. This is because the world’s future challenges will require groups of multicultural and multilingual individuals who can peacefully work together to discover *new* knowledge and apply it to solving unforeseen global issues.

The social reality of today, however, is that there is huge inequality, oppression and alienation in societies around the world. Let’s consider Dos Santos (2008) belief that “risk is an inherent characteristic of the technological society. Therefore, presenting technology as exclusively beneficial for human beings is not only a naïve view of technology but also manipulative and misleading,” (p. 371). Paulo Freire referred to this sort of situation as oppressive education; defined as “non-humanistic because it is based on elitist values, especially market values [as opposed to humanistic values], which objectify people, taking away their freedom of expression, and their creativity to act upon the world,” (Dos Santos, 2008, p. 364).

Furthermore, Aikenhead (1996, 2000) warned that:

Educational approaches that present science as a monoculture – the Western science of privileged elite – could inadvertently and tacitly privilege the dominant social, economic, and political class in society, creating, implicitly, an agenda of the status quo (Dos Santos, 2008, p. 369).

So what implications does this have specifically for STEM programs in Thailand?

Implications for STEM Programs in Thailand. Implementing STEM programs in Thailand bring with it its own unique set of challenges and opportunities. If we consider that Thailand ranked 116th out of 163 countries on the 2010 Test of English as a Foreign Language (TOEFL) (Saiyasombut, 2012), we can easily realize that Thai students will have a more difficult challenge partaking in the global marketplace when the ASEAN Economic Community opens its door and is using English as the means to transact. As such, many Thai government schools rely on foreign teachers to teach the STEM subjects using student-centered methodologies – in English – to Thai students with less than par English literacy in overcrowded classrooms. This current teaching environment is demurring due to the following considerations:

- Many foreign teachers in Thai government schools are not qualified, trained or experienced in education. Foreign teachers are hired based solely on their ability to speak English. Due to the high-demand of native English speaking teachers, many Thai government schools now need to rely on non-native English speaking individuals, mainly from the Philippines.
- STEM programs require deeper thinking and application of skills to real-life contexts; simply knowing content-specific English vocabulary is no longer enough to be competitive in the ASEAN marketplace.

- Critical thinking in the STEM fields for English Language Learners requires effective dual language instruction. The co-teaching relationship between Thai and foreign teachers on average is broken. This is due to several factors including, but not limited to, foreign teachers' limited to non-existent knowledge of culturally-relevant pedagogy, Thai teachers' low-levels of English proficiency, Thai and foreign teachers' mutual lack of cultural awareness and tolerance between them arising from conflicts between power-distance and individualism versus collectivism.
- Nurturing critical thinking skills in STEM programs requires social action. The objectives of a quality STEM program focuses on the skills for the sole purpose of improving the quality of life via sustainability education – for *all* citizens – not just the privileged elite. Many Thai classrooms are void of community service, outside learning environments and access to technology for the purposes of researching beyond their classroom walls.
- STEM programs rich in critical thinking and social action projects arise from student-centered, problem-based learning environments carried out in democratic settings where the students have a voice in the curriculum. This contradicts the current learning environment in Thai government schools, which are stemmed in passive obedience. Thai teachers rely heavily on teacher-centered, authoritarian-type delivery of knowledge rather than skills.

Recommendations for Supporting STEM Initiatives in Thailand. Thailand is one of the top education spenders in the world. Thai students are energetic, creative, community-minded, and work well in collaborative settings. Thailand's economy is growing and as such

provides many wonderful opportunities for learning about sustainable education and applying STEM skills in purposeful and meaningful ways. Money, willingness and societal problems are the building blocks of my following recommendations:

- Government schools should employ at least teacher who is a native English speaker, who possesses a higher degree in curriculum and instruction appropriate for the grade range teaching context. This teacher's responsibilities would include setting up the standards and quality control systems, as well as overseeing and managing its STEM program in collaboration with a team of qualified Thai teachers. This individual would have the crucial role of serving as the liaison with the Thai STEM leader (who needs to be fluent in English), and together they would lead a team in providing ongoing, weekly training and support to the large amount of highly unqualified and/or inexperienced teachers. Support would be not only in content knowledge and pedagogy, but in cultural awareness training and team building as well.
- Professional development for both foreign and Thai teachers specifically in STEM pedagogy is needed. This sort of development needs to be carried out as "mentoring workshops" in real classrooms with real students. I envision a group of schools who are dedicated by the Ministry of Education as 'research centers' where groups of teachers can go and carry out a day(s) of apprenticeship by jumping into a STEM classroom and learning by doing. Real-time feedback will be more beneficial than theory-based lectures that have already proven ineffective at promoting actionable change and reformation.

- Increase the English proficiency of the Thai teachers. Only place those Thai teachers who pass a TOEIC test score of 600 or above in the STEM programs. This will help tremendously with ensuring that Thai students move past rote memorization of content-specific English vocabulary only.
- Change the name from ‘English Program’ to ‘Bilingual Program’. These are Thai students in Thai society – we want to embrace their cultural identity, not lessen it.
- Strengthen the Thai and foreign teacher co-teaching relationship. The need for STEM programs is now, and yet cultural paradigm shifts can take decades. Therefore, giving mandated directives from the top-down is an effective strategy in Thai society to jumpstart a STEM co-teaching initiative. Gradual buy-in and extended communication can be nurtured along the way.
- Encourage learning outside of the classroom by strengthening the home-school connection. This can be accomplished quickly and efficiently by creating a free Class Facebook Page (or any other social media applications that may be on the market) for each classroom. Invite parent volunteers into the classroom, carry out mini field trips to nature settings and businesses rather than tourist attractions, and invite community speakers into the school

Summary. We need to embrace the belief that each and every child’s voice matters...in *any* language or manner they chose to communicate about themselves and their world. Freire (1970) stated that critical consciousness is possible with a dialogical process stemmed in cooperation and tolerant of respective views. Dos Santos (2009) expands on this by proposing that a “humanistic science education perspective should be oriented by student-centered dialogue

about societal issues related to scientific and technological modern society,” (p. 375). The learning will be in the *search* for understanding.

This is precisely the environment that I, an American teacher, and my Thai co-teacher began to explore as we carried out our EP1 STEM pilot program. I tend to agree with the generalizations that Thai culture is rich in collectivist beliefs, attitudes, and actions, whereas American culture is rich in rhetoric. This unique bicultural and bilingual intermixing, however, can serve as an opportune starting block for educational reform to begin to take shape; it did in our first grade Thai classroom. As this study indicates, rich opportunities exist for expanding perspectives and deeper thinking for all involved - teachers, students, and parents.

Multicultural teaching should not be viewed as “this or that” or “better or worse” or “right or wrong”, as is prevalent with the English-only movement taking place in the US and now many Asian schools. Here in Thailand, we should begin by embracing bilingual and multicultural learning environments with a sense of equality and strength, rather than from one of dependency and subordination (Ward, 1993, p. 5). It is important to realize that “educators face the challenge of not having a neutral political position, and yet not imposing their own values,” (Dos Santos, 2008, p. 375). Is this even possible? This is particularly relevant for multicultural teachers to reflect upon.

So the next time one of my students mimics me, with their hand on their hip while asking me “Really, teacher?! Really?”, I’ll proudly smile knowing that there is a critical consumer of information in the budding, as my Thai co-teacher and I grab her hand and say, “Let’s go find out together; where do you think we should start and who should we bring with us?”

REFERENCES

- Allwright, D. (2005). Developing principles for practitioner research: The case of exploratory practice. *The Modern Language Journal*, 89, (353-366).
- Angell, A. (2004). Making peace in elementary classrooms: A case for class meetings. *Theory and Research in Social Education*, 32(1), 98-104.
- Bangkok Post. (2012). Losing out for lack of English. Retrieved from <http://m.bangkokpost.com/opinion/274431>
- Barton, D. and Hamilton, M. (2005). Beyond communities of practice: Language, power and social context. Cambridge University Press.
- Black, N. (2009). *Blood money. A grounded theory of corporate citizenship. Myanmar (Burma) as a case in Point*. Chapter Three. Methodology – Introducing a Constructivist Grounded Theory Method. University of Waikato. Retrieved from <http://researchcommons.waikato.ac.nz/handle/10289/3577>
- Bomer, R., Zoch, M., David, A., & Ok, H. (2010). New literacies in the material world. *Language Arts*, 88(1), 9-20.
- Bondy, J. (2011). Normalizing English language learner students: A Foucauldian analysis of opposition to bilingual education, *Race, Ethnicity and Education*, 14(3) 387-398.
- Buffett, J. (1998). Callaloo. On *Don't stop the carnival!* [CD]. New York: NY, Margaritaville Records.
- Buffett, J. (1998). Kinja rules. On *Don't stop the carnival!* [CD]. New York: NY, Margaritaville Records.
- Burstein, J. & Hutton, L. (2005). Planning and teaching with multiple perspectives. *Social Studies and the Young Learner*, 18 (1), 15-17.

- Casteel, C.J. & Ballantyne, K.G. (Eds.). (2010). *Professional development in action: Improving teaching for English language learners*. Washington, DC: National Clearinghouse for English Language Acquisition.
- Clark, D., Touchman, S., Martinez-Garza, M., Ramirez-Marin, F. & Drews, T. (2012). Bilingual language supports in online science inquiry environments. *Computers & Education* 58, (1207-1224).
- Collier, V. & Thomas, W. (2004). The astounding effectiveness of dual language education for all. *National Association for Bilingual Education Journal of Research and Practice*, 2(1), (1-20).
- Cornwel-Smith, P. (2008). *Very Thai: Everyday popular culture*. Bangkok: River Books Co., Ltd.
- Cowhey, M. (2006). *Black ants and Buddhists: Thinking critically and teaching differently in the primary grades*. Chapter 6 Learning Through Activism. Portland, ME: Stenhouse.
- Darder, A. (2012). *Culture and power in the classroom: Educational foundations for the schooling of bicultural students*. Boulder, CO: Paradigm Publishers.
- Devries, R. & Zan, B. (1994). *Moral classrooms, moral children: Creating a constructivist atmosphere in early education*. New York: Teachers College, Columbia University.
- Dewey, J. (2011). *Democracy and education*. USA: Simon & Brown.
- Dos Santos, W. (2009). Scientific literacy: A Freirean perspective as a radical view of humanistic science education. *Science Education*, 93 (2), 361-382.
- Drake, S. & Burns, R. (2004). *Meeting standards through integrated curriculum*. Alexandria, VA: ASCD.

- Ferguson, M. (2011). Finding a home abroad with "Eveline": Using narrative inquiry to establish a sense of place for a western teacher in a foreign and multicultural context. *Journal of Studies in International Education*, 15(1). 25-40.
- Freire, P. (2012). *Pedagogy of the oppressed*. London: Continuum International Publishing Group.
- Fry, G. (2002). Synthesis report: From crisis to opportunity, the challenges of educational reform in Thailand. Prepared for the Office of the National Education Commission and the Asian Development Bank (TA 3585-THA). Retrieved from <http://elearning.kosumwittayasan.ac.th/ebook/pdf/4505905/pdf.pdf>
- Giroux, H. (1983). *Theory and resistance in education: A pedagogy for the opposition*. South Hadley, MA: Bergin & Garvey.
- Glesne, C. (2011). *Becoming qualitative researchers: An introduction, 4th edition*. Boston: Pearson.
- Goodman, J. (1992). *Elementary schooling for critical democracy*. New York: New York Press.
- Goswami, D. & Stillman, P. (1987). *Reclaiming the classroom: teacher research as an agency for change*. New Jersey: Boynton/Cook.
- Graham, S. (2007). Saving face with liquid paper. *The Bangkok Post Online*. Retrieved from <http://www.bangkokpost.com/education/site2007/iojn2607.htm>
- Green, J. (2011). The advantage of Facebook groups in education. edSocial Media website. Retrieved from <http://www.edsocialmedia.com/2011/02/the-advantage-of-facebook-groups-in-education/>.
- Hallinger, P., Chantarapanya, P. & Kantamara, P. (2000). The challenge of educational reform in Thailand: Jing jai, jing jung, nae norn. *Educational Change and Development in the*

Asia-Pacific Region: Challenges for the Future. Rotterdam, The Netherlands: Swets & Zeitsinger.

Hallinger, P. & Kantamara, P. (2001). Exploring the cultural context of school improvement in Thailand. *School Effectiveness and School Improvement*, 12(4). 385-408.

Heaney, T. (2005). *Issues in Freirean pedagogy*. National Louis University website. Retrieved from <http://www3.nl.edu/academics/cas/ace/resources/Documents/FreireIssues.cfm>

Hirsch, E.D., Jr. (1987). *Cultural literacy: What every American needs to know*. New York: Houghton Mifflin Company.

Hubbard, R. & Power, B. (2003). *The art of classroom inquiry: A handbook for teacher-researchers*. Portsmouth, NH: Heinemann.

Institute for the Promotion of Science and Technology (IPST). (2013). ASEAN++ STEM Education Roundtable Meeting 2013. Retrieved from <http://www.youtube.com/watch?v=bhUFNxPC5CQ>

Johnson, D. (2010). Paying attention: Talking about social justice in a reading intervention program. *Voices from the Middle*, 18 (2). 26-35.

Jukes, I., McCain, T., Crockett, L. (2010). *Understanding the digital generation: Teaching and learning in the new digital landscape*. Vancouver: The 21st Century Fluency Project.

Kerchoochuen, J. (2011) Speaking with a stranger: Intercultural classroom's tensions and managing strategies. *Journal of College Teaching & Learning*, 8(9), 9-17.

Khaopa, W. (2012). Thailand seeks overhaul of science, math, education. *Asia News Network*. Retrieved from <http://www.asianewsnet.net/news-35614.html>

Klein, J. (1990). *Interdisciplinarity: history, theory, and practice*. Detroit, MI: Wayne State University Press.

Larson, J. & Marsh, J. (2010). *Making literacy real: Theories and practices for learning and teaching*. London: Sage.

Lindholm-Learty, K. (2000). *Biliteracy for a global society: An idea book on dual language education*. U.S. Department of Education's Office of Bilingual Education and Minority Affairs. Washington DC: The George Washington University. Retrieved from <http://www.ncele.gwu.edu/files/uploads/9/BiliteracyForAGlobalSociety.pdf>

Macedo, D. (2010). Literacy for stupidification: The pedagogy of big lies. *Harvard Education Review*, 63(2), 183-207.

Macedo, D., Dendrinos, B. & Gounari, P. (2003). *The hegemony of English*.

McMillan, J. (2012). *Educational research: Fundamentals for the consumer*. Boston: Pearson.

McNulty, C., Davies, M., & Maddoux, M. (2010). Living in the global village: Strategies for teaching mental flexibility. *Social Studies and the Young Learner*, 23 (2), 21-24.

Ministry of Education, Singapore (2005). *Teacher less learn more*. Retrieved from

Mitchell, G. (1999). *Change management: Best practice in whole school development*. Report commissioned by South Africa's President's Education Initiative Department. Retrieved from <http://www.jet.org.za/publications/pei-research/001756%20Mitchell%20CIE%20Change%20management.pdf>

National Council for the Social Studies. (2012, May 10). *National curriculum standards for the Social Studies: Executive summary*. Retrieved from <http://www.socialstudies.org/standards/execsummary>

National Council of Teachers of English. (2012). *NCTE/IRA standards for the language arts*. Retrieved from: <http://www.ncte.org/standards/ncte-ira>

Organization for Economic Co-operation and Development; Programme for International

Student Assessment website. Retrieved from

<http://www.oecd.org/pisa/pisaproducts/#d.en.192289>

Pe Symaco, L. (2013). *Education in south-east Asia: Education around the world*. London:

Bloomsbury. Kindle Version.

Pratt-Johnson, Y. (2006). Communicating cross-culturally: What teachers should know. *The*

Internet TESL Journal, XII(2). Retrieved from [http://iteslj.org/Articles/Pratt-Johnson-](http://iteslj.org/Articles/Pratt-Johnson-CrossCultural)

[CrossCultural](http://iteslj.org/Articles/Pratt-Johnson-CrossCultural).

Ringbom, H. (2007). *Cross-linguistic similarity in foreign language learning*. New York:

Multilingual Matters, Ltd. Retrieved from

http://www.google.co.th/books?hl=en&lr=&id=oeEM1tK1fy8C&oi=fnd&pg=PT8&dq=language+learning+in+Thailand&ots=Wt49_Pp0px&sig=fih35nbRp0E7Rczrr5ZpvAA3K-8&redir_esc=y

Rogoff, B. (2010). Developing understanding of the idea of communities of learners. *Mind*,

Culture, and Activity, 1(4), 209-229.

Sandelowski, M. (1991). Telling stories: Narrative approaches in qualitative research. *Journal*

of Nursing Scholarship, 23(3), 161-166. Retrieved from

http://academic.son.wisc.edu/courses/n701/week/sandelowski_tellingstories.pdf

Saiyasombut, S. (2012). Thai education failures – Part 3: PISA scores & a challenge for the 21st

century. *Asian Correspondent.com*. Retrieved from

<http://asiancorrespondent.com/77060/thai-education-failures-part-3-pisa-scores-and-a-challenge-for-the-21st-century/>

Saiyasombut, S. (2012). Thai education failures – Part 4:Dismal English-language training.

Asian Correspondent.com. Retrieved from <http://asiancorrespondent.com/78647/thai-education-failures-part-4-dismal-english-language-education/>

Soka Gakkai International (n.d.). *The middle way*. Retrieved from

<http://www.sgi.org/buddhism/buddhist-concepts/the-middle-way.html>

Stake, R. (2010). *Qualitative research: Studying how things work*. New York: The Guilford Press.

Strauss, A. (2003). *Qualitative analysis for social scientists*. San Francisco: Cambridge University Press.

The Ministry of Education Thailand (1999). The basic education core curriculum. Retrieved from <http://www.act.ac.th/document/1741.pdf>

The World Bank (n.d.). Thailand. Retrieved from <http://data.worldbank.org/country/thailand>

Thomson, B. & Babity, M. (2009). *The survival guide for teaching in Thailand*. Indianapolis, IN: Dog Ear Publishing.

Wade, R. (2001). Social action in the social studies: From the ideal to the real. *Theory into Practice*, 40 (1), 23-28.

Ward, A. (1993). *Making it work: Bicultural implementation*. Workshop notes. Research Higher Education Office. University of Auckland. 28 May, 1993.

Ward, C., Bochner, S. & Furnham, A. (2003). *The psychology of culture shock*. New York: Routledge.

- Wells, G. (1994). The complementary contributions of Halliday and Vygotsky to a “language-based theory of learning”. *Linguistics and Education*, 6 (41-90). Retrieved from http://lchc.ucsd.edu/mca/Mail/xmcamail.2006_08.dir/att-0096/01-WellsHallidayVygotsky.pdf
- Wenger, E. (1998). *Communities of practice: Learning, meaning and identity*. Cambridge: Cambridge University Press.
- Winter, D. & Robbins, S. (2005). *Writing our communities: Local learning and public culture*. Urbana, Illinois: National Council of Teachers of English.
- Wouk, H. (1965). *Don't stop the carnival*. New York, NY: Doubleday.

Appendix A
Foreign Teachers' Weekly Lesson Plan Form: Sample

This is a sample of our school's lesson plan form. The bottom section entitled "Results / Evaluations" is the area from which foreign teacher feedback was collected and entered into a MS Excel spreadsheet.

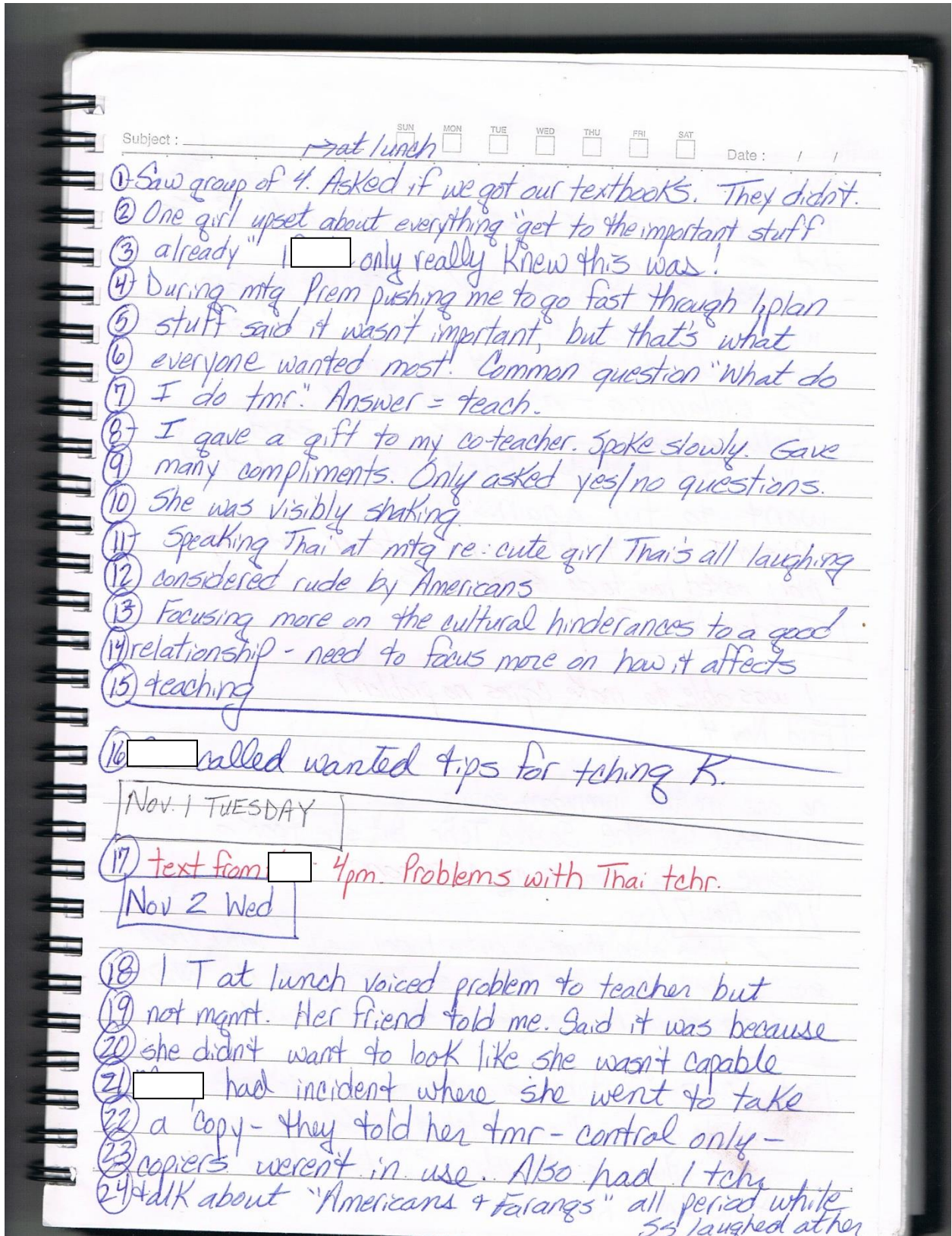


English Program School
LESSON PLAN

Teacher:	---	Program:	English Program
Subject:	English Basic	Class(es):	1/9
Topic:	Unit 10	Week:	Week 17/ Feb.20-24
Objective / Knowledge:	Review of Unit 9 vocabulary.		
Key Vocabulary:	N/A		
Materials:	Steps: T will go over vocabulary for Unit 9. E-book Ss will copy words from Unit 9 into E-book to review. Whiteboard Ss will complete page 143 in Blue Best Friends text. → <i>did not do</i> Blue Best Friends p. 143 Ss will play group-spelling game; handful of Ss will stand and spell words together out loud. Spelling group game Ss will play telephone in teams passing the word along the line and having the last person go up to the board and write out the word. Telephone		
Homework:	N/A		
Method of Assessment:	T will observe Ss as they play games and gauge their memory of vocabulary learned throughout the semester.		
Results / Evaluation:	<i>Ss were disruptive and misbehaved after to myself and their. Their teacher told them to stay quiet b/c I didn't feel well. Ss took advantage and did a punishment rather than class work.</i>		

Appendix B
 Researcher's Field Notes Journal: Sample

This is a sample from my Field Notes Journal that I kept in the classroom.



Appendix C Memo Writing Based on Researcher's Field Notes: Sample

The below memo writing supports the example journal page shown in Appendix B.

I have noticed how thick the air is with the tension between “us” (foreigners) and “them” (Thais) – more so than at my previous school. I won’t get into why I think that’s happening, but suffice to say it needs to change. Good quality instruction is suffering because of it, and for all the wrong reasons – mainly due to inefficient communication. One of the main themes going on throughout my journals is “I didn’t know. Nobody told me.”

Line 1 indicates “Nobody told me we had textbooks to go pick up”. They didn’t know what or where. And a few teachers told me that when they went to the office, they just got barked at in Thai language and it was “confusing” what they were expected to do.

Lines 4-6 indicates that the Thai manager wanted to talk about A and the teachers wanted to talk about B. I knew what the teachers would need in order to teach the following day based on my previous experiences, but Thai management wanted to talk about protocol. Both equally important, but communication was coming out haphazardly.

Lines 6-7 indicate that despite a week of training through their placement agency and a 2 day seminar at XXX, that the anxiety was high about “What do we do?”

Lines 8-10 indicate my own personal awareness of Thai culture and how the act of gift giving is integral in establishing respect. And building respect is the foundation for being able to co-teach effectively. I haven’t had an opportunity to discuss this yet with the new teachers. Nor would I in front of Thai management. Long story.

Lines 11-12 indicate an incident at our staff meeting. There were some very high figures present. I knew who they were by where they were placed in the room and the fact they were served water in a beautiful ceramic cup. Their rank would have been unknown to the others. It is very common for Thais to interrupt, talk while others are talking, answer their phones, get up and walk away etc. during a meeting...but only tolerated based on your rank. We were going around the room, introducing ourselves, where we were from, and what position we were teaching. When one foreigner stood up, a high ranker interrupted her, said in Thai language that she was the cutest and he wanted her in his department. All the other Thais started to laugh and join in, and begin the Thai comradery. The foreigners were freaked out by what they considered rude and inappropriate behavior (applying their culture to a Thai culture situation). This started setting the stage for the foreigners’ negative perceptions of the Thais.

Lines 13-15 are notes for me to try and look at the ultimate goal of how to give high quality instruction to Thai students. But now I’m realizing more and more that the cultural differences are an underlying layer to attitude, and that attitude has everything to do with how well you teach.

Line 17 indicates 1 teacher’s breakdown in communication with her Thai co-teacher. Referring back to my phone log:

*Hey Becky its xxx. Today my teachers’ aid was terrible to me. She tried to belittle me and get me in trouble when I did not have any direction. I’m not sure what to do.
Frm Karen Nov.2011 1 4:02pm*

Lines 18-20 indicate indirect feedback. One teacher was telling me all the problems another teacher was having in terms of knowing what to do. I asked her why that teacher didn’t come to me or Thai management, and the answer was that she didn’t want to feel incapable. This is American culture which doesn’t apply in Thai culture. Coming and asking questions is not only expected, it’s required if you want to survive in a society with low management skills!

Lines 22-24 indicate another example of Thai comradery at the expense of a foreigner’s ego. Michelle has been taking the initiative to figure things out on her own. She needed copies. She went digging around in the front office. A for effort but F for understanding Thai culture. She went into a high rank’s office and asked him to make copies because she saw the photo copier. (I’m still laughing over this one.) Now, although we were informed that’s where we needed to go for copies – it was never explained how best to make sure you actually get your copies. This would require bowing your head lower than anyone higher than you as you walked past, sitting quietly in a corner until someone looked at you and addressed you. Smiling big and wide as though you realize how blessed you are to be in their office. And then begging with all your mercy, if someone would please, pretty please help you get your copies. And then, just maybe, if they felt the desire to help you, you would need to express your gratitude. Michelle didn’t do this. So they rudely grabbed her papers, barked at her in Thai language, motioned for her to get out of the office, and cracked jokes in Thai language about foreigners. Yet another incident setting the stage for all the negativity ever so present in our school between “us” and “them”.

Appendix D

Video Recording Cataloging Sheet: Sample

5 Video Review Notes:

Lead Teacher: Rebecca Petersen, American
 Co-Teacher: [redacted], Thai
 Lesson: Phonics
 Time: 24.02 minutes
 Topic: Letter Sounds

Activity/Objectives: Recognize letter sounds at either the beginning or end of a word
 Technology / Materials Used During Lesson: Workbooks, Alphabet cards
 Main Activity of Lesson: Large Group interaction, listen and respond

Category	Quantity	Comments
Teacher asks Ss to repeat chorally as a group	7	
Lead teacher asks the large group a question and various Ss respond	71	
Thai teacher translates; either on their own or as requested by lead teacher (less than 30 seconds each time)	2	
Lead teacher handles a classroom management issue	0	
Thai teacher handles a classroom management issue (oral commands only)	4	During the alphabet game involving cards she gets mad at them for running around (which they had to do to play the game)
Ss ask the teacher a question (randomly)	24	
Ss stand up to go do something without permission	17	Mostly to go to another's desk to help them. 5 students in particular [redacted] [redacted] were helping [redacted] Fd [redacted] e

Comments:

The room is rather quiet while they're filling out their workbooks – busy. But there are a lot of Ss talking to me freely one-one-one during that – mostly on topic about what they know about the vocabulary word. For example if the word was "gate" Ss would say "house I have gate".

Many Ss helping other Ss with their work, and telling me who's not ready (if I proceeded too quickly).

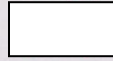
As I was watching the video, I felt there was a lot of down time (minutes) while we waited for the slow students to keep up (about 5 of them). But the majority of the class didn't seem to mind as much as I did.

There was a delay getting ready for the game. Mostly due to lack of classroom space. We started playing this at minute 17.42. All students were up and out of their chairs playing the game.

Appendix E
Academic Year 2012 Final Writing Exam EP1: Sample



P1



15-20. Write a story about riding on a train: (6 points)



We are going to the train
station. I see the man with green
and red flags. The dog is barking
and the man ^{is} running ^{on} the train
tracks and the train kills ^s him.
He ~~is~~ dies ^s and he ~~have~~ ^{has} a skeleton.

Appendix F
Foreign Teacher Feedback Data Table: Sample

This is a sample from my MS Excel spreadsheet containing foreign teacher feedback and field notes

Data Type	Created by	Date	Comments	Theme	My Thoughts
Lesson Plan	American 8	12/23/2011 0:00	miscommunication with teacher about Christmas song for program. Very short lesson.	Different Cultures: Communication	
Lesson Plan	American 16	12/23/2011 0:00	Overall reflection: more interesting/interactive/engaging lesson for next theme week. There is no need for me to allow disruption of my classes, even for Xmas practice, and I will be taking care to guard my schedule & maintain control of my classes in the future.	Different Cultures: Religion and Holidays	Too many people pulling foreign teachers out to do THEIR jobs
Lesson Plan	Filipino 2	12/23/2011 0:00	Many don't understand the lesson. They are very noisy.	Thai Teachers Not Helping/Helping	Unclear if Thai T in room or not
Email	American 4	1/8/2012 13:01	People of all cultures often think that their way of teaching or thinking or behaving is the "right" one and can often not be persuaded otherwise :-)	Thai Teachers Not Helping/Helping	
Cover Page	American 16	1/13/2012 0:00	Complete absence expectations should be made clear at the beginning of the semester	Different Cultures: Communication	She's right. She got in trouble for something that was never explained to anyone.
Email	American 16	2/3/2012 17:00	Note that the classes that don't have any failed Ss are the classes in which the Thai teacher is always present and helpful.	Thai Teachers Not Helping/Helping	
Field Notes	American 9	2/7/2012 0:00	A lot of foreign teachers are not following rules/regulations because there is only 1 month left and they don't care; "What will they do - fire me?!" I had a conversation with Thai Mgr XX about this because they are right - we do nothing.	Lack of Foreign Teacher Professionalism	I told Thai Mgr XX we need to start deducting from their salaries for infractions (i.e. not turning in lesson plans, show up late, don't attend meetings, etc)
Lesson Plan	American 16	2/10/2012 0:00	Ok lesson but had problem again with T. Supha giving incorrect instructions before I fully explain them. Had to backtrack and confused Ss. Still have a handful of Ss not participating but it's improving slightly. Still pretty sure that many don't understand a word coming out of my mouth - I think they think they don't have to listen because they wait for Thai teacher to translate. I'm saying yet again, frustrating.	Thai Teachers Not Helping/Helping	
Lesson Plan	American 5	2/10/2012 0:00	Unfortunately classroom management is still a HUGE issue. When teacher Thai xx is there she does a really good job of helping me.	Thai Teachers Not Helping/Helping	
Field Notes	American 9	2/14/2012 13:08	Just saw xxx whack Spy 3 times hard on the palm with a ruler. 15 minutes later I just saw her whack Earth 5 times, and Engrit 2...not counting all the shouting in the Ss faces she's doing	Different Cultures: Corporal Punishment	
Field Notes	American 9	2/15/2012 0:00	Thai Mgr XX came over to pick me up for the trip to Bangkok in the morning all hot to trot. She was furious that teachers were complaining about next year when we didn't even have a meeting to discuss anything yet. She was insinuating it was because of my email where I asked teachers to tell me their position preference. After she was finished ranting I simply asked "What do you want me to do?" of which I got no reply. She said, "We just need to tell them what to do, we know best." And I said "Yes, I agree, this works well if you're a militant leader and you want to lead your people by giving orders". Needless to say the conversation was over.	Thai Teachers Not Helping/Helping	
Field Notes	American 9	2/16/2012 0:00	Thai Mgr xx told me this morning that parents are complaining to her and the Director about Am xx. That her Science lessons were too difficult for the students (agreed). She's still not following my lessons and her lack of qualification in teaching to TEFL students has produced negative results and attitudes.	Unqualified Foreign Teachers	We will have difficulty getting around this use of qualified teachers because the salary is way too low for professional teachers to accept (I can do because of my husband's job)
Field Notes	American 9	2/16/2012 0:00	Had a dinner meeting with Thai Mgr xx and Thai Mgr XX at my house 2 until 7pm. I had asked about the Thai culture of thinking that the older someone is and the higher the position, that the person is considered to know more. Beth had asked if it was culture or spiritual (about not being able to change your status). The answer was a quick "tradition"	Thai Teachers Not Helping/Helping	Some things are just difficult to speak about from a foreigner to a Thai

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Appendix G

Students' Writing Final Exam Academic Year 2012; Grading Rubric: Sample

My MS Excel spreadsheet I contained to score students' writing.

max		Final		Final		Final	
100		P1 Student 7		P1 Student 15		P1 Student 22	
	weight	count	point	count	point	count	point
number of words (max X) (- the word train)	1	38	38	49	49	50	50
number of unique words used (max X) (includes the word train 1x)	2	54	100	56	100	40	80
No of sentences*		4		7		6	
average number of words pr sentence (max X)	2	19.0	38.00	14.0	28.00	16.7	33.33
spelling/grammar/punctuation/capitalization	-1	7	-7	16	-16	9	-9
number of times critical thinking / reason used (answers because, how, why or answers a direct question, uses quotes for dialogue)	10	1	10	1	10	1	10
number of adjectives/adverbs/proper nouns/-ing/unique vocab/contractions (considers each time, unless said twice in same sentence)	5	13	65	11	55	12	60
sentences about me +0 / my world +1 (each sentence)	2	3	6	5	10	2	4
TOTAL SCORE		250.00		236.00		228.33	
* use of 'and' requires content continuation or it will count as a new sentence							
Text		and	and	a	a	a	a
		and		baby	a	a	
		and		ben 10	baby	and	and
		and		big	ben 10	and	
		are	are	care	big	and	
		barking	barking	cartoon	care	and	
		die	die	dad	cartoon	and	
		dog	dog	dad	dad	and	
		flags	flags	day		and	
		going	going	don't	day	and	
		green	green	don't	don't	eat	eat
		have	have	friends		family	family
		He	He	go	friends	funny	funny
		he		go	go	funny	
		him	him	go		go	go
		I	I	happy		happy	happy
		is		home	happy	happy	
		is	is	i	home	happy	
		is		I	I	hungry	hungry
		kill	kill	is	is	i	i
		man	man	is		i	
		man		is		i	
		on	on	mom	mom	i	
		red	red	mom		i	
		running	running	mom		i	
		see	see	mom		is	is
		skeleton	skeleton	mom		is	
		station	station	my	my	is	
		the	the	my		is	
		the		my		is	
		The		my		mom	mom
		the		my		my	my
		the		my		my	
		to	to	on	on	say	say
		tracks	tracks	on		say	
			train	sad	sad	so	so
				see	see	so	
				see		the	the
		we	we	sees	sees	today	today
		with	with	sit	sit	today	
				sleep	sleep	today	
				tell	tell	today	
				the	the	today	
				the		today	
				the		today	
				to	to		train
				to		very	very
				very	train	water	water
						water	
						yes	yes
				very			