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Realities of Curriculum and Teaching: Revelations From Singapore Teachers' Meta-reflections

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This study examines four Singapore teachers' reflections on issues and problems in their teaching practices. As an insider-outsider or educator-researcher seeking to understand the complexities of teaching, we interrogated the teachers' beliefs, dilemmas, biasness and prejudices embedded in their reflective narratives on experiences in curriculum work within an education system which is dominantly centralized and highly routinized. The teachers reexamined taken-for-granted practice and beliefs, and revised their written reflections. The recursive process of reflection and meta-reflection reveals more critical insights into the curriculum work and teaching. This shows that superficial forms of reflections are easily constructed, but critical reflections, especially on race and gender issues in teaching, tend to be ignored. Analysis of the reflective narratives written by the teachers showed divergence in their experiences as science teachers despite of teaching in a seemingly centralized and homogenous system. The findings suggested that interrogation of teachers' reflections could provoke more critical and in-depth reflections on normative teaching practice and offer teachers a platform for their voices to be heard.

Keywords: science curriculum, reflection, meta-reflection, teaching and learning, Singapore teachers

Introduction

Reflections entailed retrospective re-search, continual re-examination, and critique of normative practices in teaching in order to invoke new ideas for change. Such a process encapsulates the intricacies, details and complexities of past events, activities and ideas in dialectic with the present and transcendence into the future. Frameworks and guidelines could systematically guide practitioners in making reflections or limit it and reflection is caught in a web of interconnectivities rendering reflections and the process of reflecting unsystematic, confusing and even disturbing. Superficial and deep feelings of pride, hubris, guilt and regret are generative, making reflections uncomfortable and at times cathartic.

Reflection is an active process of being aware of one's experiences so that we can give attention to the experience and explore new insights. Reflection helps professionals to understand why they do and what they do. It gives meaning to an action which has taken place. By being sensitive and curious about our experiences, we are provided with powerful learning experience which we cannot be derived from books or formal training. Gaining insights into our experiences helps us to be more focused on and purposeful in our practices. Reflection can also help to translate learning from our experiences into reality. Researchers have, however, cautioned against treating reflection merely as an intellectual exercise (Boud & Walker, 1998), but rather to

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engage in “active, persistent and careful consideration” (Dewey, 1910, p. 6).

To make possible the dialectical relationship between reflection and change of practice, Schon’s (1983) suggested the notion of reflection-in-action and reflection-on-action. Reflection-in-action is often described as “thinking on our feet”. It is an act which involves looking at our own experiences, connecting these experiences with our emotions and harnessing on the theories which we use at that point. It is also about building new understandings to inform our actions in the situation we are in. Reflection-on-action usually takes place after the event and adopts a “look back” mode. Both forms of reflection are important as they complement each other in helping to enrich the understanding of experiences.

Reflection can be done as an individual or as a group depending on the goals which are set. In schools, self-reflection illuminates personal practices of an individual’s classroom teaching while peer-reflection informs collective and group practices. Again, self- and peer- reflections complement each other mutually. In this paper, we relied on self-reflection to illumine teacher’s personal ideas about issues and dilemmas they faced in their practice.

Purpose of This Study

We have three goals in this paper. First, we want to illuminate problems and issues Singapore teachers face in curriculum work and strategies they have devised to manage them. Their situated school contexts as embedded within the larger context of a national curriculum illuminate that how negotiations in the multiple systems of constraints are made.

Second, we want to challenge and delimit the boundaries of reflections as an internalized, personalized and static experience into externalized, critical and fluid forms. Writing reflective narratives necessarily entails the reconstruction of past experiences, beliefs, inner feelings and assumptions into stories that could be shared. We incorporate our own views and personal stories as we relate to the teachers’ narratives to show that we have personal interests in their lives. This encourages rapport-building between the researchers and teachers.

Last, we want to test out our idea that teachers would reflect more critically if their reflections are subjected to repeated interrogations. Being able to reflect critically is not an innate quality. People are usually caught in their own biasness, prejudice, or enframed thinking to see other possibilities or angles. As such, being critical about one’s own practice entails struggling in making interpretations and definitions (Bennet, 1980). The experience is typically non-solitary and does not guarantee insights (Giroux, 2001). In this research, we want to demonstrate how conventional reflections could be transformed into critical reflections. As insiders-outsiders or educators-researchers, we facilitate their process to becoming critical reflective practitioners. This study, thus, has catalytic validity (Lather, 1986b), as the research process could provoke teachers to think and “act otherwise” (Freire, 1985).

Methodology

In this study, we act as insiders of educational research and outsiders of the teachers’ classroom to facilitate the teachers’ reflection process. We purposefully engage our subjects—four Singapore teachers—as research collaborators in the reflection and meta-reflection process. The research design entails “progressive focusing” (Parlett & Hamilton, 1976; Stake, 1995) and “reciprocity” (Lather, 1986a).

Using these teachers’ initial reflections on broad questions related to their professional and educative experiences and thoughts, we teased apart their reflective narratives to ask new questions and make comments.

The two questions asked were:

(1) Describe your experience in science curriculum making and teaching;

(2) What are some factors you consider in reflecting on the curriculum and teaching? How are these factors important or significant?

We read the teachers' narratives and asked new questions to incite new or revised thoughts. We looked for points of clarifications, elaborations and examples, hinted at alternative interpretations of the observed phenomena, looked for gaps and asked the teachers if they would consider other factors in their decision-making and read into and tease out nuances teachers' narratives to have them say more about what is mentioned but seemingly "evade" providing more information. In other words, we deconstructed their narratives to encourage them to reveal more, expose their hidden ideas and critique. For example, when the teachers talked about meeting the needs for students with differing abilities, we asked them if gender, race, ethnicity and class could interplay with the "ability" factor they saw. Hence, we work with these teachers to make them reflect and reveal penetrating thoughts and emotions through "progressive focusing" or "unlayering". This meta-reflection was an invitation to reexamine what was said, what was not said and what could have been said using a reconstructed lens of an outsiders looking into insiders' narratives.

We noticed that some critical issues that we wanted teachers to think about or comment on were ignored, neglected, or consciously resisted. We tried to reciprocate with the teachers' hesitance or resistance by using vignettes of our own experience or quotes from other teachers we have worked with to invite responses. This opened a new window to extend the dialogue with teachers. For example, we quoted a US teacher saying, "Chemistry is Chemistry" which means there was no way he could make the chemistry curriculum address gender, race, ethnicity, or class differences. Chemistry, to him, was self-contained, asocial, acultural and apolitical. We borrowed the words of this teacher from a different socio-cultural and socio-political context to invite the Singapore teachers to comment or critique what he said and offer their views.

The Four Singapore Teachers

The four teachers (pseudonyms given) were approached by us as we had previously worked with them in schools. The profiles of the teachers are tabulated as follows (see Table 1).

Table 1

The Profiles of the Teachers

	Jessie	Kathy	Sonia	Gordon
Gender	Female	Female	Female	Male
Level taught	Elementary school	Secondary school	Elementary school	Secondary school
Educational level	Bachelor of Business (with honors)	Bachelor of Science	Bachelor of Science	Bachelor of Science
Years of teaching experience	5 years	8 years	15 years	4 years

In following, we present the four excerpts of the teachers' reflective and meta-reflective narratives.

Jessie: "Finally Someone Is Listening"

Teacher's Background

I am an elementary school teacher. I teach a class with 29 grade one pupils English, mathematics and social studies. At the same time, I also teach a class with 24 grade four pupils science. The small enrollment in

each class is unusual (and likely to be temporary), since the school is relatively new. Being a teacher, in charge of the grade one class, means that I have a lot of administrative duties. Each week, I conduct a Form Teacher Guidance Lesson to get to know my pupils better through planned activities. Besides that, I also conduct lessons on life-skills like folding clothes. Besides classroom teaching, I serve in three committees in school—Science, NESS (National Education and Social Studies) and Pupil Leadership. It is a norm in schools for teachers is to be in at least two project committees. I also serve in other ad-hoc projects committees, such as the school appraisal committee and well, the list goes on.

Problems in Curriculum Work

With the change in the primary science syllabus in 2008, the task of interpreting the syllabus seems to get tougher due to the limited information found under the "learning outcomes" section. Many of my colleagues do not even bother to refer to the new syllabus when they teach. Most of them teach according to the teaching materials available especially the textbook adopted by the school. This is something which I can not understand and the publishers are also trying to interpret the science syllabus. Some teachers will teach according to what they remember based on the old syllabus. I am guilty of that too. Hence, it is imperative for teachers to come together and explicitly define the learning outcomes they want to see in their students. However, due to various reasons, priority is not given to truly and fully understand the Primary Science curriculum in my school.

I am also given limited access to and opportunity in writing, planning, designing and revising the school's science curriculum. There is not a specific school's science curriculum anyway. Most of the time, teachers just follow the SOW (scheme-of-work), provided by the publisher with some refinements here and there. The activities spelt out in the SOW written by publisher could include activities or learning outcomes that students are not required to learn. For instance, many textbook publishers tried to include as many kinds of plants and animals in the textbook but students are not required to know the specific name of organisms in the examination.

Reflecting and Reflections

Reflecting on my teaching and lesson delivery is something that I hold dearly to. After each lesson, I would reflect on how the lesson was delivered, the learning environment perceived by the students and the engagement of the students and most importantly their understanding of the concepts taught. More often than not, I would also come out with activities or questions for the next lesson to gather feedback from students. It is important for students to fully understand each concept before moving to the next. I prefer to set diagnostic tests to assess their understanding. It is something concrete and students can refer to them when they revise for examinations as compared to mere questions asked in the classroom. I reflect in five areas of teaching and learning: experience of learning, tone of environment, assessment, learning content and pedagogy.

In my school, it is mandatory for the teachers to reflect upon their teaching. We have to reflect using the guiding pointers and state three things that went well in the classroom, two things that did not work so well and lastly, one thing one would like to do in order to improve the lesson in the future. The only eyes for teachers' reflection are the reporting officers and no one else. But, teachers would be able to share their experiences and reflections during the teachers' timetabled time. During this one hour, teachers with the same teaching level come together, sharing ideas to improve teaching and learning. However, this is not done for science. This could be due to the small number of science teachers available in each level and furthermore, teachers in primary school do not only teach one subject. I have to teach English, mathematics and science across two levels. Greater effort is needed to allocate time for science teachers to share with one another. This not only

provides a pillar of support for the science teachers but also addresses any misconceptions if there are any ones. My greatest fear in teaching primary school science is teaching students the wrong concepts without myself knowing. It is very difficult for students to unlearn the wrong concepts hence they have to learn it right at the very first time. To be honest, I feel inadequate as a science teacher without a science degree.

Strategies to Overcome Problems

In order to overcome the inadequacy in science content, after I became a trained teacher, I attended courses to improve my science content. I took a few modules under the Advance Diploma in Science just to make sure that I am teaching the right thing in the classroom. Only then, I realized that constant upgrading is important for teachers to sharpen our tools in order to stay relevant and effective. Teachers cannot stay stagnant with the skills that we learnt years ago. Since time is a scarce resource, no one can possibly learn everything. Hence, sharing among the teachers is important. Sharing, in my opinion, is a form of professional development for teachers. Sharing of "best practices" helps us to zoom in to the instructional strategy that works with students and this is especially helpful when teachers are always short of time to complete the curriculum. Personally, I have attended many sharing sessions and workshops conducted by teachers in the cluster schools. Some are helpful and others are not so. I believe sharing should start at school level and should be done as often as possible. It should not be confined to timetabled time, but as and when the need arises.

Kathy: "Two Mirrors Facing Each Other"

Teacher's Background

I am a biology teacher in a high school for girls. Besides teaching biology, I also teach values education and am a form teacher to a tail-end (lowest ability group) grade nine class. I am a member of the school's discipline committee, but my main job is to prepare the students for morning assembly everyday. I serve in the examinations committee where I can be doing things like the examination timetable, invigilation schedule, seating plans and setting up central location for examination. To add to the list of duties, I am also the subject coordinator for biology where I conduct professional sharing sessions (white space), ensuring every student fulfils their SPA (science practice assessment) portfolio requirements, coordinating the SPA assessments, marking the exam scripts for alternate years and vetting questions of formal assessments.

Reflecting and Reflections

Reflection for me is on-going. I do not particularly reflect on specific things but generally everything around me. I remember going for two renewal courses and it was utterly painful and contrived. Because the reflection process was structured and guided, we had to do group work and produce evidence of reflection. I am personally not a writer or an artist, so using such media was unnecessary and tedious. I would rather go for a walk in a park and talk about controversial issues with a friend. I find more meaning in the latter. During the renewals, we were put in groups and obviously how can one reflect so deeply with group members whom you have not built any trust yet. So, I think schools should not have structured reflection sessions, because it gives this very personal and meaningful activity a very bad reputation. The people who have to conduct it can sound very strained too because they know what it is like to be in the audience. This can happen as some of us have a very packed timetable and are in no frame of mind to slow down and reflect, because there are so many other things to attend to. So, people cooperate to shorten the process. This is the sadness of not being able to reflect. I think a lot of this boils down to personality. Despite of all the structures, some people are still doing the stupid

things repeatedly. But that is the extreme.

Personally, I do not reflect by having an allocated time or by method of journaling, etc.. A lot of it comes during the lesson itself or when I am reminded of something and when I read or watch television program. During the lesson itself, I find that when I teach a difficult concept I share my thoughts by "thinking aloud" with the pupils. When that happens, I get to see how they are reacting to the way I present that idea. At the same time, I encourage them to ask questions and clarify, so through this process we learn together. As thinking aloud, I make it a point to present the idea generally in two ways—a broad idea version to keep the minds of those who have the aptitude to understand an open, simple and less complex version for those who need more time and take comfort and security in "just learning this". When I realize that the kids are really into something, I take the opportunity to introduce or link them to other concepts, ideas, or stuff I have seen, read or experienced. This leads the class discussion to other related matters as well. I usually let them indulge until they start to digress to something too far off. Though I may not be able to finish what I want to teach, I take to heart that they have learnt something that they want. The time spent is at the expense of the syllabus, but we can always catch up later. I may have used the same time to dwell on the harmful effects of smoking, but if they are not with me, all the time would have been wasted. However, I see value in telling them about my uncle and my father and their experiences with the habit. Somehow pupils are very interested in their teacher's lives, so I would tell them about my grandfather (an opium trader before the war), my father who picked up opium smoking, subsequently to cigarette smoking when opium became illegal and my uncle who had smoker's cough until he burst blood vessels in his lungs and started vomiting blood.

I suppose, whether one reflects or not depends very much on their personality. There are some people who are so blind to themselves that they do not realize the impact they create in the way they behave. Or maybe, they just refuse to admit it. I think it is impossible to get people like that to reflect. Then, there is the other extreme where they become so pre-occupied with what others think of them that they become over-sensitive and worrying too much about what they just did or said. I think in order to reflect effectively, one must have the humility and courage to admit their wrong-doings and have the motivation to change to themselves better. Reflection can be quite disconcerting for most people because it opens the skeletons in their closet. Some people are afraid to open the closet for fear of being judged and others open their closets but put on a facade and return them into the closet. There are those that open the closet, letting them go and move on. I think it is hard to encourage others to reflect unless it is demonstrated through casual conversation and sharing which begets more reflection from the conversing partner and it usually spirals into a meaningful conversation from there. Any reflection that is too explicit becomes futile exercise because people feel obliged to say what is expected of them. So, responses can become contrived and text-book answers like just to get on with it.

I never really found sharing of best practices very effective. Only a few get my attention, maybe because some of these practices are not new. Most of the time, it does not fit into the context of my school and it is not my character to do certain things. I think it is good to share but no one has really monitored how effective these sharing sessions are and how the presenters and participants really feel about the whole affair. Or it was the whole point of the exercise to fulfill other agendas.

Sonia: "From Personal and Private Reflection to Dialogic Reflection"

Teacher's Background

I taught elementary school science for 15 years and I am currently the head of science department in school.

The students I teach come from privilege family backgrounds and the students are generally high-performing. Besides teaching, I am in charge of the administrative and curriculum matters in the science department. As a head of department, one of my primary tasks is to mentor beginning teachers who join the school.

Reflecting and Reflections

As a classroom teacher with 15 years of teaching experience, reflections can sometimes take place instantaneously during lessons as we are teaching. Looking back at my practice when I first started out as a teacher, I do not see it possible that I could have been able to do that as a beginning teacher. Due to inexperience, response would be more delayed when it came to reflecting on the day's lesson. Ability to reflect instantly is developed through experience as we become more confident and at ease with the flow of lesson. We are also more adaptable and less fearful of impromptu changes during lessons (from what was previously planned). It could be triggered by unexpected responses of pupils that prompt us to rethink what we could have done at the earlier part of the lesson that could have resulted in it. This helps us revise our next plan of action immediately. However, I usually reflect upon my practices when I am reviewing pupils' responses in their written work. Like all teachers, my reflections are driven by the essential question: Why have not my pupils learned? Very naturally, a replay of how the lessons were carried out followed by a series of questions will come to mind: Has the activity been effective in leading pupils to the concept? Or was it the questioning following that was not tight or clear enough? Was the consolidation not comprehensive enough? Besides the day-to-day reflection for improving the next lesson, I reflect upon the general approaches to teaching after the major examinations. The drivers of such reflections are usually the performance scores. The key questions explored are: What are the approaches that I should credit for such performances? What areas have been lacking that I should work on?

As a head of department, I also engage in reflections that centered on pupils' science learning experience. What kinds of science learning experiences are my pupils taking away after graduating from my school? Looking beyond results, the rigor in scientific skills and thinking and having the appropriate scientific ethics and attitudes are considered. This leads to reflection on the science curriculum, programs and teacher readiness and capacity. There are instances when colleagues are also engaged in such reflections through informal settings over meals or formal settings during department meetings. In preparation for the 2008 syllabus, dialogue sessions were arranged to gather feedback on ways to enhance the quality of science learning in the school. Such dialogues enabled teachers to reflect on their own beliefs with the purpose of science teaching. That session was enriching, as I found that dialoguing stimulated the teachers to question their own beliefs and value systems. Such platforms enable us to verbalize our beliefs. We clarify our own thoughts through discussions during dialogues. Listening to different perspectives relook our own assumptions. There may not be any answers and some teachers find such disequilibrium unsettling, but it enables us to dig deeper towards new-found understanding of our own purpose and roles after listening to different perspectives from peers. While most of the time, reflections is a personal and private activity. When done in the form of dialogue, it can further engage us to reframe our existing knowledge through new perspectives.

Gordon: "Developing a Deeper Appreciation Through Teaching"

Teacher's Background

I am a male teacher teaching in an all-girls secondary school. I have been teaching for about four years and

this is the first job that I have since I graduated from college with a Bachelor of Life Science degree. I teach a diverse group of students with very different family backgrounds and also of diverse intellectual abilities. Besides teaching science and biology, I am the teacher in charge of the school band and I assist my colleague in mentoring pre-service interns who are attached to my department.

Reflecting and Reflections

When I first entered the pre-service teacher program in 2006, I discovered that I had many misunderstanding and misconceptions about my teaching subject biology. I reflected and thought that perhaps having misunderstandings and misconceptions was a part of my coping mechanism, as a student to comprehend concepts that were rather hard and abstract to understand. I also thought that perhaps my teachers did not really have the time to explain concepts in detail to such a big class and hence the misunderstandings and misconceptions. During the time of my pre-service teacher program, many concepts started to make sense and I developed a deeper appreciation for my teaching subject. I am thankful that I had studied the three sciences in secondary school and junior college and the natural world really started to make more sense from then on as the dots were being connected. Then about a year later, I was exposed to the method of curriculum planning, "Understanding by Design". It got me thinking about what am I teaching in the classroom. Previously, I was merely going into class and covering the curriculum but this method of planning got me to reflect on what am I teaching. Now, I go into class bearing in mind the "Big Ideas" and it really did help me to teach better and my students could understand better as well. When I reflect upon my lessons, I would consider the level of students I am teaching and their abilities. I will also think about the main ideas that I want them to learn after two years of biology at "O" (a national examination conducted at grade 10) levels. I always ask myself, if there were just a few things that I hope my students will remember in 20 years, what would these things be? Teaching the big ideas are important as eventually, the smaller more minute ideas will fall in place and it will make more sense to the students.

I am lucky to have a very supportive working environment. My immediate working colleagues are very helpful and willing to share resources and experiences. That was very helpful to me as a young teacher and also gave me courage to experiment different teaching strategies. I really enjoyed the intellectually stimulating and professional discussions I have in my department, so did other people from various other teaching institutes. As most members of my department are all seated near each other, it makes professional sharing easy. As and when we have a new idea, we will usually just turn about and share it with whoever is around. This usually happens after a lesson that we considered unusually successful. We reflected on the elements that made the lesson successful and we will proceed to sharing it. As we teach across the different tracked and different types of students, we can now deploy modified methods of teaching in the next available lesson. Having a supportive environment enabled me to try out new concepts and teaching methods.

If anything, I think my three years in teaching has certainly made me a more reflective person in various aspects of my life. I also taught me to be less judgmental and to be more open to ideas. "Agreeing to disagreeing" was perhaps a new insight that never did occur to me.

Discussion

Analysis of Teacher Reflections and Meta-reflections

Reflections in its internalized form could be solicited and externalized for sharing, critique and extension

analogous to peeling layers of an onion to uncover the core. Kathy advocated using casual conversation and sharing as reflections "begets more reflection". Reflections through such means were comfortable and generative of more reflections. It encouraged her to reveal dilemmas and identify problems which could normally pass as the norm, tradition and convention. She also developed a unique reflective pedagogy integrating her teaching and reflections with "thinking aloud" techniques.

The teachers' reflections were associated with their teachers' roles, years of teaching experience, beliefs about reflections, teaching and learning, personalities and the school structure. In Jessie's school, it was "mandatory" to reflect and her administrators adopted a structured framework which Jessie felt was helpful in framing her reflections. Kathy argued structured and mandatory reflections and sharing painful, contrived, strained and unnatural experience. She preferred flexibility, space and unlimited time to engage in ongoing reflections—something she felt it was associated with her personality. Gordon, having learned about a curriculum planning framework known as "Understanding by Design", reflected on the big ideas he wanted students to learn. His reflections were projections into the students' long-term learning and future. In her position as the Head of the Science Department, Sonia was held accountable to parents and school administrators. As such, her reflections focused on practical issues and goals including students' results, ethics and attitudes. Her reflections are consisted of the macro-issues on performance scores and micro-issues on the qualitative experiences of students' learning. She also ensured her teachers engage in dialogue to reflect on such issues. Interestingly, she saw the ability to reflect as related to years of experience. As such, novice teachers were not able to reflect as quickly and react to changes in classrooms.

The teachers engaged one or several metaphors in their reflections and meta-reflections. The implicative complex (Black, 1979) of these metaphors illuminated how they viewed reflections and meta-reflections. For example, Jessie described having structured time for sharing of reflections as the "pillar of support" for teachers. Time was scarce and reflections would be sacrificed, if time were not officially stipulated for reflections and sharing. Reflection was important and central for professional development. Hence, having a designated time for it offered her the feeling of security that it would be done. She valued it but desired it to be heard by others. Kathy said reflections could be "disconcerting" for some people, as though revealing one's "skeletons in a closet". The process of reflections requires coming face-to-face with hidden fears which may not be pleasant to deal with afterwards. Gordon described this as "agreeing to disagree" to reflect the internal conflicts as he resolved his dilemmas in the process. Sonia described engaging in deeper reflections as "disequilibrium" to imply the process as shaking, disturbing and uncomfortable for some teachers as they reassessed their teaching and students' learning. However, it also implied some possibilities of stability after the thoughts become more settled. Kathy viewed meta-reflections as having spiraling effect and two mirrors facing each other and the latter implies reflections as infinite, having no definite beginning and ending points and possibly confrontational.

Despite of several attempts to make the teachers reflect on critical issues, such as the implications of gender, race, ethnic and class issues in relation to curriculum and teaching, none of them considered these factors to be pertinent in their curriculum and teaching. Students' differences were ability-based, independent of their gender, race, ethnicity, or class. There are three possible reasons for not making distinctions or paying attention to how these factors play out in their curriculum and teaching. First, these teachers are highly educated, representing to top 10% to 20% of the cohort who attended high school and college education and they may not have experienced inhibitions or personal difficulties in learning. Hence, they may not identify

with and understand the real struggles students experience in relation to these issues, family value and conditions and their schooling experience. Second, teachers would never have enough time in curriculum developing and teaching. Reflections become more ad hoc, prioritizing on ways to improve students' performance scores and grades to in tests and standardized examinations. Deeper and more intricate analysis of additional and controversial issues was possibly avoided to reduce complexities so that curriculum development and teaching could proceed. Third, in the national curriculum, teachers adopted the science syllabi provided by the national agency. The science syllabi stipulated behavioral objectives or science content students needed to learn by the end of grade level. These statements projected the image of science as self-contained and indisputable facts which had been rigorously "proven", having no relation with the social issues mentioned. Science is hence "delivered" as such. We view this project as ongoing as reflections were temporal, contextualized and subjected to change. We would be continual to track and engage our teachers in meta-reflections, which would subsequently settle as reflections and subjected to reexamination and reconstructed insights.

Teachers' Experience in Curriculum Development and Teaching

The teachers' experiences in curriculum development and teaching were related to views, beliefs, confidence level, teacher roles and milieu. Gordon had the least number of years of teaching years among the teachers. He related many of his teaching and beliefs to his pre-service teacher training, saying that the stint helped him to clear misunderstandings and misconceptions he had as a student. Collegiality among his colleagues and milieu were important factors supporting his curriculum development and teaching. In Kathy's description, she appeared to be independent in curriculum development and teaching, as though she had autonomy in decision-making. She made a conscious effort to relate to students, even if it meant exposing some family secrets and "take to heart" students' needs. As a result, she had developed strong rapport with students such that she could employ "emotional blackmail" to make some students work harder for her. Jessie revealed her insecurity and the lack of confidence in science teaching without college qualifications in the relevant discipline. She was responsible for following the unrevised syllabus teaching in the same way but was critical of differences in the unrevised and revised syllabus. Her resistance to change made her felt guilty but it also reflected her reclamation of teacher agency in questioning if there were any significant change in the revised prescribed curriculum. Her criticality also showed when we asked her to share her experiences doing curriculum writing in a relatively new school. She questioned the meaning of "curriculum". She said, "To be very frank, in my opinion, my school does not have a school science curriculum at this point in time unless SOW is the curriculum. We just follow the SOW given". Jessie questioned if the scheme-of-work—a document summarizing the order of topics, schedule of tests and quizzes and so on—was justifiably called a "curriculum". Her opportunity in curriculum writing was admittedly limited in the context of the national curriculum which she had to adhere closely for teacher's accountability. This also reflected the imbalanced power relations in her school context as she implemented the curriculum as provided. Having said that, Jessie and her colleagues taught, according to their interpretations of the learning objectives in the syllabus. In her 15 years of teaching and current role as a teacher and administrator, Sonia's experiences in curriculum development and teaching differed from Jessie's, Gordon's and Kathy's experiences. She was concerned about students grasping the concepts but acknowledged her focus was on students' performance scores. She had to be accountable to the school administrators and to ensure her teachers accountable to her and their students. She had to teach and

execute her administrator's role concurrently. Therefore, in their reflections on their curricular and teaching experiences, these teachers' revealed dilemmas faced in their work and how they manage these problems or issues by prioritizing what they viewed to be most or more important.

Conclusions and Implications

In this paper, we set out to examine issues and problems teachers faced in their practices and also challenge the boundaries of reflections, taking into account the biases and prejudices teachers bring with them. Working with the teachers and taking the stances of an insider-outsider seeking to understand their world, the teachers' beliefs, dilemmas, biasness and prejudices were questioned and revealed issues that they have taken either for granted or have given superficial attention to. Tensions in balancing their own preferences and that of the society, parents, pupils and school administration became apparent.

The teachers' repeated resistance, ignorance, or hesitance to address the critical issues implied that reflections needed to be carefully solicited by some intricate means. Reflections, perhaps superficial forms, were easily constructed. Nonetheless, deeper and uncomfortable reflections attending to sensitive issues needed external stimulus or catalysis to purge. The process also had to be developmental rather than instantaneous. Further, reflections embodied situated meanings and personalized thoughts and feelings. Hence, questions and prompts grounded in the teachers' narratives of reflections were more appropriate than generic ones.

The four teachers reflected on their experiences about curriculum and their practices within an education system that is dominantly centralized and highly routinized. Schools have a set of fixed science syllabus that is geared towards the national examinations and teachers generally have to "teach to the test". As such, their experiences with authentic curriculum planning and design are at the best one of interpretation and implementation of a curriculum that is "prescribed". In spite of this seemingly constrained context, these four teachers differed in their experiences as science teachers, both in terms of their ideas about the curriculum and their ideas about reflecting on their professional practices. All the four teachers spoke about their own practices and experiences in relation with some forms of others—Kathy related her preference of non-structured reflection to a structured one school administrators generally prefer and adopt; Jessie identified her guilt of using the old syllabus to the practices of her colleagues; Sonia related her concerns about her role as the head of department in relation to school and parental expectations; and Gordon spoke about his teaching experiences in relation to a new curriculum framework. While it was evident that the teachers avoided controversial issues of gender, race and differing students' abilities in their narratives, they related their own preferences, beliefs and experiences to the norms of the contexts they lived in. This, we argue, showed that the teachers could be reflexive in their practices (Chiseri-Strater, 1996), albeit relating to a different "other".

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