

## **SECONDARY SCIENCE TEACHERS' METAPHORS: A Case Study, Part 2**

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Part 2 of this paper reports on a group of five science teachers' metaphors, their responses to the concepts presented on the Diploma in Education (Dip.Ed.) programme, and the changes in their selected metaphors at the end of the programme. The analysis reveals that all the teachers' metaphors accommodated the contemporary ideas, such as student-centredness, lesson planning, and the reflective habit, to which they were exposed. There were no changes in the teachers' selection of metaphor at the end of the programme.

### **Introduction**

Drawing upon Ausubel's (1968) dictum that "the most important single factor influencing learning is what the learner already knows" (see [http://www3.hi.is/~joner/eaps/wh\\_ausub.htm](http://www3.hi.is/~joner/eaps/wh_ausub.htm)), contemporary theories of learning stress the role of prior knowledge. Teacher educators involved in the education of prospective teachers or in the development of practising teachers, therefore, are advised to attend to their students' prior conceptions of teaching and learning, as any hopes of meaningful learning must target students' prior knowledge. Much of the literature on teacher education is related to pre-service education within the developed countries such as the USA, and the literature reports that prospective teachers are often asked to reveal their prior knowledge of teaching and learning by use of metaphor. The findings have been used to understand teachers' conceptions of teaching and learning, and the development of teachers' professional knowledge (Munby & Russell, 1990). To date, however, there has been no research in Trinidad and Tobago on how science teachers' conceptions of teaching and learning influence their response to teacher education programmes. The question then emerges: Can knowledge of science teachers' metaphors be useful to determine the concepts that resonate with teachers' conceptions of the teaching/learning enterprise and those which do not?

The decade of the 1990s ushered in the most recent reform movements in education. The declaration of Education for All (EFA) in Jomtien has been the primary impetus for reform in developing countries. As the title implies, the reforms are based on the ideas that "all

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children can learn.” In developed countries, too, reform has occurred apace, and is also premised on education for all. For example, in the USA, the philosophy that every child can learn is captured in the *No Child Left Behind Act*. In Trinidad and Tobago, the *Education Policy Paper (1993–2003)* states explicitly as one of the tenets of the philosophy of education that “every child has the ability to learn and that we must build on this positive assumption” (Trinidad and Tobago [T&T]. National Task Force on Education, 1994, p. xvii). It is upon these beliefs that many contemporary curricula are designed, and it is more likely that the policies will be implemented in the classroom if teachers subscribe to these beliefs.

Teacher education programmes are influenced by the theoretical and political thought of the day. Hence, it is evident that teacher educators will expose their clients to the concepts and pedagogy associated with child-centred education, which, however, are quite likely to conflict with traditional notions of teaching and of the role of the teacher. Furthermore, in adhering to the said contemporary theories about learning, teacher educators are themselves likely to design learning experiences that tap into their students’ prior knowledge about teaching and the role of the teacher. For example, metaphor-related tasks might be used to probe teachers’ notions of teaching and of the teacher’s role.

Part 1 of this paper reported on the investigation into a group of six science teachers’ metaphors. The findings provided some valuable insights into teachers’ conceptions about teaching and learning. The findings revealed three categories of conceptions of teaching involving levels of teacher control ranging from “teacher as helpless” to “teacher in control but with some student input” to “teacher exhibiting authority and control with little student input.” Part 2 focuses on the relationships, if any, between the metaphors from five of the six science teachers from whom rich data were available, their responses to educational ideas and concepts presented on the Diploma in Education (Dip.Ed.) programme, and the influence, if any, of these ideas and concepts on the science teachers’ metaphors. The following two research questions were investigated:

- 1. What insights do science teachers’ metaphors provide into their responses to the ideas/concepts presented in the Dip.Ed. programme?**
- 2. What changes in the metaphors occur during the period of training?**

## **Conceptual Framework**

### **Constructivism, Metaphors, and Teacher Education**

It is well established that prospective teachers enter the teaching profession/teacher education programmes with conceptions of teaching and learning that have been developed from their own experiences as learners (Bullough, 1991; Sillman & Dana, 1999). For the special case of Trinidad and Tobago, where the entry requirement to teach at the secondary level is an undergraduate degree in a subject specialization and formal training in pedagogy is not compulsory, secondary teachers are exposed to courses in education after having spent a few years, ranging from 2 to 20 years, in the classroom. So in addition to their own experiences as learners, these teachers would have developed conceptions of teaching and learning while on the job. Furthermore, the experienced teachers who enter the Dip.Ed. programme have had years of acting upon their beliefs in the classroom, which can have either positive or negative impacts on students. Chen (2001) cites Clandinin (1986), Clark and Peterson (1986), and Glasson and Lalik (1993) as stating that “teachers practices are influenced and directed by their beliefs” (p. 264). Also in support of the relationship between beliefs and practices, Carter (1990, p. 112) reports that cooperating teachers involved in a study in which she was engaged “used metaphor to show how conceptions of teaching are reflected in teachers’ actions.” Additionally, in relation to mathematics instruction, Stipek, Givvin, Salmon, and MacGyvers (2001) also reported consistent associations between teachers’ beliefs and their practices. Though more tentative, Tsai (2002) cites Nespor (1987) and Pajares (1992) in reporting that “many educators agree that teachers’ beliefs may, in some way, affect teachers’ instructional practice” (p. 771). The research on teachers’ beliefs parallels the rise in the influence of constructivism as a theory of knowledge and of learning.

Constructivism underpins contemporary discourse in education at all levels of the education system. Among its tenets are that people actively make sense of their experiences and that the knowledge generated from these learning experiences acts as a filter for new learning. Constructivism provides an explanatory framework for learning as the development of schema via a network of coherent propositions. According to Chen (2001, p. 262), “when learners are taught, they construct individual meanings from the material by relating it to their existing conceptions and frameworks of knowledge.” In a similar vein, constructivism also provides an explanation for the initial rejection of

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concepts that do not fit within a pre-established network of ideas. However, changes in schema do occur. In line with constructivist principles, it is the active and explicit interrogation and questioning of beliefs that can lead to dissatisfaction with conceptual schema, and which can result in change to new ways of thinking or conceptual change. It is therefore not surprising that teacher education programmes include strategies that explicitly solicit their clients' prior knowledge and beliefs and lead to an examination of this knowledge. These strategies include using teachers' metaphors and engaging prospective teachers in individual and collective reflection. It is therefore suggested that given opportunities to reflect, experienced teachers might be more able to discern how their conceptions of teaching have guided their actions in the classroom, and might be more able to relate these actions to their students' performance (positive or negative). Drawing upon the constructivist paradigm, Fosnot (cited by Chen, 2001) posits that teacher education which actively draws upon teachers' prior knowledge will likely have a profound effect on teachers' conceptions of teaching and learning.

As related specifically to teacher education programmes, the literature reports (Zeichner, Tabachnick, & Densmore cited by Bullough, 1991) that for teacher education programmes which do take account of their clients' prior knowledge, the clients tend to respond to/accept the content and experiences that resonate with their schema and related conceptions of self as teacher. Similar findings were also reported by Tilemma (1995), who stated that "the greater the correspondence between teachers' beliefs and what was presented in training, the more likely it was that learning would take place" (p. 291). Conversely, some teachers' conceptions of teaching and the teacher's role can in fact act as hindrances to learning and hence to the development of new actions in the classroom. For example, teacher as *guide on the side* is more in line with contemporary ideas about teachers' role in interacting with students than the traditional *sage on the stage*. The following examples from Carter (1990) reinforce the point. With respect to classroom management, she found that teachers' metaphors could be related to the effectiveness of their actions in the classroom. Furthermore, the metaphors "illustrated how dysfunctional understandings of the task of classroom management negatively influenced the teachers' abilities to teach and students' abilities to learn" (p. 110). Consequently, teacher education programmes that deliberately attend to teachers' prior knowledge aim to have them recognize how their beliefs can impact on learning and to help them to construct new understandings of teaching and learning.

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However, research has shown that conceptual change does not happen easily. According to Duit and Treagust (2003), who summarized the research in conceptual change, there are different explanations for conceptual change. For example, the original explanation by Posner, Strike, Hewson, and Gertzog (1982) posits that changes in thinking/schema occur when persons become dissatisfied with the old frameworks and the new conceptions are intelligible, plausible, and fruitful. This view has been described as cold and rational and as ignoring the affective factors that influence changes in thinking. Duit and Treagust (p. 679) cite Pintrich et al. as proponents of this view. They state that “it is with these ideas in mind that Pintrich et al. (1993) proposed that a ‘hot irrational’ explanation for conceptual change is as tenable as cold cognition...”; further, they state that “teachers who ignore the social and affective aspects of personal and group learning may limit conceptual change” (p. 679).

The researchers above focus on the conditions that facilitate conceptual change. Others focus on specific activities that enable conceptual change. For example, Sillman and Dana (1999) posit that reflection is critical to the process of conceptual change. They are of the view that through the process of reflection, beliefs and understandings are made explicit, which can facilitate the shift in teachers' thinking from themselves and teaching to students and learning. They suggest that the metaphor is an appropriate vehicle to gain insights into teachers' thinking and hence to assist the process of reflection. In a study done by Sillman and Dana, the metaphor was used to facilitate reflection for four prospective teachers in a pre-service education programme. The results of their study led to two main assertions:

1. Reflection with metaphor helped prospective teacher realize their beliefs and changing beliefs, some of which guided their practice.
2. Learning to teach science depends on the prospective teacher's personal history as a science learner and on the cooperating teacher.

Implied in these assertions is that teacher education programmes can facilitate a change in beliefs if the strategy of reflection with metaphor is used. Sillman and Dana (1999) also imply that there is a relationship between some of the actions of some teachers and the beliefs that they espouse. Supporting the role of reflection in facilitating changes in thinking, Brownlee, Purdie, and Boulton-Lewis (2001) also attest to the impact of reflection on pre-service teachers' epistemological beliefs. In a study comprising two groups of pre-service graduate teacher education

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students enrolled in a teacher education programme, they found that the students who were required to reflect explicitly in journal entries experienced more growth in sophisticated epistemological beliefs than those who were not encouraged to reflect.

There are a few reports in the literature on the use of metaphor in pre-service programmes over the year of training, including changes in metaphor used to describe conceptions of teaching science based on teachers' experiences in the programme (see Sillman & Dana, 1999). However, there have not been attempts to investigate science teachers' responses to the in-service Dip.Ed., as described below, within the framework of metaphor.

### **Outlining the Contextual Background and the Research Process**

Teacher education is aimed primarily at introducing untrained teachers to public theories about teaching and learning and in having students access and perhaps to come to accept many of the theories presented during the programmes. In recent times, too, a major goal of teacher education has been the development of the reflective practitioner. The Dip.Ed. programme that is delivered by the School of Education at The University of the West Indies (UWI), St. Augustine can boast of the same goals/aims. The activities in which students are engaged, including the development of a portfolio as one of the significant assessment tools of the programme, provide evidence of the focus on reflection. For example, science teachers engage in journal writing during the programme, and science teachers complete lesson plan forms that include a section devoted to teachers' reflections of the lesson. They are also required to assemble a portfolio that projects their growth and development, which accounts for 25% of their grade in "The Practice of Education."

The Dip.Ed. programme comprises four courses—"Foundations of Education," "Curriculum Process," "Project in the Theory of Education," and "The Practice of Education," which provide opportunities for engagement with the theoretical and conceptual foundations. During the foundations course, the students are exposed to "Philosophy of Education," "Psychology of Education," "Sociology of Education," "Language in Education," and "Health and Family Life Education." "Curriculum Process" exposes students to "Teaching in the Curriculum Area," "Assessment in Education," "Classroom/School-Based Research," "The Use of Media in Education," "Electives," and "Arts in Education." Exposure to the course "The Project in the Theory of Education" moves

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students beyond local concerns to regional and international perspectives on issues in education. Finally, during the course entitled “The Practice of Education,” students are encouraged to reflect upon and develop their lesson presentation skills and their interpersonal skills. This paper is based directly on the experiences provided in two courses for the science curriculum group. These are “Curriculum Process – The Teaching of Science” and “The Practice of Education.”

The first session of the Dip.Ed. programme usually begins in the last week of July each year and continues for a month, ending in the third week of August. During this period, the teachers attend classes full time at the university on Mondays to Fridays from 9:00 a.m. to 3:00 p.m. As an introduction to the process of reflection, during the first week of the course entitled “The Teaching of Science,” all science teachers were asked to write an autobiographical statement that described their journey toward becoming a teacher. This assignment is also used as an artifact that is included in the portfolio. During Week 2, the science teachers were given an assignment in which they were asked to write a metaphor of themselves as teachers (see Appendix).

Upon resumption of school in September, the teachers returned to their full-time teaching responsibilities from Monday to Thursday and attended the Dip.Ed. sessions on Friday. Alternate Friday sessions were conducted either at the university or as a “Field Day” at selected teachers’ schools to satisfy the criteria for the courses “Curriculum Process” and “The Practice of Education.” On the scheduled field days, three teachers, including the host teacher, each taught a 35-40 minute session. In addition, a tutor also visited each teacher during pre-arranged one-on-one “school visits” during the term.

To fulfil the requirements of the course “The Practice of Education,” science teachers were observed in the classroom and on field days, and were also encouraged to submit lesson plans for review. During the second semester, the science teachers were asked to revisit their metaphor of teaching by doing the assignment a second time. The assessment for this course was an examination of their practice as well as the examination of a portfolio in which they were expected to present a portrait of themselves as teacher, select 8–10 entries from their journal that demonstrated significant growth points—in general, to project their growth and development.

This is an instrumental case study of five teachers for whom I served in the capacity of curriculum tutor. These student teachers were enrolled in the in-service Dip.Ed. programme, and their teaching experience ranged from 3 years to 20 years. The teachers were asked to develop a metaphor that describes them in their teacher’s role. These metaphors

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were then analysed and the results reported in another paper. This aspect of the study was conducted in order to gain insights into the match, if any, between teachers' metaphors and their responses to the programme elements.

The teachers' comments through journal writing, portfolio artifacts such as their autobiographical statements and curriculum assignments, and their reflections on their lesson plans were analysed qualitatively to determine patterns and themes. These patterns were in turn analysed in relation to the teachers' metaphors and the interpretations of the metaphors as derived when the metaphor deconstructs.

## **Findings**

The research questions are used as the framework for presenting the findings below.

### **Research Question 1**

**What insights do science teachers' metaphors provide into their responses to the ideas/concepts presented in the Dip.Ed. programme?**

Four of the five teachers responded positively to the use of media in their lessons. The following comment from the teacher who selected the metaphor of *teacher as gardener* illustrates:

#### ***Acceptance of use of media***

The two media that I favour for lesson presentations are (i) the overhead projector and (ii) the multimedia. However, my use of media has been restricted to the overhead projector because of the mere fact that we do not possess a laptop. Since I started teaching I have never made use of the media in my lessons, in fact, exposure to its use in presentation came on the Dip Ed Programme. Since then I have tried to make more use of it in my lessons.

The teacher who selected the metaphor *teacher as sieve* (teacher as helpless) was the only one who seemed to have rejected the idea of including media in his lessons. It seems that for this teacher, the metaphor selected was inextricably linked to the school context. He rejected the use of media on practical grounds. His feelings of helplessness were compounded by the physical and financial constraints:

***Rejection of media (visual)***

*Sieve*

Using transparencies however, is not very practical for regular use in my school. There are only two overhead projectors and many of the classrooms either do not have an electrical outlet or are too cramped for space. Using transparencies can also be an expensive affair. The transparencies themselves and also the special markers for them can be very costly if a teacher has to pay for these from his or her own pocket.

However, the teacher was willing to try strategies in relation to classroom organization and to adopt techniques for behaviour modification, which he perceived to be related to classroom management.

**Willingness to Try New Strategies: Becoming Empowered to Act**

It is plausible that a teacher who selected *teacher as sieve* and who thought of himself as helpless due to the influence of external factors became empowered to act in those arenas over which he had some control—his actions in the classroom. The teacher initially felt helpless with respect to classroom management and he responded to those aspects of the programme that could reduce his feelings of helplessness. Armed with new knowledge, attempts to change behaviour were evident, as illustrated in the caption and the corresponding reflective piece:

***Classroom management issues (Caption): Small steps***

These items indicate my progress in the aspect of classroom management. I have tried a lot of intervention strategies with my classes. I have succeeded in some and failed in others. Classroom management is essential for the smooth running of a lesson to achieve its desired outcomes. I will definitely have to continue trying different strategies in the unsuccessful classes until an effective one is discovered. In the past, I just ignored the misbehaving students and continued with my class being noisy. I realize that this practice is wrong since the good students are affected and sometimes the lesson is affected. This is definitely not the attitude of a good teacher.

The journal entry shows that while the teacher reflected on the effectiveness of his actions in the classroom, he still tended to locate the problem within the physical environment. He did not suggest, for example, that the teaching strategies selected might have influenced

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students' behaviour or that he had not yet acquired and/or mastered the skills needed to implement some of the new strategies:

***Quick fix/external factors insurmountable***

Today, my tutor visited me at school to observe my teaching my form 1 class. She told me that she noticed an improvement in the children's behaviour when compared to the last time she saw them on 2<sup>nd</sup> October, 2004. I felt very satisfied and happy about this observation.... I also felt motivated to continue trying out different techniques since I think that I have failed with my form 3 class in achieving a suitable level of classroom management. I have tried positive reinforcements, negative reinforcements, giving group work where I hoped that student [sic] would involve themselves in cooperative learning instead of doing useless talk and having lessons with a lot of beneficial discussions where I hoped that students would prefer these interactions instead of their own. All these interventions failed with my form 3 students. I think the overall general breakdown of classroom management in all of the form 3 classes, not just my own, is due to the fact that the classrooms are very cramped for room and are very hot, even on mornings. The students are thus not very comfortable and are uneasy.

The entry below shows that the concept of developing personal relationships with students also found some resonance with this teacher. The teacher began to show concern for his pupils. Again, this is an aspect of the teacher's role for which he could have assumed personal responsibility:

***Accepts expanded teacher's role: Care and concern***

This entry showed the care I had for the well being of one of my students. I helped him solve his problem of being too anxious during a test causing his performance level to drop. Ordinarily, I would have ignored the consistent failing by this student and would have blamed him for just not studying his work. I have grown to appreciate that there are other factors around that influence student performance. If I discover these factors, I can research possible solutions and maybe, one day I can get all of my students performing well.

In general, the teacher who thought of himself as "helpless" was open to the ideas and suggestions for which he could assume personal responsibility and which required a more student-centred approach.

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The reflective statements showed that the remaining teachers all responded positively to the concept of student-centredness. This positive response could be linked to their metaphors, which deconstruct to reveal core and peripheral meanings. As illustrated below, teachers recognized that they should not ignore students' needs. Irrespective of metaphor selected, the teachers responded positively to the concept of "student-centredness," especially with respect to the notion of student diversity.

The following illustrates teachers' responses to student-centredness in relation to assessment strategies. The theme of student-centredness then continues, with teachers' views on strategies that addressed student diversity in terms of learning styles and student involvement in the learning process. The presentation begins with the teacher (*gardener* metaphor) who explicitly described the students as passive, and continues with two teachers whose metaphors of *eagle* and *sculptor* described teaching and learning as requiring some student input. The final example is the teacher who also selected the metaphor *sculptor*, but who described the teacher as exhibiting authority and control with little student input:

### ***Student-centeredness***

#### *Gardener*

I view assessment as an important tool to the teacher not only to assess students to discern their achievement/learning, but to offer feedback and for the teacher to make appropriate adjustment to the lesson. While in the past my assessment strategy was limited to the paper and pen test, I am now aware of the numerous strategies that can be utilized for assessment. A multi-faceted approach is even more important with the dawn of the differentiated classroom. This entry marks my varied use of assessment strategies throughout the year.

#### *Eagle*

After months of pursuing the Dip Ed., I had learnt a lot, which has again served to alter my philosophy. In addition to my last philosophy (that student should work at their own pace), I believe that the teacher is responsible for creating a learning environment that is conducive to the development of all intelligences and learning styles.

In my view, the underlying principle in most lectures was student centeredness. Prior to the introduction of this theory in so many formats, I used a traditional approach. I taught, gave assignments and left it to the student to learn. During the course

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of this year, I realized that the student-centered approach resulted in more learning and development of interest on the students' part. Due to this fact, I developed these resources.

*Sculptor 1*

The purpose of the Portfolio is linked to this metaphor and my resulting desire to treat my students as individually as I could, to provide learning experiences to which everyone could relate. It was obvious to me at the start of September that I would need to apply the Theory of Multiple Intelligences to my practice. To this end, I planned and delivered lessons and assessments in different formats, using the strategies afforded me by the Dip Ed. I was of course limited by my inexperience with some of these strategies so that not all of my attempts were successful. However, the year provided useful learning experiences for myself as a teacher and as an individual.

Reflecting on ideas presented during the curriculum integration workshop, one of the teachers, who chose the metaphor of *sculptor 1*, was struck by the idea that there are multiple ways of presenting lessons, which would cater to student diversity. The journal entry stated in part:

Then the third session. We danced to soca-parang and brainstormed the word Christmas. Numerous ideas for lessons in myriad subjects turned up.... That was when I finally got it! The lesson could be presented in so many ways, and quickly.

*Sculptor 2*

*Sculptor 2*'s own experiences of learning led to an understanding of the role of students' input in the learning process. From her autobiography, student input plays a significant role in learning:

As I grew older, I realized a huge part of learning involved experiencing things myself. Reading from a text book and listening to my teachers helped me in the learning process to some extent but actually seeing a process being carried out made understanding a lot easier.... At Secondary school, I remember being taught in chemistry class how soap is made. My understanding of this process became a lot clearer when I actually did it myself in the laboratory.... My chemistry teacher at that time influenced me a great deal as a student. He had a very practical approach to teaching chemistry and this made me look forward to his chemistry class. When I looked back at his

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style of teaching and the impact it had on me as a student, I felt I wanted to have this kind of impact on my students as well....

As a teacher, however, she saw herself controlling the teaching/learning dynamic with very little input from students:

Four years ago when I started as a teacher, I was not very experienced in dealing with students. My philosophy was a simple one at that time. It was to teach everything on the syllabus and to complete the syllabus on time. I simply gave notes and gave assignments and discussed topics, which students did not understand. Although this worked on some level, I felt I was not truly reaching all the students. I realized that I needed to do a lot more to hold the interest of students, and it was at this point my philosophy changed.

In response to exposure to the programme, the teacher (*sculptor 2*) tried new strategies for interaction with the students. There was an awakening to the idea that students should be involved in and contribute to the learning process. Based on the new approaches tried, the teacher began to recognize that students can contribute to the learning environment and can think independently. For example:

As a teacher in the past, I always thought it would be a waste of time to let students try and solve problems like these. I thought instead of doing this I should just give them the theory and then perhaps give them a similar question to see if they grasp the concepts. However, I now realize that by allowing students to work on a problem before teaching the theory can actually help them to come up with similar ideas or techniques on their own. This definitely allows them to develop their critical thinking skills which are so important in today's world.

The metaphor of *teacher as sculptor* can be easily interpreted as indicative of students' active involvement; yet, this particular teacher's interpretation did not convey this understanding of the students' role in the teaching/learning interaction. However, the teacher's observation of her peers during a field visit facilitated her access to, and acceptance of, the idea that students can contribute to their learning. In a reflective piece, she wrote:

The first lesson was taught to a form 5 class. It was based on the homologous series in organic chemistry. I was really impressed with one of the activities the teacher used to get the students to deduce the general and molecular formulae of certain organic compounds. It was a game using 2 die. One dice bore the first

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part of the name of an organic compound and the other the second part of the name. The students were asked to name the compound formed each time both die were thrown. They were also asked to deduce the general and molecular formula of the compound named. I thought that this was really inventive and the students seemed to enjoy the activity a lot.

The reflective entries below show the teacher's reflections on her own attempts to involve students in the learning process through questioning and discussion strategies:

Today in my Form 6 class, I taught a lesson on gravimetric analysis. I taught this topic by mainly questioning the students to trigger responses that could be further questioned. In so doing, the students were allowed to develop their thinking skills. This also helped them to build the main concepts of the lesson. They were able to fully grasp on their own what gravimetric analysis is about and how it can be used in the chemical laboratory and everyday life.

I found myself being able to have a discussion with the class rather than actually teaching and at the same time the students were receiving the main concepts of the lesson.

There were attempts at new approaches, but, as seen from above, the *teacher as sculptor 2* still conceptualized "teaching" as "telling." This is in line with the view of a sculptor as one who has control over what shape is taken based on what is done—in the teacher's case based on what is told.

In addition to the above, the teachers also responded positively to (i) arts in education, (ii) the importance of lesson planning, and (iii) the overall development of the reflective habit, which also related to the notion of student-centredness:

### ***Arts in Education***

#### *Gardener*

As I sat in plenary sessions, week after week, I notice that numbers were dwindling.... For myself, however, I would not have traded these sessions. Arts in Education was informative and it showed many innovative ways of presenting, assessing, and reviewing learning.

*Sculptor1*

In recognition of student diversity, this teacher responded naturally to the idea of multiple intelligences. In her caption for a journal entry on the topic "Arts in Education," she wrote:

In my foray into the world of teaching for MI, I had to train myself in a variety of methods. I started using charts, models, group-work and giving assignments for marks in these same formats. I deliberately avoided using the Arts in my classroom. It was a weak point for me and I naturally shied away from it. At the end of intensive sessions on the incorporation of Music, Drama, Storytelling and other techniques into Education, it became obvious that I could not keep on in this way. The defense of Chemistry being incompatible with the use of Arts was invalid.

In addition to the above elements presented during the course of the Dip.Ed., two teachers also wrote explicitly about lesson planning and about their reflections on lessons. Their responses to these concepts coincide with their interpretations of the metaphors selected—*teacher as gardener* and *teacher as eagle* as described earlier.

***The importance of planning***

*Gardener*

The teacher spontaneously developed her own simile for lesson planning. She felt that lesson planning is to teacher as stethoscope is to a doctor:

***Caption***

In my entry of Sept 3<sup>rd</sup>, I describe lesson planning as being 'difficult' and 'time consuming.' However, in subsequent entries, I acknowledge the advantages of lesson planning: students understanding of the relationship between concepts (Big Picture) and the concept itself as well as that time management factor. I conclude that lesson planning is to teacher as stethoscope is to doctor or lesson planning is to teacher as the ledger is to accountant. Whatever the simile, lesson planning is an important tool to the teacher for it ensures goal attainment. As such my changing attitude to lesson planning certainly demonstrates my professional development as a teacher.

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*Eagle*

The teacher linked the importance of lesson planning with student-centeredness:

***Caption***

At the time lesson one was being planned, I thought it would have been a success because it was a topic I liked. I believed that once I was excited about a topic that excitement would immediately transfer to the children. After several curriculum sessions and much research, I finally planned a lesson that served to increase the students' interest. The lesson was more student-centered.

***Reflecting on lessons taught***

*Gardener*

**The importance of the set**

Two weeks have passed since my initial attempts at lesson plans and I still have not written an entire one. What I have attempted is to identify a 'set induction' for my lessons and to incorporate more group work. This I have managed with some degree of success, students seem to enjoy lessons more.

By Wednesday I had finished the lesson, but I wasn't too comfortable with the set. Finally, I came up with a more attractive set on Thursday. However, I had to work and rework it to ensure it would work.

Throughout this year, I have learnt so much. My main objective was to become a better teacher in the classroom and with the various field days my lesson planning skills as well as delivery of lessons has improved. Even my assessment strategy has moved from standardized test to performance assessment of projects, role-play and group work. Generally speaking, I am a better teacher than when I started, however there is so much more to learn.

*Eagle*

It was at that point I reflected on some instances when I would join with other teachers and use the following remark in reference to students, "I'm not here for them to like me. I'm here to do my job, and who doesn't want to learn, then that is their business." I remembered feeling so powerful when making this statement, as if it was an indication of my dedication. This

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statement was usually made when we attempted to increase the workload in order to complete the syllabus in the scheduled time. On reflection, I also realized that when I adopted this attitude, most students complained about not understanding the work and their enthusiasm dies. I always thought that this was because they did not want to work, but now I'm seeing a correlation between my sometimes non-caring attitude and their unwillingness to work. It is now I realize that my students are my job. I must no longer place all my emphasis on completing the syllabus, as no teaching has taken place until they learn. The teachers that I liked the most were the ones who peaked [sic] my interest in the subject area making sure everyone understood the work that was covered.

#### **Summary**

The teacher who selected the metaphor of *gardener* responded to most of the elements of the programme, as she related these to increasing student-centredness (which was embedded within the metaphor selected) to enhance student performance. Similarly, as the teacher who selected the *eagle* metaphor developed, the lessons moved away from sole reliance on teacher telling to use of questioning and guided discussion, which were more in line with her explanation of the metaphor initially selected. For example, with the selection of the metaphor of *eagle*, the notion of student-centredness was an intrinsic component of the metaphor. The teacher's autobiographical statement illustrated her orientation toward student-centredness explicitly, which most likely served as the prior knowledge (anchor) on which the ideas presented during the programme were linked.

The examples above illustrated that there were elements of the programme to which teachers related, and which seemed to match some teachers' initial views about teaching. However, this was not always the case. For example, for the teachers who selected the metaphors *sculptor 2* and *sieve*, their responses to some ideas seemed to contradict their explicit renderings of their selected metaphor. In these instances, congruence between implicit and explicitly stated interpretations of the metaphor and ideas presented was not a prerequisite for the teachers to access the concepts presented.

It is plausible that for *teacher as sieve*, the state of helplessness associated with the metaphor was unacceptable and reflected the teacher's response to perceived contextual factors rather than a fixed characteristic of the teacher. For *teacher as sculptor 2*, the influence of

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her own learning experiences were perhaps reinforced by the concepts presented on the programme, and hence they became relevant to her teaching/learning interaction. The ensuing tension might have facilitated these teachers' access to some of the ideas and strategies presented in the programme, which were in turn implemented in the classroom. It can therefore be surmised that the ideas presented seemed to be plausible, intelligible, and fruitful.

### **Overall Summary**

From the teachers' reflections and actions, it is evident that they responded positively to many aspects of the programme. For some teachers, their responses could be linked in part to their own conceptions of teaching as revealed by the metaphors selected. Some aspects of the programme that resonated with the teachers' beliefs were: (a) student-centredness, (b) student diversity linked to MI theory and multiple models of presentation, (c) the importance of planning, (d) classroom management issues, and (e) reflecting upon their practice. However, for the participants in this study, the analysis provided evidence that knowledge of the metaphor alone is not sufficient to predict their responses to the programme. Some of their responses to aspects of the programme could be linked to their autobiographical statements or to their actions in the classroom, which were not necessarily related to their explicit elaboration of their metaphors. Additional data sources were therefore required to gain a better understanding of teachers' responses to the programme elements.

### **Research Question 2**

#### **What changes in the metaphors occur during the period of training?**

Two teachers indicated that they had not selected a new metaphor (see also Bullough, 1991), and they did not submit the repeat assignment. Of the three teachers who did submit the assignment a second time, the changes occurred at the level of interpretation of the original metaphor instead of the selection of a new metaphor. For the two teachers who chose the metaphor of *teacher as sculptor*, the impetus for change was, respectively, the strengthened view and the new focus on the individual student. For example, *sculptor 1*, who, during the programme, was transferred voluntarily to another school said:

My first weeks at [new school mentioned] have put me back to this assessing phase of knowing my students. Trying to pigeonhole each of them. This resulted in the realization that the

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fundamental differences among students are still there. Thus, the student is not necessarily clay waiting for me to shape her but may be another type of material needing alternative ways of working. I now see that a student may be like weed, clay, stone or some other material that requires me to get to know the individual before I can decide a means of working with her. The wrong method could be ineffective or even destructive. My classroom management approaches and instructional strategies are currently designed with the class in mind rather than the student. I must find a way to address these singular needs while still maintaining focus on class goals.

For *sculptor 2*, the explicit recognition of student individuality became evident in her theorizing about teaching and learning, but under the framework of the same metaphor:

My metaphor is basically the same except for a few changes. I realize now that there are different types of clay and some take longer to mould. This is similar to teaching in the sense that there are different kinds of students and some may need more attention than others. There are different methods that can be used to mould the different types of clay to achieve a good end product. Therefore, depending on the type of clay used, the sculptor must use a suitable method for moulding. This relates to teaching because students learn in different ways and not one method is suitable for teaching. I realize now that I must be willing to cater to the different learning styles of my students and therefore I should be able to use different strategies in teaching.

**The Sieve: (Concluding statement)**

In presenting the new interpretation of the metaphor of *teacher as sieve*, the teacher revealed that he related the holes in the sieve to “gaps” or “areas of weaknesses.” He believed that the weaknesses were reduced as a result of training. The feeling of helplessness that was originally evident in the teacher’s explanation of the metaphor was changed to feelings of empowerment. The teacher began to see himself as an agent in his own professional development and in the teaching/learning encounter. He stated:

Instead of being a sieve with big holes, I am now one with vastly smaller holes. However, these smaller holes still need to be sealed up. All of the skills I acquired in this Dip Ed programme, I never really thought about ever doing. I have moved from doing zero media items in my classes to being familiar with and

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competent in the most common media sources. I have become more able to properly assess students' performance levels. I have become proficient in unit and lesson planning thus improving the learning done by students.... Although I made a lot of improvements, I still need to enhance my classroom management skills more. Being trained as a reflective practitioner, I am confident that I will improve in this venture. I also have to keep investigating different strategies available for different topics. Certain student-centered teaching methods are better suited for certain topics. I need to further investigate this link.

### **Summary**

Three teachers' reflections revealed changes in the interpretation of the metaphor selected. The changes were made to reflect contemporary ideas presented in the Dip.Ed. programme. These included the recognition of learner individuality/difference within the classroom setting and the role of the teacher in catering to student learning, by developing the reflective habit and continuing professional development through research. The retention of the original metaphor highlights the multiple possible interpretations of words used to represent phenomenon/experiences. In relation to cognition, it is likely that this multiplicity of meanings can facilitate the anchoring of contemporary ideas/theories about teaching, making the ideas presented on the programme plausible and intelligible and, hence, resulting in a different focus in their theorizing about teaching and learning. In addition, for the teacher who selected the metaphor *teacher as sieve*, it is likely that the feelings of helplessness were motivational factors that could be linked to learning.

### **Conclusion and Discussion**

The teachers entered the programme with three categories of conceptions of teaching involving levels of teacher control ranging from "teacher as helpless" to "teacher in control but with some student input" to "teacher exhibiting authority and control with little student input." However, it was evident that the teachers' metaphors, even while quite varied and some seemingly incongruent with contemporary notions of teaching and learning, did not in any way hinder teachers' access to concepts and theories that were presented during the year-long Dip.Ed. programme. Significantly, all teachers, having produced a range of metaphors, responded positively to many of the same aspects of the Dip.Ed.

programme, especially to ideas of student-centredness. This is quite a significant finding because teacher education programmes aim to provide experiences that can facilitate changes in the participants' thinking. In addition, as indicated above, learning occurs most readily when there are similarities between the concepts to which learners are exposed and their prior knowledge. It is plausible that the areas of congruence could be interpreted as indicative of the multiple interpretations that each metaphor accommodates, and aided teachers' access to the concepts.

As illustrated in Part 1, the metaphors deconstructed to reveal marginalized meanings, which were congruent with contemporary theories. For example, the *gardener* metaphor centres around the actions of the teacher but, at the same time, the student can be interpreted as an active rather than passive learner. And it is this inherent contradiction that aligns with contemporary learning theories and would have fit with students' mental schemes. Significantly, for the teacher who espoused most teacher control (*sculptor 2*), her own experiences as a school learner pointed to the direction of student-centredness and, hence, these prior experiences could have facilitated her access to concepts presented. It is also possible that the teachers' reflections were designed to convey what they thought they were expected to write for the purpose of a grade. The real test of their commitment to the new understandings suggested is that their practice after graduation from the Dip.Ed. programme reflects the contemporary notions observed during the programme. Such an investigation should be the next step in the research.

Teacher educators might also be tempted to evaluate the success of the programme by having their students develop new metaphors, and assessing these metaphors in terms of their obvious alignment to the contemporary ideas to which students were introduced. However, this reasoning may be flawed. In this study, there were no changes to the initial metaphor selected, a finding which is consistent with some reports in the literature. For example, Sillman and Dana (1999) have reported that prospective teachers retained their initial metaphors. However, in this particular study, the retention of the original metaphor did not mean that there were no changes in thinking about teaching and learning on exposure to programme elements. It is evident that the teachers' interpretation of the metaphor was based on their unique experiences and that the same metaphor can be interpreted differently.

Accordingly, a selected metaphor can allow new aspects of the teaching/learning interaction to become prominent. This phenomenon was noted in the current study with the different interpretations provided by the two teachers who selected the metaphor of *teacher as sculptor*. It was also reported by Lloyd Yero (2001–2002), who presented a number

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of interpretations of the *lesson as a journey* metaphor. Additionally, the findings from this study support Lederman's (1997) view, as cited by Monk and Dillon (2000, p. 85), that teachers' conceptions are not necessarily reflected in their planned or actual behaviours. However, knowledge of metaphors and of the multiple interpretations can serve as a framework for dialogue and discussion between teacher educators and their students regarding teaching and learning. The metaphor is therefore a useful tool to give some insights into teachers' conceptions of teaching and their responses to teacher education programmes. However, in-depth longitudinal studies of teachers' metaphors and their actions in the classroom on a case-by-case basis would be a meaningful contribution to the literature.

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## **Appendix**

### **Task**

- a) Write a metaphor that captures you as a teacher.
- b) Illustrate how this metaphor is translated into action in the classroom.
- c) What are the assumptions about teachers, learners, subject matter, and context that underpin your choice of metaphor?

