

**THE EXTENDED PRACTICUM BEYOND THE CLASSROOM OPTION:  
IMPACTS OF A PRE-SERVICE PRACTICUM IN A MUSEUM SETTING**

by

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## **Abstract**

A key challenge facing reformist teacher educators and researchers today is one of aligning pre-service teachers' epistemologies and pedagogies with current theories of learning and teaching. The deficiencies in the traditional school-based practicum experience can be argued to complicate the process by reinforcing pre-service teachers' value of naïve epistemologies and contributing to pre-service teachers' questions about the relevance of more dominant epistemologies of learning and teaching. Based on recent research, teacher educators considered the role of non-traditional practicum structures in teacher development to be a viable complement, specifically the development of a *Schönian* practicum option.

A qualitative study case study methodology was employed to examine the experiences, conceptions of learning and teaching, and teaching development of three small cohorts of pre-service teachers participating in practicum experiences at an aquarium, an art gallery, and a science centre. Participants developed flexible pedagogies, gained experience using constructivist pedagogical principles, insights into the affective components of pedagogical relationships, felt better prepared for the role of a Teacher-On-Call, and used reflective practice to consider the effect of their pedagogical choices on student engagement, learning and motivation.

This study illustrates the potential for using museum spaces as the context of non-traditional *Schönian* practicum spaces that can more effectively transition pre-service teachers' naïve epistemologies of learning and teaching to more sophisticated ones and supports the potential for effective reforms to programs of teacher education.

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We only think when we are confronted with a problem.

- John Dewey

No problem can be solved from the same level of consciousness that created it.

- Albert Einstein



## **Dedication**

I dedicate this to my wife Amy. I could not have done this without you.

## **Chapter 1: Introduction**

As our understanding of learners and learning has evolved, so has our understanding of teachers and teaching. A key challenge facing teacher educators today, specifically those who are working to align the practice of teachers more closely with current theories of learning, is one of overcoming the traditional conceptions of both (Lewis, 2007; Rosenfeld & Rosenfeld; 2006). As we work to prepare teachers that will approach learning as an active and constructive process by which the learner makes sense of the world (Hein, 1998), we must also find or create the new contexts necessary to break the circle of traditionally trained teachers teaching in a traditional manner (Stofflett & Stoddart, 1994). Non-traditional teacher-preparation contexts, such as museums<sup>1</sup>, must be considered for the role they might play in this endeavor.

### **1.1 Situating the research**

This research study emerges from: (1) the challenge facing teacher educators today, specifically those who are working to align the practice of teachers more closely with current theories of learning; (2) a review of the literature pertaining to initial teacher education (ITE) and museum partnerships with ITE programs (Chapter 2); and, (3) my own interests and professional background. To explore the questions that gave rise to my research study, I studied the impacts of a museum practicum experience on pre-service teachers. An aquarium, a science centre and an art gallery provided the practicum contexts for three groups of pre-service teachers during a three-week practicum

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<sup>1</sup> In this paper I use the term museum to refer to institutions such as aquariums, science centres, natural history museums, art galleries, etc.

experience. I conducted a multiple case study and gathered data from the pre-service teachers about their experiences.

I hold Bachelor degrees in both Education and Visual Fine Arts, and I have 14 years of professional experience with a variety of informal learning institutions in both British Columbia and Alberta. My professional experience includes developing and evaluating many different programs of public and school-based visitor engagement used by museums, and the development and delivery of in-service and pre-service teachers' professional development programming offered by museums. Additionally, during the completion of my ITE program, I spent summers delivering both public and school programming in a museum context. I believe that my museum experiences provided perspectives on teaching and learning that were complementary to my ITE experiences. They allowed me more opportunity to practice student-centred approaches to teaching and learning than did my classroom practicum experience. I found my school-based practicum experiences to be very much about adapting to the existing classroom culture as a means of passing my evaluations, which were very traditional, didactic and safe. I found that my museum-based work experiences provided more concrete practice using the pedagogy that I had learned about in my pre-service program's university components. I found that I emerged from both experiences feeling confident in my ability to succeed in the traditional classroom setting using non-traditional pedagogies.

## **1.2 The area of research: museums as sites of pre-service practica**

Museums, as an integral part of the community infrastructure (Falk, 2001), serve as destinations of leisure; as institutions of research; as cultural, historical and natural

gateways; and, as providers of educational experiences for tourists, locals, families and school groups (Falk, Koran & Dierking, 1986). Indeed, education has become one of the major functions of the modern museum (Hein, 1998), which often employs staff specifically for the delivery of educational programs to both the leisure visitor and for more organized groups such as school classes. In a recent survey of 85 American art museums, over 90% offered educational programs specifically targeted for school groups in addition to public program offerings that visiting school groups may elect to attend (Wetterlund & Sayre, 2003).

School groups, as part of the formal educational system, are an intriguing but not surprising user of museums. Museums have long been recognized as educational in nature (Dewey, 1897; Hooper-Greenhill, 1991), and indeed education is frequently cited as a desired outcome (Hood, 1983; Pekarik, Doering & Karns, 1999; Packer & Ballantyne, 2002) of a self-directed, leisure-oriented museum visit (Falk & Dierking, 2002). Self-directed, leisure-oriented museum learning experiences are commonly referred to as informal, to contrast with formal learning experiences, where a designed, planned, and mandatory educational agenda is authoritatively structured over time and usually occur in schools (Ellenbogen & Stevens, 2005). What I find intriguing, as a museum researcher and a teacher educator, is the blurring of the boundaries between formal and informal learning experiences when school groups visit museums. In particular, I am interested in exploring processes through which school teachers might become effective mediators of student learning and the role that museum contexts might play in teacher education.

### **1.2.1 The problem**

The practicum component is seen as the traditional context within which pre-service teachers can put into practice their developing pedagogies, and it is therefore considered to be possibly the most important component of ITE programs by both pre-service teachers and teacher educators (Gallego, 2001; Lauriala, 1997; Tang, 2003; Wilson & I'Anson, 2006). Teacher educators tend to view the pre-service practicum as a time for pre-service teachers to explore non-traditional ways of teaching (Griffin, 1989), to try transferring the pedagogical content knowledge that they learned on campus (Atputhasamy, 2005; Onslow, Beynon, & Geddis, 1992), to reflect on their experiences as a teacher (Borko, & Mayfield, 1995), to move out of their comfort zones as a teacher (Chandler et al., 1994), and to shift the examination of their teaching from the “how” to the “why” (Pape, 1992). The shift from the “how” to the “why” can be seen as representative of the challenge facing teacher educators today, specifically those who are working to align the practice of teachers more closely with current theories of learning. It can be the shift from transmissive classroom pedagogy to constructivist classroom pedagogy, from a mechanical practitioner to a reflective practitioner, or from a teacher-centred practice to student-centred practice.

Pre-service teachers, on the other hand, tend to focus their examination of teaching on the “how”, not the “why” (Bolin, 1990), and tend to perceive the practicum as an opportunity for practicing and gaining experience, the keystone upon which hiring decisions will be made (Wideen, Mayer-Smith, & Moon, 1998). A consistent theme in pre-service teachers' comments about their practicum experience highlights the “general difficulty they have in integrating the work that they are expected to undertake on the

practicum with what they are learning about teaching in the university component of the course” (Ingvarson, Beavis & Kleinhenz, 2007, p. 375). One difficulty can be attributed to the conflict between the constructivist practices endorsed by the university and the transmissive instruction prevalent in K-12 classrooms (Anagnostopoulos, Smith, & Basmadjian, 2007) which has been manifested in some instances as a lack of support from their supervising classroom teacher for the introduction of new teaching practices advocated by the university (Waghorn & Stevens, 1996), and a lack of confidence on the part of pre-service teachers to continue introducing new practices in the face of negative reception or lack of support (John, 2001).

It can be argued that “teachers’ beliefs and value systems will shape their conceptions and practical theories in classroom teaching, eventually influencing their instructional strategies and performance in the classroom” (Cheng, Chan, Tang & Chen, 2009, p. 319). Without the ability to test new teaching methods, pre-service teachers cannot appraise the effects of their practice in context, and the opportunity to refine their personal epistemological beliefs through reflection on that effectiveness will be lost (Kang, 2008). ‘Epistemological beliefs’ refer to personal beliefs about the nature of knowledge and how humans develop it (Hofer & Pintrich, 2002), and have been closely connected to the pedagogical approaches of teachers (Kang & Wallace, 2005). If teacher educators wish to aid pre-service teachers in the development of pedagogies that include new teaching practices, then ITE programs must develop practicum components that allow pre-service teachers to experience and evaluate new practices before new beliefs about those practices can impact their personal epistemological beliefs. The challenges pre-service teachers face when trying to enact new pedagogy in the traditional classroom-

based practicum, however, cannot be ignored and so teacher educators must consider either the radical restructuring of the current school-based practicum in ITE programs or the development of non-traditional practicum experiences.

Wilson and I'Anson (2006) posited that a non-traditional approach to the ITE practicum, as described by Schön (1987), might provide an important bridging context between 'the practice world' and the "esoteric world of the academy" (Schön, 1987, p. 37). This *Schönian* practicum would be designed specifically for the task of learning a new practice without the "complexity, uncertainty, instability, uniqueness, and value conflicts" (Schön, 1983, p. 14) associated with the traditional school-based practicum that could distract pre-service teachers from learning a new practice. Wilson and I'Anson (2006) describe the Schönian practicum as a space:

- "that has as one of its primary purposes the promotion of reflection" (p. 354);
- that provides for a "dialogical relationship" between the pre-service teacher and "coach" (p. 355).
- that is "free from many of the pressures of apprenticeship" encountered by pre-service teachers during the traditional school-based practicum (p. 356);
- for "the entertaining of alternative pedagogies and their implications for the practice of teaching" (p. 356);
- that occurs "outside their eventual community of practice" possibly providing pre-service teachers with different perspectives of teaching (p. 356);
- and, that I'Anson, Rodrigues and Wilson (2003, p. 195) observed, "puts considerable emphasis on opportunities for dialogue with various others (peers,

teacher fellows, tutors), each of which enables engagement with a range of different understandings and perspectives.”

Wilson and P'Anson (2006), however, do not advocate replacing the traditional school-based practicum with a Schönian version; rather they present the two practica as complementary in that one allows pre-service teachers to focus on the “how” while the other allows them to focus to the “why”. Because pre-service teachers tend to place a higher value on the practical and school-based components of their ITE program (Malderez, Hobson, Tracey & Kerr, 2007, p. 241) then these components should be considered a *critical phase* in the professional socialization of pre-service teachers (Lauriala, 1997), and should therefore be maintained as the opportunity to focus on the “how”. The challenge for teacher educators will then be to find ways to construct a complementary Schönian practicum experience that allows pre-service teachers to focus on the “why”. In other words, the challenge is to develop a practicum component that provides pre-service teachers with the opportunity to practice and reflect upon the pedagogical approaches that, if successful, can influence pre-service teachers’ beliefs and that will help them transition from naïve epistemologies to more sophisticated ones.

### **1.2.2 Purpose of the study**

My research aims to understand the impact and outcomes of practicum models that are different from the classroom-only practicum traditionally offered during most teacher education programs. My objectives are to assess the impact of a museum practicum experience on pre-service teachers’ epistemologies and pedagogies of teaching



and learning, and to identify the strengths and weaknesses of such a practicum.

Therefore, the research questions that guide and frame my study are:

- 1) What are the experiences of pre-service teachers during a museum-based practicum?
- 2) How do the experiences of pre-service teachers during a museum-based practicum impact their personal epistemologies and pedagogies of learning and teaching?

### **1.2.3 Significance of the study**

The literature is quite sparse with regards to ITE programs that have partnered with museums to provide opportunities for pre-service teachers to develop new epistemologies or pedagogies through practicum experiences (Chin, 2004; Chin & Tuan, 2000; Jung & Tonso 2006; Metz, 2005; Middlebrooks, 1999; Olson, Cox-Petersen & McComas, 2001; Tal, 2001), and the existing literature advocates for additional research. This study adds to the body of research that informs museum and teacher education practices around the world. It will also contribute to a better and shared understanding between the practices of museum education and teacher education.

### **1.2.4 Methodological approach**

This study employed a qualitative methodology in order to investigate the impact that a museum-based practicum option might have on pre-service teachers' developing epistemologies and pedagogies of teaching and learning. A qualitative methodology allowed for the collection of and examination of pre-service teachers self-reported gains from a museum-based practicum. A case study approach (Merriam, 1998; Stake, 2000;

Yin, 2003) was used to allow for the rich, personal experiences of the pre-service teachers to be captured for examination. Focus groups using semi-structured, open-ended interviews were used both immediately before and immediately following the museum-based practicum experience as the main tools for data collection. Interview sessions were recorded on both video and audio recording devices. For the purposes of triangulating the data, participants were also asked to submit weekly emailed reflections about their museum-based practicum experience. Data analysis included transcription of the interview audio, coding the transcriptions and submitted reflections within the individual contexts of each of the practica, and subsequent interpretation of the data sets.

### **1.3 Organization of the thesis**

In Chapter 1, I considered the development of a non-traditional practicum for pre-service teachers that would complement their traditional school-based practicum experience and presented my research questions. Chapter 2 then provides a review of the literature that is relevant to this study. It begins with a discussion of pre-service teacher education with a focus on the practicum as the opportunity for pre-service teachers to practice their profession. It continues with a discussion of the challenges facing school-based practica with regards to pre-service teachers enacting pedagogies that are aligned with new theories of learning. The literature around non-traditional practicum settings is then explored and a case for a non-traditional practicum is made. The literature review concludes with a consideration of museums as sites of non-traditional practica.

Chapter 3 begins with a reintroduction of the research questions followed by a presentation of the epistemological underpinnings for my study. The ITE program and museum partnerships are discussed contextually followed by a description of the three different museum-based practicum structures. The methodology and methods of my research are then presented as are the data collection and analysis procedures. The chapter concludes with a discussion of the validity, reliability and ethics of my research methods.

Chapter 4 provides the results and data analysis of the three different museum-practicum settings contextually. Additionally, the outcomes of the study are analysed across contexts and presented. The results are presented in alignment with my research questions.

In Chapter 5, I summarize the significant findings of the study in the context of current knowledge in the fields of learning in museums and teacher education. The limitations of the study are identified and the implications of the significant findings for future research and for the remediation of future programs are presented. Finally, recommendations for future studies are proposed.

## **Chapter 2: Literature review**

In this Chapter, I provide a review of the literature that provides support for the research that I have undertaken as described in this dissertation.

### **2.1 Overview**

The first section of this review begins with a discussion of the research literature about pre-service teacher education with a focus on the practicum as the opportunity for pre-service teachers to practice their profession. It continues with a discussion of the challenges facing school-based practica with regards to pre-service teachers enacting pedagogies that are aligned with new theories of learning. The literature around non-traditional practicum settings is then explored and a case for a non-traditional practicum is made. The literature review concludes with a consideration of museums as sites of non-traditional practica.

### **2.2 The call for research into programs of initial teacher education**

Despite decades of research examining different approaches to the comprehensive preparation of pre-service teachers, there has been no single program capable of demonstrating a definitive solution to the challenge of aligning the epistemological beliefs and pedagogies of teachers more closely with current theories of teaching and learning (Cochran-Smith & Zeichner, 2005). Zeichner and Conklin (2005), identified several contextual challenges facing the development of a definitive program that can be transferred across contexts between different programs of initial teacher education (ITE)

including: differences between the political context and type of institutions; the history and culture of the institutions; the goals and capabilities of their respective faculties; the substance and academic rigor of the pre-service teacher preparation curriculum; the vision of teaching, schooling and society that underlies the curriculum; and as is relevant to my research, the program's courses and field experiences, and the degree to which the vision underlying the curriculum is supported and understood by the teacher educators and the institutional partners involved in the education of pre-service teachers.

It would be too simplistic to judge the current lack of definitive program development as a failure of the research on teacher education, and instead Cochran-Smith and Fries (2005), suggest that it is reflective of the relative youth of this field of research. They recommend further research investigating the impact of teacher education programs that include varying degrees and kinds of support for teacher learning. The call for additional research into programs of pre-service teacher education is echoed within much of the recent literature (Darling-Hammond, 2006; Korthagen, Loughran, & Russell, 2006; Maandag, Deinum, Hofman, & Buitink, 2007; Zeichner, 2005), and provides the impetus and focus for my research.

### **2.3 The practicum as a context for studying the personal epistemological beliefs and pedagogies of pre-service teachers**

The practicum is often chosen by reformist teacher educators and researchers as a context within which to examine the development of pre-service teachers' personal epistemologies and pedagogies (Atputhasamy, 2005; Clarke, 2004; Ferrier-Kerr, 2009; Graham, 2006; Haney & McArthur, 2002; Hodkinson & Hodkinson, 1999; Poulou,

2007). Personal epistemologies or epistemological beliefs refer to the beliefs pre-service teachers hold about the nature of knowledge and how human beings develop knowledge (Hofer & Pintrich, 1997). Research indicates that pre-service teachers' pedagogical choices are influenced by their beliefs about teaching and learning (Bryan & Atwater, 2002; Pajares, 1992; Kang, 2008; Kang & Wallace, 2004; Wilkins, 2004). Understanding how epistemological beliefs influence pedagogy can be problematic as beliefs "cannot be directly observed and must be ascertained by what people say and do" (Marbach-Ad & McGinnis, 2007, p. 175). The practicum, by providing pre-service teachers with the opportunity to "put into practice the many theories and skills that they have been exposed to in the teacher education programme" (Atputhasamy, 2005, p. 1), therefore provides teacher educators and researchers with a significant opportunity to observe what pre-service teachers say and do. Teacher educators and researchers must then ascertain whether or not what pre-service teachers say and do is reflective of current theories of teaching and learning.

### **2.3.1 The significance of naïve and sophisticated epistemological beliefs and pedagogies**

Researchers have examined the pedagogical choices of teachers with the goal of being able to more explicitly connect the epistemological beliefs of teachers to their choices (Hashweh, 1996; Kang, 2008; Kang & Wallace, 2004; Yerrick, Parke & Nugent, 1997). Hashweh (1996) used a survey to show that teachers' epistemological beliefs aligned with their teaching strategies, and Yerrick, Parke and Nugent (1997), used interviews to demonstrate an alignment between teachers' beliefs and their instructional

choices. Kang and Wallace (2004) found that a teacher's naïve epistemological beliefs are clearly reflected in the teacher's practice. They defined naïve epistemological beliefs as being comprised of beliefs that reflect the ontological perspective of knowledge as one certain truth, and the relational perspective of learner as receiver of knowledge and separate from its construction. Naïve epistemological beliefs and pedagogies are often targeted for reform by teacher educators and researchers seeking to more closely align them with new theories of teaching and learning.

Kang and Wallace (2004) also found that the more sophisticated the epistemological beliefs of the teachers, the more difficult it was to explicitly connect those beliefs to the teachers' pedagogical choices. They defined sophisticated epistemological beliefs as being comprised of beliefs that reflect the ontological perspective of knowledge as tentative multiple truths, and the relational perspective of learner as actively involved in the construction of their own knowledge and meaning making. Sophisticated epistemological beliefs and pedagogies enacted by pre-service teachers during their practicum are often interpreted by reformist teacher educators and researchers as evidence of successful alignment with new theories of teaching and learning.

#### **2.4 The practicum as a contested space**

The practicum component is seen as the traditional context within which pre-service teachers can put into practice their developing pedagogies, and it is therefore considered to be one of the most important components of ITE programs by both pre-service teachers and teacher educators (Gallego, 2001; Lauriala, 1997; Tang, 2003;

Wilson & I'Anson, 2006). Teacher educators tend to view the pre-service practicum as a time for beginning teachers to explore non-traditional ways of teaching (Griffin, 1989), transfer the pedagogical content knowledge that they learned on campus (Atputhasamy, 2005; Onslow, Beynon, & Geddis, 1992), reflect on their experiences (Borko & Mayfield, 1995), take some risks (Chandler et al., 1994), and to shift the examination of their teaching from the *how* to the *why* (Pape, 1992). The shift from the *how* to the *why* represents the challenges facing teacher educators today - it is the shift from transmissive classroom pedagogy to constructivist classroom pedagogy, from a mechanical practitioner to a reflective practitioner, from a teacher-centred practice to student-centred practice, and from a naïve personal epistemology to a more sophisticated one.

Pre-service teachers, however, tend to focus their examination of teaching on the *how*, not the *why* (Bolin, 1990), and tend to perceive the practicum as an opportunity for practicing and gaining experience, the keystone upon which hiring decisions will be made (Wideen, Mayer-Smith, & Moon, 1998). “Their goal is to be judged proficient in terms of the values that govern the school. Although the university has some opportunities to reinforce its values during supervision visits, these occasions are fleeting relative to the constant presence of the mentor teacher and ubiquity of the school culture” (Smagorinsky et al., 2004, p. 10). If the school culture at the site of the practicum experience reinforces the value of naïve epistemologies and pedagogies for pre-service teachers, then questions about the relevance of a teacher education program that promotes the development of sophisticated epistemologies and pedagogies will arise (Hobson, 2003, Lewis, 2007; Younger et al., 2004).



## **2.5 The questionable impact of pre-service teacher preparation programs on pre-service teachers epistemologies and pedagogies**

A consistent theme in pre-service teachers' comments about their practicum experience highlights the "general difficulty they have in integrating the work that they are expected to undertake on the practicum with what they are learning about teaching in the university component of the course" (Ingvarson, Beavis & Kleinhenz, 2007, p. 375). The difficulty can be attributed to the conflict between the constructivist practices endorsed by the university and the transmissive instruction prevalent in K-12 classrooms (Anagnostopoulos, Smith, & Basmadjian, 2007) which has been manifested in some instances as a lack of support from their supervising classroom teacher for the introduction of new teaching practices advocated by the university (Waghorn & Stevens, 1996), as a belief in the primacy of the curriculum content over the integration of constructivist pedagogical approaches (Haney & McArthur, 2001), and as a lack of confidence on the part of pre-service teachers to continue introducing new practices in the face of negative reception or lack of support (John, 2001). A study in New Zealand by Waghorn and Stevens (1996, p. 50) suggests that "student teachers usually comply with the status quo and carry out actions and routines preferred by their supervising teachers" (p. 50), and so it is understandable that pre-service teachers tend to reproduce the kind of teaching that they have experienced and observed (Korthagen & Kessels, 1999). As a result, pre-service teachers are often not able to practice with the new pedagogies they learn about in their teacher preparation coursework, and so those pedagogies have less of an opportunity to impact the pre-service teachers' epistemologies and pedagogies of learning and teaching (Kang, 2008).

An extensive meta-study by Wideen, Mayer-Smith, and Moon (1998) led to a general conclusion that the impact of teacher education on the practice of teachers tends to be minimal. In a review of North-American research on teacher education, the AERA Panel on Research and Teacher Education (Cochran-Smith & Zeichner, 2005) came to a similar conclusion that there is no convincing evidence of the impact that teacher education makes on the practice of teachers. However, there are contrasting studies showing that teacher education based on specific pedagogies does influence the practices of teachers (Anderson, Lawson, & Mayer-Smith, 2006; Korthagen et al., 2001; I'Anson, Rodrigues, & Wilson, 2003).

For example, Korthagen et al. (2001), describe a teacher education program element called the *one-on-one* experience that connected individual secondary pre-service teachers with individual high school students for the delivery of an hour-long lesson each week. The pre-service teachers found that by reflecting on their epistemologies and pedagogies, they were able to shift perspectives from teacher-focused to student-focused. Korthagen et al. (2001) attributed the success of this approach in part to the provision of *real* experiences. Real experiences were described as experiences that were professionally relevant to the practice of a teacher (i.e. delivering lessons to students). These experiences were provided in a setting that avoided socialization with traditional practices of teaching and were not considered threatening enough to trigger survival responses (i.e. manifestations of traditional epistemologies and pedagogies). The real experiences that Korthagen et al. (2001) described, are reminiscent of Schön's (1987) description of the *reflective* practicum as a "setting designed for the task of learning a practice" within a context that "approximates a practice world" where "students learn by

doing, although their doing usually falls short of real world work” (p. 37). The researchers’ purposeful structuring of pre-service teachers’ teaching experiences allowed for practice with the new reflective pedagogies that may not have been as successfully adopted during a traditional classroom practicum.

I’Anson, Rodrigues, and Wilson (2003), while investigating the reflective practices of secondary pre-service teachers, implemented micro-teaching opportunities because of their potential to “promote reflexivity, enabling the fledgling teacher to review their set of priorities and renegotiate their position with regard to their previous, taken for granted attitudes, values and assumptions” (p. 197). The pre-service teachers participating in the micro-teaching sessions planned, delivered and evaluated six or seven 30-minute lessons to students drawn from local secondary schools and engaged in reflective practices following each teaching experience. Pre-service teachers were observed to become much more effective reflective practitioners, a finding the researchers attributed to not only the opportunity to practice reflection individually and with their peers, but also to the reduced complexity of the teaching experiences (i.e. not in a typical classroom environment).

Anderson, Lawson and Mayer-Smith (2006) investigated the impact of a museum-based practicum component on the epistemologies and pedagogies of secondary pre-service science teachers. Pre-service teachers completed a ten-week, school-based practicum experience before spending three weeks teaching the educational programs offered by an aquarium whose views on learning and teaching were aligned in part with the views of the university education program. The researchers found that all pre-service teachers in the museum-based practicum experienced “profound changes in their views of

what it means to teach and learn, gained confidence in their ability to teach, and felt empowered as science educators following the practicum” (Anderson, Lawson, & Mayer-Smith, 2006, p. 341). This program provided real experiences for pre-service teachers to practice in a setting of reduced complexity that provided opportunities for self-reflection and reflection with their peers. Darling-Hammond (2006) identifies “integration and coherence” between course work and clinical work, and “extensive, well-supervised clinical experiences linked to course work using pedagogies that link theory and practice” as two pedagogical cornerstones capable of “achieving radically different outcomes from preparation programs” (p. 306-307).

In the research conducted by Korthagen et al. (2001), P’Anson, Rodrigues, & Wilson (2003), and Anderson, Lawson, and Mayer-Smith (2006), the opportunity for pre-service teachers to practice with the new approaches teacher educators and researchers advocate, clearly contributed to the pre-service teachers’ success in learning the practice. The opportunity to practice in a non-threatening setting that is less complex than the traditional school-based practicum was also found to be instrumental as it allowed the pre-service teachers to reflect upon the efficacy of the new pedagogies that they were practicing. The challenges pre-service teachers face when trying to enact new pedagogy in the traditional classroom-based practica, however, cannot be ignored and so teacher educators must consider either the radical restructuring of the current school-based practicum in ITE programs or the development of non-traditional practicum experiences.

## **2.6 Considering ‘practice’ as a condition of impacting the epistemologies and pedagogies of pre-service teachers**

It can be argued that “teachers’ beliefs and value systems will shape their conceptions and practical theories in classroom teaching, eventually influencing their instructional strategies and performance in the classroom” (Cheng, Chan, Tang & Chen, 2009). Without the ability to test new teaching methods, pre-service teachers cannot appraise the effects of their practice in context, and the opportunity to refine their personal epistemological beliefs through reflection on that effectiveness will be lost (Kang, 2008). If teacher educators wish to aid pre-service teachers in the development of pedagogies that include new teaching practices, then ITE programs must develop practicum components that allow pre-service teachers to experience and evaluate new practices before new beliefs about those practices can impact their personal epistemological beliefs. Teacher educators should also consider the research by Korthagen et al. (2001), I’Anson, Rodrigues, & Wilson (2003), and Anderson, Lawson, and Mayer-Smith (2006), that would also suggest that the new practicum components are non-threatening, that they provide real experiences without also providing the complexity of a traditional classroom practicum, and that the context for the practicum is supportive and linked to the coursework pre-service teachers experience during their preparation program.

## **2.7 Considering the development of a Schönian practicum experience**

Wilson and I’Anson (2006) posited that a non-traditional approach to the ITE practicum, as described by Schön (1987), might provide an important bridging context

between “the practice world” and the “esoteric world of the academy” (Schön, 1987, p. 37). This *Schönian* practicum would be designed specifically for the task of learning a new practice without the “complexity, uncertainty, instability, uniqueness, and value conflicts” (Schön, 1983, p. 14) associated with the traditional school-based practicum that could distract pre-service teachers from learning a new practice. Wilson and I’Anson (2006) describe the Schönian practicum as a space:

- “that has as one of its primary purposes the promotion of reflection” (p. 354);
- that provides for a “dialogical relationship” between the pre-service teacher and “coach” (p. 355).
- that is “free from many of the pressures of apprenticeship” encountered by pre-service teachers during the traditional school-based practicum (p. 356);
- for “the entertaining of alternative pedagogies and their implications for the practice of teaching” (p. 356);
- that occurs “outside their eventual community of practice” possibly providing pre-service teachers with different perspectives of teaching (p. 356);
- and, that I’Anson, Rodrigues and Wilson (2003, p. 195) observed, “puts considerable emphasis on opportunities for dialogue with various others (peers, teacher fellows, tutors), each of which enables engagement with a range of different understandings and perspectives.”

Wilson and I’Anson (2006), however, do not advocate replacing the traditional school-based practicum with a Schönian version; rather they present the two practica as complementary in that one allows pre-service teachers to focus on the “how” while the other allows them to focus to the “why”. The Schönian practicum model they

implemented with pre-service teachers used micro-teaching experiences featuring the opportunity to deliver lessons to small groups of children drawn from local schools which were then reflected upon by the pre-service teachers. The pre-service teachers valued the opportunities to practice within spaces of reduced complexity that were in a location other than the school which “enabled them to reflect upon specific aspects of their practice” (Wilson and I’Anson, 2006, p. 360).

Because pre-service teachers tend to place a higher value on the practical and school-based components of their ITE program (Malderez, Hobson, Tracey & Kerr, 2007, p. 241) it should be considered a *critical phase* in the professional socialization of pre-service teachers (Lauriala, 1997), and should therefore be maintained as a valuable opportunity for pre-service teachers to focus on the “how”. A complementary Schönian practicum could then be developed to provide opportunities for pre-service teachers to experience significant changes in their beliefs about teaching and learning (Anderson, Lawson, & Mayer-Smith, 2006). The aquarium practicum experience described by Anderson, Lawson, and Mayer-Smith (2006), appears to satisfy many of the criteria for Wilson and I’Anson’s (2006) successful Schönian practicum. This suggests that teacher educators and researchers should consider museums as potential contexts within which to structure a Schönian practicum.

## **2.8 Considering museums as contexts for a Schönian practicum**

There are a small number of studies exploring a variety of partnerships between teacher preparation programs and museums. David and Mathews (1995) observed that pre-service teachers who took advantage of training offered at a science museum later

reported an increased use of science activities in their classrooms in comparison to pre-service teachers who did not attend the training. Neathery (1998) found that teachers provided with one or two day learning experiences at a number of different museums reported gains in content knowledge that could be used in developing lesson plans. Chin and Tuan (2000) found that by including museum resources in science methods courses, pre-service teachers not only reported gains in their science knowledge, but that they also later incorporated the resources into their own classroom teaching. Olsen, Cox-Petersen and McComas (2001), interviewed 64 pre-service teachers who, as part of their teaching methods course assignments, took classes on field trips to a local museum with their cooperating teacher. During the methods course, pre-service teachers were required to visit local museums and to evaluate the learning they observed, and then to plan an excursion with their students during their school practicum experience. The researchers observed that the main concerns of the pre-service teachers before the field trip were predominantly managerial in nature and that pre-service teachers focused on the logistics of planning a field trip instead of student learning. The pre-service teachers were observed to have shifted their focus from managerial concerns towards a more student-centred focus on learning as the field trip progressed, and after the field trip experience concluded when they returned to school. The pre-service teachers also reported that they learned much about teaching by watching how learners learn in museums including the importance of establishing boundaries and of preparing students in advance of their experiences to reduce confusion. While these are positive attributes of pre-service teachers' experiences with museums during their teacher education programs, none of



these studies investigated or reported significant impacts on pre-service teachers' theories of teaching and learning.

The examples of ITE programs partnering with museums discussed so far have not provided significant findings to support the potential for museum practicum contexts to impact the epistemologies and pedagogies of pre-service teachers, however they have all been studies of very short-term experiences focused more on familiarizing teachers with 'museums as resources' than examining how museums can contribute to teachers' epistemologies and pedagogies of learning and teaching. The literature does provide evidence of significant impacts when research allows for more immersive experiences for pre-service teachers in museum settings.

In a survey of several pre-service partnerships between science museums and colleges, Middlebrooks (1999) considered the impacts of internship programs for pre-service teachers in different museum settings that ranged in length from a few days (workshops, field trips to a museum as part of a teaching methods class, volunteering for credit) to a few months (internships). She identified several significant and positive impacts emerging from the 12 different partnerships she reviewed including opportunities for: (1) working with children at various age levels; (2) observing multiple educators in their pedagogical practices; (3) practicing science teaching; (4) creating supportive networks among museum staff that will be available for them to draw upon when they start teaching. Middlebrooks (1999) concluded that internships offered the most benefits to future teachers and attributed these benefits to pre-service teachers being able to observe the museum from both behind-the-scenes and out front. This created "numerous opportunities to observe museum staff teaching and to try teaching science to individuals

and groups of different ages and backgrounds” (p. 5). She continued, describing museums as “positioned between college and classroom, or...between theory and practice” and as such capable of providing “safe and nurturing places for pre-service students to work on becoming teachers” (Middlebrooks, 1999, p. 73). In this way they gain “the experience, knowledge base, know-how, and allies that they need to be agents of change, prepared to create tomorrow’s classrooms” (Middlebrooks, 1999, p. 8). These internship experiences appear to offer significant opportunities to impact pre-service teachers epistemologies and pedagogies especially when, as Middlebrooks (1999) stated, “college professors make the internship the core of class discussion, and pre-service teachers make links between practice and theory” (p. 8).

Jung and Tonso (2006) also reported positive impacts as a result of an ungraded practicum option designed to increase the amount of science teaching time for elementary pre-service teachers. Ungraded credit received for “merely completing the required number of science teaching hours” created a non-threatening teaching environment that allowed students to concentrate on teaching and to “experiment with finding their own teaching style” (Jung & Tonso, 2006, p. 21). The pre-service teachers delivered between 15 and 30 hours of educational programming concurrently with the science methods class offered by the researchers during a teacher education program. The program was conceived “out of a desire to enhance the science backgrounds of elementary teachers and to better prepare pre-service teachers to teach science” (Jung & Tonso, 2006, p. 18).

In Jung and Tonso’s (2006) study, pre-service teachers were given programs to learn for delivery at a museum and the opportunity to observe them being delivered. After the first stage, they team-taught the programs under supervision and eventually

moved on to individual delivery of the programs at the museum. The following positive impacts were observed: (1) science expertise was conveyed from museum staff to pre-service teachers; (2) misconceptions held by pre-service teachers could be corrected through consultation with museum staff; (3) pre-service teachers were able to practice using hands-on, inquiry-based teaching “which had been notably absent at their in-school practica to date”; (4) pre-service teachers gained confidence in the non-threatening and cooperative atmosphere of the museum; (5) increased awareness of classroom resources and learning opportunities offered by the museum; (6) opportunities for the multiple delivery of the same lesson provided for mastery experiences, reflective practices, and increased confidence; and, (7) science was brought to life for the pre-service teachers, improving the chances that they would help do the same for their own students.

Jung and Tonso (2006) did note limitations with regards to teaching practice that could not be modeled during the museum practicum because of limitations associated with not being able to work with a single class over time. The limitations identified included the lack of opportunities to develop: (1) understandings that allowed them to make individualized decisions about teaching students; (2) classroom and time management skills; (3) meaningful lessons to convey science ideas to students; (4) skill in moving between different subjects; and, (5) questioning techniques. Despite these limitations, Jung and Tonso (2006) felt that the museum teaching experiences “served to condition pre-service teachers to think of themselves as people willing, and becoming able, to get in front of children and teach science, something that ‘having to please people’ at in-school practica hindered,” (p. 27), and have called for further research into ITE partnerships with museums.

## 2.9 Summary

The literature discussed here illustrates the importance of the practicum as an important opportunity for pre-service teachers to develop their epistemologies and pedagogies of learning and teaching (Lauriala, 1997). It also highlights the many challenges facing pre-service teachers trying to implement the pedagogical approaches advocated for by teacher education programs during a school-based practicum (Haney & McArthur, 2002; John, 2001; Lauriala, 1997; Waghorn & Stevens, 1996). The option for teacher educators to provide a non-traditional practicum experience for pre-service teachers is also discussed through the literature (Anderson, Lawson and Mayer-Smith, 2006; I'Anson, Rodrigues, & Wilson, 2003; Korthagen et al., 2001) and the “Schönian practicum” is identified as a significant and appropriate structure for the non-traditional practicum (Schön, 1987; Wilson & I'Anson, 2006). Museums are then presented as potential Schönian practicum contexts for pre-service teachers that can provide significant impacts on pre-service teachers' epistemologies and pedagogies of teaching and learning (Anderson, Lawson & Mayer-Smith, 2006; Jung and Tonso, 2006; Middlebrooks, 1999; Olsen, Cox-Petersen & McComas; 2001). This provides the basis for my research which examines the impact that non-traditional practicum experiences in a museum might have on pre-service teachers' developing epistemologies and pedagogies of learning and teaching.

## **Chapter 3: Methodology**

### **3.1 Overview**

This chapter examines the methodological considerations of this study through which my research questions were answered. The research questions which frame the study are presented, as are the epistemological underpinnings that guided the methodological considerations. The ITE program and museum collaborators responsible for developing the practicum contexts for my research are then presented, as are the practicum contexts themselves and the pre-service teachers that experienced them. A justification of the methodology and methods used in my research is then offered, as well as an account of the data collection and data analysis procedures. The chapter concludes with a discussion of the trustworthiness and the ethics of my research.

#### **3.1.1 Research questions**

- 1) What are the experiences of pre-service teachers during a museum-based practicum?
- 2) How do the experiences of pre-service teachers during a museum-based practicum impact their personal epistemologies and pedagogies of learning and teaching?

### **3.2 Epistemological underpinnings**

This study was situated within a social constructivist theoretical framework. This framework describes learning as an active and dynamic process by which individuals such as pre-service teachers might individually and socially construct and adapt meanings

(Ausubel, 2000; Lave & Wegner, 1991; Vygotsky, 1978), and which is not the domain of any one single context or experience (Flavell, 1987). This study is also informed by the assumption that education occurs across contexts and is not limited to school-based classrooms (Bruner, 1996).

This study was undertaken with the beliefs that:

- teachers require the opportunity to practice new teaching methods in context in order to appraise and reflect upon their effects before they can be incorporated into their personal epistemological beliefs (Kang, 2008);
- teachers' epistemologies play a significant role in determining their pedagogy which directly affects many aspects of their professional practice including lesson planning, assessment, and evaluation (Bryan & Atwater, 2002); and,
- “teachers need to know how and when to use a range of practices to accomplish their goals with different students in different contexts” (Darling-Hammond, 2006, p. 304).

### **3.3 Extended practicum beyond the classroom option**

In this section, the ITE program and museum partnership that provided the context for my research are described, as are the participants and the structure of the practicum they experienced.

#### **3.3.1 The partners**

In 2006, the University of British Columbia's (UBC) Teacher Education Program partnered with the Vancouver Aquarium Marine Science Centre (Vancouver Aquarium),

the Vancouver Art Gallery and Science World British Columbia (Science World) to offer a museum practicum experience for pre-service teachers at UBC. Of the various teacher education programs offered by UBC in 2006, one allowed candidates with a bachelors degree in a science discipline to complete a Bachelor of Education (B.Ed.) degree in secondary science education within a 12-month timeframe, which can lead to a secondary science teacher certification in the province of British Columbia (BC), Canada. A similar education program at UBC provided candidates with a bachelors degree in a fine arts discipline the opportunity to complete a 12-month B.Ed. degree in secondary art education, which can lead to a secondary art teacher certification in the province of BC, Canada.

The Vancouver Aquarium, the Vancouver Art Gallery, and Science World are all located in the City of Vancouver, BC. All three institutions provide regular structured educational programming designed to complement the Province of British Columbia's mandated educational curriculum, and all three offered this programming during the timeframe determined to be the most feasible for the pre-service teachers (see Section 3.3.2). The institutions themselves expressed an interest in partnering with UBC to accommodate this research for purposes of: influencing new teachers to make effective use of their programs and spaces; shaping the attitudes of pre-service teachers and in turn their students with regards to the educational role of museums; accessing the expertise of the pre-service teachers; and, heightening awareness of their presence and role within the community.

### 3.3.2 The practicum

The practicum model for the 12-month UBC Teacher Education Program traditionally offers two different practicum experiences to pre-service teachers – a two week school-based practicum early in the first semester of the program, and a thirteen week school-based practicum in the second semester. The practicum experiences are designed to facilitate the process of pre-service teachers connecting pedagogical theory with practice; to prepare pre-service teachers for a career in teaching by providing professional experiences; to encourage systematic reflection and analysis of teaching in schools and the classroom; and, to create opportunities for pre-service teachers to gain experience in the planning, evaluation and implementation of instruction for students (Anderson, Lawson, & Mayer-Smith, 2006).

The practicum option offered through the museum partnerships was created as a variation within the second semester practicum. Referred to as the *Extended Practicum Beyond the Classroom Option* (EPBCO), this museum-based practicum was offered as an optional experience during the final three weeks of the 13-week school-based practicum (Jenkins, Anderson & Mayer-Smith, 2007). It was designated an optional program because the pre-service candidates for the EPBCO program were required to reach the same level of competency in 10 weeks as pre-service teachers not participating in the EPBCO program were required to reach in 13 weeks. If this level of achievement was not met, they would be required to continue in their classroom practicum for the full 13 week duration. The EPBCO candidates' levels of success were determined jointly by the pre-service teachers themselves, their classroom-based school advisor (SA), and their UBC faculty associate (FA). As a consequence of the potentially shorter 10-week practicum,



EPBCO candidates also experienced an accelerated version of the 13-week practicum and therefore assumed teaching responsibilities during the practicum more quickly than did pre-service teachers not participating in the EPBCO program.

### **3.3.3 The pre-service teachers**

Art and science majors in the 12-month B.Ed. Secondary Teacher Education Program at UBC were made aware of the extended practicum option after the first month of their program. Pre-service teachers, after indicating their interest via email, were asked to submit a written 'application' to EPBCO administrators expressing the reasons for their desire to participate in this practicum option (see Appendix A). In 2005, applications for EPBCO were received from thirty pre-service teachers. Applications were judged by UBC education faculty members using the following three criteria: 1) evidence of desire to expand pedagogical skills beyond the secondary school classroom to work with students in grades K-12 and in informal learning settings; 2) indication of desire to work in, or make use of in their teaching, contexts beyond the classroom; 3) enthusiasm for participation in the practicum option.

Eight pre-service teachers were selected for participation in the Vancouver Aquarium practicum site, six pre-service teachers were selected for participation in the Vancouver Art Gallery practicum site, and six pre-service teachers were selected for the Science World practicum site based on the application criteria. The number of pre-service teachers selected was reflective of the capacity determined as optimal by the museum partners. Pre-service teachers were then notified of their acceptance in advance of their second classroom-based practicum beginning. By the tenth week of the school-based

practicum, three of the pre-service teacher candidates selected for the Vancouver Art Gallery practicum and two of the pre-service teacher candidates from the Science World practicum were determined not have demonstrated sufficient levels of success in their school-based practicum and continued in the traditional practicum stream.

The eight pre-service teachers that participated in the Vancouver Aquarium practicum option had biology degrees. The three pre-service teachers that participated in the Vancouver Art Gallery practicum option had Visual Fine Art degrees. The four pre-service teachers that participated in the Science World practicum option had biology, chemistry or physics degrees. All EPBCO pre-service teachers were between the ages of 20 and 30.

### **3.3.4 The Vancouver Aquarium practicum structure**

To prepare pre-service teachers for their practicum experience, the Vancouver Aquarium created two-day, focused training sessions<sup>2</sup> for the EPBCO participants that took place prior to the pre-service teachers beginning their 13-week practicum. During the training sessions the pre-service teachers were given an orientation to the facility and staff. Pre-service teachers met with the school program coordinators and other key staff that they would be working with, and were introduced to the school programs offered by the institution. These introductory sessions generally included a presentation about each school program and the program's objectives by institutional staff or docents. The pre-service teachers then participated in some of the school program activities themselves, or observed the program they had chosen if one was scheduled for this time.

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<sup>2</sup> The word "training" reflects common vernacular among museum staff for the preparation experiences they provided for EPBCO participants and does not reflect the language choice of the researcher.

The first day of the three-week museum-based practicum for the Vancouver Aquarium cohort consisted of a reintroduction to the facility and the program leaders they would be working with. An hour of this day was reserved for the pre-service teachers to meet with the researcher to discuss the purposes of this study. Over the remainder of week one, pre-service teachers were given the flexibility to select from and teach several of the institution's school programs, specifically those they were the most interested in. They were also encouraged to narrow their selections to only two or three of the programs. The pre-service teachers learned the program structure by observing (or 'shadowing') the school program coordinators and docents as they taught the programs. By the end of week one or the beginning of week two, they progressed to team-teaching the programs in pairs, and eventually they taught the programs solo. Within each program the pre-service teachers assisted in the greeting and organizing of school groups, contributed to the opening and closing program activities, and taught the small group portions of the program. As per the Aquarium school program schedule, the pre-service teachers usually taught two programs each day, one in the morning and one in the afternoon.

In the third week of the practicum, pre-service teachers continued to teach on average one program per day. The pre-service teachers used their non-teaching time at the Aquarium to design and develop pre- and post-visit activities for the school programs they had been teaching. Each pre-service teacher developed activities for two school programs. They worked closely with the appropriate school program coordinators in this endeavor, and some worked collaboratively in pairs to discuss and develop the activities. The pre-service teachers produced written documents for these activities which were

designed to reflect the objectives of the Vancouver Aquarium's educational programming.

Throughout the three-week practicum the pre-service teachers met informally with each other, with the Aquarium school program coordinator, and with their assigned UBC faculty associate to discuss and reflect upon their practicum experiences.

### **3.3.5 The Vancouver Art Gallery practicum structure**

To prepare pre-service teachers for their practicum experience, the Vancouver Art Gallery did not provide a specific training program for orienting pre-service teachers to the institution. Instead, the pre-service teachers were invited to participate in the Vancouver Art Gallery's docent training program which had originally started two months earlier. Therefore, the pre-service teachers were not able to attend all of the docent training sessions which were necessary to attend before Vancouver Art Gallery education staff would permit docents to deliver the gallery's educational programming. The sessions that pre-service teachers were able to attend dealt with aspects of exhibit history and contextual information for the educational programs.

Due to an institutional reorganization occurring within the Vancouver Art Gallery before the practicum had begun, the institution was unable to offer a full three-week EPBCO experience to the pre-service teachers. This resulted in an 11-week school-based practicum and a two-week museum-based practicum instead of the 10-week school-based practicum and three-week museum-based practicum originally planned. The reorganization also affected a change in the programming staff at the Art Gallery. This resulted in the appointment of a new EPBCO program liaison person at the Vancouver

Art Gallery who did not feel comfortable with having pre-service teachers that had not first fully participated in the docent training sessions delivering educational programming on the Gallery's behalf.

For the Art Gallery cohort, their first day consisted of a general orientation to the facility, and an hour reserved for the pre-service teachers to meet with the researcher. The practicum thereafter consisted of opportunities to observe a variety of Art Gallery staff and docents delivering the educational programming for different grade levels, working with the staff to develop new educational programming for the next exhibition, and exploring the Gallery as an institution while familiarizing themselves with the different roles of staff.

### **3.3.6 Science World practicum structure**

To prepare pre-service teachers for their practicum experience, Science World created two, full-day, focused training sessions for the EPBCO participants that took place prior to the pre-service teachers beginning their 13-week practicum. During the training sessions the pre-service teachers were given an orientation to the facility and staff. Pre-service teachers met with the school program coordinators and other key staff that they would be working with, and were introduced to the school programs offered by the institution. These introductory sessions generally included a presentation about each school program and the program's objectives by institutional staff or docents. The pre-service teachers then participated in some of the school program activities themselves, or observed the program they had chosen if one was scheduled for this time.

The first day of the three-week museum-based practicum for the Science World cohort consisted of a reintroduction to the facility and the program leaders they would be working with, plus an hour for the pre-service teachers to meet with the researcher. The pre-service teachers were given the flexibility to select from and teach several of the institution's school programs, specifically those they were the most interested in. They were also encouraged to narrow their selections to only two or three of the programs. In the first week, the pre-service teachers learned the program structure by observing (or 'shadowing') the school program delivery staff as they taught the programs. When comfortable, they progressed to team-teaching the programs in pairs, and eventually they taught the programs solo. Within each program the pre-service teachers assisted in the greeting and organizing of school groups, contributed to the opening and closing program activities, and taught the small group portions of the program. As per the Science World school program schedule, the pre-service teachers usually taught two programs each day.

During the duration of the practicum, the pre-service teachers were given time every afternoon to develop a project of their choosing that had been proposed by Science Worlds' educational staff. They then worked in consultation with that staff member on the project. The pre-service teachers produced written documents for the activities they developed to complement the objectives of Science World's educational programming.

Throughout the three-week practicum the pre-service teachers met informally with each other, with Science World staff, and with their assigned UBC faculty associate to discuss and reflect upon their practicum experiences.

### **3.4 Methodology**

This study employed a qualitative, interpretive case study methodology (Merriam, 1998; Stake, 1995). The study sought to provide an in-depth description of pre-service teachers' experiences in the three museum-based practica options. This kind of qualitative research seeks to provide rich description of the experiences of the participants, and to generalise conceptually about the nature of their experiences. This study did not seek to generate statistically generalisable findings and outcomes, but rather to increase knowledge and appreciation of the role that museums might play as sites of pre-service teacher practica, and to consider how such practica might contribute to the epistemologies and pedagogies of pre-service teachers.

#### **3.4.1 Interpretive case study approach**

To answer the research questions, an interpretive multiple case study design (Merriam, 1998), was used. For the purpose of this study, each practicum cohort (three in total) was considered to be an individual case in that it was embedded within a unique context (Yin, 2003). Each case can be described then as an instrumental case as its exploration provided rich and complementary insights into the experiences of pre-service teachers participating in a museum-based practicum. Each instrumental case was defined by the context in which it occurred, i.e. an aquarium, an art gallery, and a science centre.

Consistent with the method of case study, the data collection for each case involved multiple methods and multiple sources (Merriam, 1998; Stake, 1995). As there was interpretation and reflection on the part of the researcher, the methodology could also be described as a descriptive-interpretive-case study approach (Merriam, 1998). This

acknowledges as well that the researcher was, in the end, responsible for assembling the findings for this thesis and any other emerging documents.

The chosen design proved to be useful and meaningful for this study, as a clearer understanding of the potential experiences of pre-service teachers in museum-based practica, and the potential impacts those experiences could have on pre-service teachers' epistemologies and pedagogies of teaching and learning, came to light through the data collected, and the reflective interpretation of the researcher, as presented in chapter four of this paper.

### **3.5 Methods**

Two key methods of data collection were employed to provide insights into pre-service teachers' experiences during the EPBCO practicum: focus groups and non-evaluated, weekly reflections, written by the pre-service teachers.

#### **3.5.1 Focus groups**

Two face-to-face focus groups, one at the beginning of the practicum and one at the end, using semi-structured interview protocols, were used as a key research method for this study. Focus groups allow for rich conversations among participants. Such conversation may generate and stimulate deeper reflective thinking that may occur in individual interviews. However, a limitation of using focus groups is the potential for 'group think' to occur. To mitigate this, semi-structured interview protocols were used, because these allow for the generation of knowledge through a dynamic social relationship that occurs during conversations between the interviewer and participants



(Kvale & Brinkmann, 2009), and they provide a context within which pre-service teachers can consider their own responses in the context of others' (Patton, 1987). The flexibility inherent in semi-structured interview protocols allows for inquiry about a range of pertinent issues while also allowing the exploration of issues in depth if participant responses provoked further interest. Given the narrow body of research exploring museum-based pre-service practicum experiences, responses could neither be predicted nor anticipated and so semi-structured interview protocols provided a suitable means of data collection.

### **3.5.2 Weekly written reflections**

Non-evaluated, weekly written reflections were used as a second key research method for this study because of the potential for the data they provided to inform the semi-structured interview protocols used in this study; because the method of interpretive case study advises the use of multiple sources of data; and because reflective practices are widely supported in the literature as key components of ITE programs.

Asking pre-service teachers to submit weekly written reflections was seen as a method by which to gain insights into the experiences of pre-service teachers not brought to light during the post-practicum focus group discussion, or insights that could be used to shape questions for the focus groups. Additionally, it was anticipated that the longitudinal nature of the written reflections might highlight experiences or trends that were cumulative in nature but that might be expressed during the focus groups as a singular experience. In short, the written reflections were anticipated to provide additional context for data collected during the focus groups.

The integration of a reflective component in ITE programs is widely supported in the literature as having the potential to contribute to changes in pre-service teachers epistemological beliefs (Cheng, Chan, Tang & Chen, 2009; Kang, 2008; Kang & Wallace, 2005; Loughran, 2002). The non-evaluated nature of the reflections was clarified for the pre-service teachers to reduce inhibitions attributed to formal assessment that may produce writing designed to meet assessor expectations (Martin, 2005).

### **3.6 Data collection procedures**

Framed by the interpretive case study design, this study explored the museum-based experiences of three different pre-service practicum cohorts via four or five data collection occasions which were determined by the context of the practicum. The procedures occurred on the first day of the practicum, at the end of each week of the practicum experience (two weeks for the art gallery, three weeks for both the aquarium and the science centre), and within one week of the practicum's completion.

Focus groups featuring semi-structured interview protocols with the pre-service teachers were held on the first day of the museum-based practicum, and each museum provided a private room for this research activity. The interview protocol consisted of a series of open-ended questions designed to inform the specific aims of the study (Appendix B). The focus group discussions were recorded using both video and audio recorders and were scheduled to be one hour in length, although the end-time was declared to be flexible if the pre-service teachers wished to stay longer.

The post-practicum focus group discussion for each cohort took place at the UBC campus within one week of the practicum ending. Again, the semi-structured interview

protocol consisted of a series of open-ended questions designed to inform the specific aims of the study (Appendix C). Each focus group discussion was both video and audio recorded, and focus group discussions were scheduled to be one hour in length but with flexible end times if necessary.

Pre-service teachers submitted their weekly written reflection at the end of each week of their practicum via email. The pre-service teachers were asked to provide me with written responses of no more than 500 words that identified:

1. “The practicum experiences that you felt were meaningful to you this week.”
2. “How do you feel that these experiences are impacting your teaching practice and your beliefs about teaching and learning?”

### **3.7 Data analysis**

Transcripts of the focus group discussions and the written reflective submissions were generated and read independently and multiple times by the researcher before being coded for emergent themes (Stake, 1995). The themes were manifestations of the significant self-reported experiences and insights of the pre-service teachers that emerged from the data. The emergent themes were then interpreted through the literature that supported this research (chapter 2) and are thusly discussed in chapter 4. The emergent themes were developed with the understanding that unless individual focus group members in some way indicated their disagreement with sentiments shared by other members, that the sentiments would be interpreted as ubiquitous provided that multiple members indicated their support of the sentiment.

The emergent themes are presented along with verbatim quotes of participants to illustrate the experiences of the participants. Verbatim quotes are included however, the speakers are not identified. Quotes from the interviews are reported using the identifying format: [Institutional interview number]-[Participant number]-[Time index on video]. Quotes from the reflective pieces are reported using the identifying format: [Institution]-[Participant number]-[Reflection number].

### **3.7.1 Trustworthiness**

Naturalistic research is not intended to provide quantitative results with statistical measures of significance. Rather, in qualitative studies the researcher incorporates specific processes to ensure trustworthiness as a measure of the study's overall reliability and validity. The principal strategy for enhancing the trustworthiness of this qualitative study was triangulation, or the use of multiple sources of data and methods to clarify meanings and to verify the observations and interpretations (Merriam, 1998; Stake, 2000). In this study, focus groups and written reflective submissions provided two distinct sources of data. This created a more robust data set which allowed for triangulation and a more complete understanding of the situations under study. However, as Stake (2002) states, the whole story may be beyond the ability of anyone to understand and relate, including the researcher and the research participants.

Trustworthiness for this study was also enhanced through the inclusion of multiple cases which increases the extent to which the findings of this study can be applied to other scenarios (Merriam, 1998). The rich descriptions of each of the museum-based practicum settings enhances the opportunity for other researchers to determine how

closely matched their own research contexts might be. However, we must keep in mind that each of the three instrumental cases of museum-based practica in this study occurred in museum contexts that differ significantly.

The method by which the data was recorded, using digital audio and video, and emailed submissions, provides a chain of evidence (Yin, 2003) that could allow for the evidentiary process to be traced backwards if required. This contributes to the overall trustworthiness of the data collection procedures, and of the data collected. With regards to trustworthiness however, we must keep in mind that human perception is very selective and subjective and therefore partially unreliable (Merriam, 1998), both on the part of the researcher and on the part of the pre-service teachers that were the source of the research data.

And finally, because the research on museum-based practica is so limited, it should be understood that the goal of this study was not to generalise replicable findings that are definitive of museum-based practica. Rather, the goal was to generalise conceptually about the nature of the pre-service teachers' experiences, and to contribute new knowledge for the consideration of teacher educators and museum practitioners.

### **3.8 Ethics**

This research, using multiple case study research methodology, sought to provide rich descriptions of the experiences of the participants, and in doing so created a potential risk of exposure for those participants. All participants were informed before research began that the transcribed audio data and reflective data collected might be used in some future form of presentation but that identities would be replaced with pseudonyms at that

time. However, as participants were informed of these considerations beforehand and were required to sign a consent form, and because the participants disclosed no deeply sensitive or personal data, this research was considered to be of low risk to the pre-service teachers. Additionally, participants were given a separate consent form that they could accept or decline, to indicate if they would allow the researcher or UBC to use portions of the video recordings in future presentations.

## **Chapter 4: Results and analysis**

In this Chapter, I present the results of this study. The results presented address the research questions that guided and framed this study:

- 1) What are the experiences of pre-service teachers during a museum-based practicum?
- 2) How do the experiences of pre-service teachers during a museum-based practicum impact their personal epistemologies and pedagogies of learning and teaching?

The data was analyzed in terms of each practicum context and the findings are presented accordingly. In section 4.1, I present the findings emergent from the Vancouver Aquarium EPBCO experience; in section 4.2, the outcomes of the Science World EPBCO experience are presented; and in section 4.3, the findings from the Vancouver Art Gallery EPBCO experience are presented. In section 4.4, I look across the EPBCO experience for commonalities and distinct outcomes for the three practicum contexts and to conclude, I provide a summary of the outcomes in section 4.5.

### **4.1 The Vancouver Aquarium practicum context**

In this section I present nine major themes emerging out of the data collected from the eight pre-service teachers participating in the Vancouver Aquarium EPBCO placement.

#### **4.1.1 Pre-service teachers gained personal insights into the importance of teacher-student relationships**

During their EPBCO practicum at the Vancouver Aquarium, pre-service teachers described realizations about the importance of teacher-student relationships and how these relationships in turn impacted the pre-service teachers' own enjoyment of- and engagement with their work. The short-term nature of the interactions occurring between the pre-service teachers and students visiting the aquarium limited the pre-service teachers from forming emotional connections with the students they taught. Emotional connections, forged over time, have been described as "psychic rewards" (Lortie, 1975, p. 4), and are recognized as one of the identified motivations for being a teacher. The inability to forge these bonds was described by pre-service teachers at the Aquarium as frustrating. Some pre-service teachers felt that this missing emotional component negatively impacted their motivation to engage with the students in their programs.

The concern expressed regarding student-teacher interactions illustrates the pre-service teachers' realization of the lived differences between the school-based practicum experience and the EPBCO practicum experience. They considered not only their changing engagement levels, but also the relationships they developed with students in both contexts and how those relationships contributed to their engagement with and enjoyment of the work they were doing. As one of the primary purposes of the Schönian practicum is the "promotion of reflection" (Wilson and I'Anson, 2006, p. 354), the observation that pre-service teachers are self-reflecting during the EPBCO practicum is significant.



**AQ-7-2:** Though I am experiencing great benefits in working with new students everyday, I also enjoyed and miss the experience of getting to know my students at the secondary school on a more personal level. The teacher-student relationship that develops in the regular classroom is based on a trust and familiarity that takes time and commitment that is unavailable in short school programs.

**AQ-2-2:** On several occasions this past week, I have been less than motivated to work with misbehaving children, simply because I have much less invested in them. This happens much less frequently in the regular class room, because there is a mutual respect that exists between the student and the teacher. The students misbehave less, and I as a teacher invest more effort in correcting these behaviours. At the Aquarium, not only do I lack the motivation to struggle with the students, but it is not at all my place to be doing it. I have found this to be very frustrating.

#### **4.1.2 Pre-service teachers gained insights into the affective components of pedagogical relationships**

Observing how museum educators at the Vancouver Aquarium worked with students provided opportunities for pre-service teachers to consider the role that the affective components of pedagogical relationships play in teaching and learning. By observing the relationships established by museum educators, pre-service teachers made connections between the levels of engagement they observed in the students and the emotional engagement modeled by the museum educator. Pre-service teachers concluded that friendly, caring, and enthusiastic teachers engaged students more effectively than teachers who were not. The importance of teacher-pupil relationships to pre-service teachers has been identified in the literature as part of the core experience of becoming a student teacher (Malderez et al., 2007). In a study by Ng, Nicholas and Williams (2010, p. 287), secondary pre-service teachers perceived good teachers as being “experts in their discipline who were good at relating to and working with adolescents.”

**AQ-8-1:** I had the opportunity to shadow and observe meaningful teaching strategies in action. For instance, I was able to see how genuine enthusiasm and an animated approach to teaching can make learning meaningful. The students in this session sensed that the teacher genuinely cared about the subject matter and this made it “okay” for them to do the same.

**AQ-4-1:** Within a few minutes the entire group of students had tuned out and had lost an extremely valuable learning opportunity. Therefore I have concluded that even though one can be in an extremely rich learning environment, if the teaching is poor, the learning impact will be low... Having watched such polar opposite teaching strategies has highlighted the impact that the instructor can have on a group of students. It is our responsibility to be warm, caring, and enthusiastic about our material.

**AQ-3-2:** It is good to get to see...the huge effect the teacher’s emotion, interest and demeanor can have on the students learning. If the instructor is not excited, has an aggressive demeanor, and is not interacting with the students well, even being in an amazing place like the wet lab at the Aquarium probably will not provide the students with a positive learning experience.

Pre-service teachers also identified a reciprocal relationship between students and teachers with regards to the affective components of pedagogical relationships. Having previously concluded that demonstrated excitement on behalf of the teacher increased the engagement of students, pre-service teachers also found that they felt more engaged and excited about their role as a teacher when the students that they were teaching were excited. Pre-service teachers noted that the excitement of the students made teaching “easier” somehow. This observation is supported by the literature about learning in museums which shows that school classes visiting museums have shown higher motivation and more positive attitudes toward learning (Bamberger & Tal, 2008; Knapp, 2000).

**AQ-6-1:** The most meaningful experience during my first week at the Aquarium is the excitement of the children. It's been very contagious and I think it makes the teaching easier somehow.

**AQ-1-1:** The environment created by these new experiences has really allowed me to become more animated in my teaching. When working with younger students this animation helps keep student attention and create interest in specific ideas.

**AQ-7-1:** I am convinced that not only does meaningful learning happen in informal settings, but better teaching does too. Teachers are supposed to make learning fun, right? Well, I find making teaching fun a lot easier in a setting like the Aquarium, where I am amazed and delighted to be every day...The students are also enthusiastic to be out of the classroom for a day of seeing things they never have before.

#### **4.1.3 Pre-service teachers identified relevance as a pedagogical strategy**

Pre-service teachers were able to practice the use of relevance as a pedagogical strategy while teaching at the Aquarium. The pre-service teachers recognized that creating relevance between students and the information being presented was an effective engagement strategy for teaching. They were able to practice creating relevance while teaching by relating what they were trying to teach to what students already knew. Pre-service teachers developed strong beliefs about their own desire to continue creating relevance for the students they taught by linking information to the past experiences of themselves and of their students. Brophy (2006) describes the practice of using examples from the lives of teachers and of students to articulate understanding as one that contributes to the legitimization of students' feelings, that encourages students to share their insights, and that models the knowledge construction process.

Pre-service teachers identified the creation of relevance between students and presented information as a pedagogical approach of interest. Pre-service teachers described their experiences of practicing with this pedagogical approach while teaching students at the Aquarium, of considering the impact of this pedagogical approach on students' engagement and learning, and then stated their intentions to incorporate this pedagogical approach into their own future practices. This process illustrates Schön's (1987) description of how a reflective practicum can contribute to pre-service teachers' learning of a practice, and demonstrates the potential role for museums as Schönian practicum contexts.

**AQ-5-1:** While I was leading my own group of grade 1 students with another student teacher, I really noticed how important it is to relate what you are trying to teach students to what they already know. Of course I've known this from experience with older students; however the importance is made much more apparent while working with younger students because they seem to express themselves more immediately.

**AQ-3-3:** I want to make my classes more of an experience than a place to copy information and data. Linking to students past experiences and knowledge is definitely important and sharing my experiences will help to engage the students in what we are covering.

**AQ-8-3:** Regardless of the type of students a teacher has, it is important for the teacher to personalize the experience he or she has with the students in order to make each learning experience both meaningful and memorable. Although this was a lesson that was consolidated in an informal teaching setting, I now realize how it also holds true for the teaching that occurs within a traditional classroom setting.

#### **4.1.4 Pre-service teachers gained a fuller appreciation of hands-on activities as a constructivist pedagogical principle**

Pre-service teachers developed a greater appreciation of the use of hands-on activities for engaging students while teaching. Pre-service teachers were able to make use of first-hand objects such as props and animals at the aquarium while they were teaching. The impact of using hands-on activities on student engagement was considered to be significant to the pre-service teachers and comparisons were made to the difficulties they encountered engaging students during their classroom practicum experiences. They felt that hands-on activities allowed students to “build a deeper connection” to that which they were learning about, a statement that reflects more sophisticated epistemologies of teaching and learning. Hands-on activities, for these pre-service teachers, became a pedagogical approach that they intended to incorporate into their own future classroom practices.

Hands-on activities have been identified by Saunders (1992) as one of four main foci to enhance the success of constructivist pedagogies as the activities facilitate the construction of knowledge through the questions the activities may raise and the answers the activities may provide. Black (2004), found that although pre-service teachers were able to integrate hands-on activities into their classroom practicum, they faced barriers such as “lack of materials for the science classroom, time to complete activities within the changing nature of the classroom, and class management issues” (p. 41). During the EPBCO practicum however, the rich learning environment of the Aquarium provided the materials necessary for the implementation of hands-on activities while the reduced complexity of the Aquarium allowed pre-service teachers to focus on the impact of the

hands-on activities on students' engagement and learning, instead of on issues related to classroom and time management. These pre-service teacher experiences speak to the role that Aquariums might play as Schönian practicum contexts.

**AQ-1-3:** On several occasions students have even involved in themselves in the lessons and handled the animals themselves. Seeing the students engaged in this manner has shown me the true value of “taking the students to the lesson instead of the lesson to the students”.

**AQ-8-1:** While teaching, I found that it was easy to engage students because of the available animals and props. The most meaningful mode of teaching this program offers is “discovery-based, hands-on learning.” Students are given the opportunity to see and touch material and build a deeper connection to what they are learning about. I saw how effective this strategy was and I hope to further develop it in my own teaching practice.

**AQFG1-7-(45:55):** I think that rather than having a screen to stare at or a picture on the overhead or a book to look at, [students are] actually here and they are surrounded by [the exhibits]. [Students] have people to ask questions of but they can also touch things, they can see them, they can be connected with it and make that personal connection...I think it's harder to achieve in a traditional classroom.

#### **4.1.5 Experience with students of different ages contributed to pre-service teachers' development of a flexible pedagogy**

The experience of teaching multiple grade levels during the Aquarium practicum allowed pre-service teachers to practice adapting their pedagogical approaches to different developmental levels. Pre-service teachers identified the requirement to adjust their pedagogical approach as a challenge, but one that they felt successful in meeting. The pre-service teachers described making changes to the level of questioning they used and to the level of detail they used when teaching younger students, both indicative of

their pedagogical decision making and of their implementation of reflection-in-action (Schön, 1983).

The pre-service teachers tried different strategies to maintain student engagement. This indicated growth in their confidence in making autonomous decisions about the pedagogical approaches they employed. This was a notable aspect of the Aquarium practicum experience as it contrasts with Waghorn and Stevens' (1996) observation that “student teachers usually comply with the status quo and carry out actions and routines preferred by their supervising teachers” (p. 50) during their classroom practicum.

**AQ-7-2:** Differences in background knowledge, interest, energy level, attention span and behaviour encourage flexibility as I try new strategies to maintain student engagement.

**AQ-8-2:** The elementary programs I taught this week truly tested my teaching ability. In these programs, I had to consciously adapt my teaching strategies for the younger students. For example, I asked relatively more lower-level questions and reduced the amount of detail.

#### **4.1.6 Pre-service teachers developed skills identified as directly applicable to the role of a Teacher-On-Call**

Pre-service teachers identified the opportunity to work with students of different ages as important because they were able to practice making short-term, meaningful connections with students. The ability to make these connections was deemed to be directly applicable to the role of a Teacher-On-Call (TOC). TOC's provide classroom coverage for teachers unable to teach their regular classes, a role many new teachers fill after graduating and before taking on full-time contracts with their own school and classroom. This aspect of the EPBCO practicum should be considered as significant by

teacher educators facing questions about the relevance of teacher education programs to classroom practice (Cochran-Smith & Zeichner, 2005; Wideen, Mayer-Smith & Moon, 1998).

**AQFG2-8-(3:55):** I was going into this a little worried about how was I going to make short-term meaningful connections with the students because you only deal with a group for about an hour or two. But I learned that I actually could do it. So going into TOC-ing, that's something we are going to have to do - in class for half a day or with one block or maybe a whole day if you are lucky.

**AQ-5-1:** I feel that one of the strongest advantages of this program is the exposure to working with different age groups – especially since I've heard that when we start TOC-ing we'll be working with all sorts of students.

#### **4.1.7 The EPBCO practicum allowed pre-service teachers to further refine their questioning skills**

The Aquarium practicum allowed pre-service teachers to engage with many different classes of students which provided multiple opportunities to practice with, and reflect upon, the use of questioning as an explicit pedagogical strategy. All pre-service teachers stated the belief that they improved upon their questioning skills during the Aquarium practicum. They found that delivering multiple programs to younger students allowed them to practice and gain expertise with simpler, more concise questioning techniques. Pre-service teachers also found it easier to use higher level questioning with students at the Aquarium than in the classroom setting. They attributed this to the first-hand experiences that students' were having and how these experiences allowed for an easier transition by the students into critical thinking. They also developed a greater appreciation for the role that questioning can play in engaging students effectively and



identified the use of questioning as an effective means for establishing students' prior knowledge before attempting to build upon that knowledge. The Aquarium practicum then has provided pre-service teachers with significant opportunities to further refine a practice that they value as a pedagogical strategy which is aligned with the purposes of a Schönian practicum.

**AQ-7-1:** In this past week, I feel that my biggest area of growth has been in my questioning style. I sometimes found it difficult in the classroom to raise my students beyond the first levels of Bloom's Taxonomy. At the Aquarium, I find it a lot easier to ask questions that reach the higher levels of Bloom's Taxonomy. Both the students and the teacher have common and [nearby] real life examples to engage our minds and the critical thinking follows naturally.

**AQ-8-3:** Overall, the time I spent teaching these younger students offered me the opportunity to practice and fine-tune my questioning techniques. I learned how to break down my questions into simpler components, and this strategy is one that I know will be very beneficial for questioning secondary students as well.

**AQFG2-3-(48:13):** I felt it really easy to focus on questioning and constructivism - see what [students] know and then let them explore, and ask questions and place some questions to encourage them along. I think it was a great chance to practice that. And noticing the younger docents that hadn't had the education background and didn't have that line of questioning, there was a big difference in how the students reacted to that. It seemed that if they were asked questions ... they were much more engaged and involved.

#### **4.1.8 The EPBCO practicum helped pre-service teachers appreciate the autonomy of the classroom**

The use of the Aquarium's pre-established program materials contributed to the gradual disengagement of pre-service teachers as the practicum progressed. The lack of personal investment in the development of the content pre-service teachers taught was

identified as contributing to their struggle to remain engaged while presenting to students. Pre-service teachers identified the importance of novelty in curriculum content for inspiring the teaching and the teacher. Their lack of control with regards to the curriculum in the EPBCO practicum contributed to their recognition of autonomy as an aspect of the classroom role that they valued.

**AQ-7-3:** I did continue to find it challenging to always approach the same material with equal enthusiasm everyday. I think I require a job with a lot of novelty. After having a lot of individual control over how my lessons were structured and how I ordered the material, it was a different experience to follow a set program, and I did miss the greater responsibility of teaching in the formal setting.

**AQFG2-1-(10:46):** My biggest complaint from the last week was I felt tired of teaching the same thing over and over. In the high school, every day you are teaching something new and you go home and you spend five hours prepping it and it's a totally new subject and you are nervous because you are not sure how it is going to go.

**AQ-2-2:** I have discovered that while I am still enthusiastic about the groups of students that are coming through, I am significantly less enthusiastic about the content. I have found that the most challenging aspect of this practicum is keeping the material interesting for MYSELF, and in doing so, finding new ways to deliver the content to the students. I think that this is an important realization for teaching in the classroom as well. It is crucial for the teacher to remain excited about the information being taught.

To address the repetitive nature of the program content, the pre-service teachers were able to remain engaged by taking the initiative to change their programming responsibilities. They also acknowledged that each program they taught allowed them to engage with a new group of students who contributed in new ways to the pre-service teachers' experiences.

**AQFG2-7-(17:22):** I had a really open schedule because the two programs that I was scheduled with didn't run very often so I bounced around a lot and just sort of slotted myself in wherever. I found that I was able to structure diversity into my teaching so I never really got tired of any one thing.

**AQFG2-8-(15:05):** By the end there were one or two programs a day and it was getting a little bit repetitive but I felt like I had to be a little bit more proactive... We did get the chance to personalise and it's true with every group you never know how they're going to react and they are going to bring what they already know - their information. They're going to teach you as well so it's always a little bit different.

**AQFG2-3-(13:55):** Our basic goal is conservation or just getting them to interact with the animals and so there is some leeway to personalise it, tell your own stories and things like that. They did have a certain amount of information [to present], but we could still make it our own. Each time we had different students so they would react differently, ask different questions.

#### **4.1.9 Pre-service teachers felt tension between their existing epistemologies and pedagogies and those embodied within some Aquarium programming**

Pre-service teachers also identified aspects of the Aquarium's educational programming they delivered that they felt to be contrary to their own epistemological beliefs, which they believed were more aligned with constructivism. For example, pre-service teachers identified the tendency for some programs to be oriented more towards information dissemination as being contrary to their own practices, and noted their attempts to navigate the conflict. This finding is significant as it demonstrates that pre-service teachers completed their school-based practicum experience with their university-aligned, sophisticated epistemologies still intact. This outcome, although not proven out through a longitudinal evaluation, does contrast with literature that describes the impact

of teacher education programs on pre-service teachers epistemologies of teaching and learning as negligible (Cochran-Smith & Zeichner, 2005; Wideen, Mayer-Smith, and Moon, 1998).

**AQ-4-3:** After my experience at the Aquarium, I have found myself to be surprised by the volume of straight information dissemination that occurred there in the form of lecture. Even though I prefer the classroom environment, I am a huge advocate of discovery learning and yet there was not all that much discovery going on. I attempted to probe with leading questions but the environment was so distracting that it rarely got anywhere.

**AQ-6-1:** The observations have been helpful because the majority of the teaching is ‘telling’ instead of ‘questioning’. This is somewhat contradictory to what we have been taught in the education program and even my own teaching practices thus far. I find myself very conscious of asking questions rather than telling the information. I do not necessarily cover the same amount of material in the allotted time as others may, but I feel that I’m giving the students an opportunity to participate. I also think that the students are able to understand concepts better through discovering the answers on their own rather than me ‘telling’ them the answer.

## **4.2 Science World practicum context**

In this section I present seven major themes emerging from the data collected from the four pre-service teachers participating in the Science World EPBCO placement.

### **4.2.1 Pre-service teachers found that the Science World practicum facilitated reflection about their pedagogical choices**

Pre-service teachers’ schedules at Science World included purposefully structured project time at the end of each day. The project time contributed to the pre-service teachers’ ability to engage in self-reflective practices, specifically reflection-on-action

(Schön, 1987), an important component of a Schönian practicum. Pre-service teachers identified ‘not having to prepare new lesson plans’, and ‘not having to worry about supervisor evaluations’ as contributing to their ability to engage in those reflective practices. Lesson planning and preparing for evaluations have been described as “pressures of apprenticeship” (Wilson & I’Anson, 2006, p. 356), which can interfere with a pre-service teachers’ ability to learn a new practice during the school-based practicum. The absence of these pressures during a Schönian practicum reduces the complexity of the pre-service teachers’ experiences and allows them to focus on the new practice. In the Science World EPBCO practicum structure, the reduced complexity of the pre-service teachers’ role contributed to their opportunity to focus on and practice reflection.

**SWFG2-2-(39:47):** The whole experience in the classroom was like going with my hair on fire for ten weeks. We never really had time after class to kind of step back and really think about what really worked, what really didn’t, what I could have really changed. I don’t know if I asked myself those questions during my practicum, I was always worried about what is coming up for tomorrow, what lesson plans still have to get done, what marking do I have to get done?...I found the reflection process for me was almost nonexistent in my ten week practicum as opposed to being very much prevalent in my head for the Science World component.

**SWFG2-1-(7:13):** When you are student teacher, you are so much more focused on the theatrics and the elaborate song and dance that you are doing, and the classroom management, and is every one paying attention?..You really don’t get a chance to sit back and watch. I was just too swept up in “Is this going well for my FA, is this going well for my SA, and are the kids on task?”...You are not really stepping back and seeing what worked for the students, what didn’t work. You are focusing on you as the teacher in the practicum and not necessarily the students.

#### **4.2.2 Repeated opportunities to deliver educational programming facilitated pre-service teachers' development of a flexible pedagogy**

Similar to Aquarium EPBCO experience, pre-service teachers at Science World were afforded multiple opportunities to present the same two programs to a range of students of different ages and grade levels. This repetition allowed pre-service teachers to move beyond concerns about teaching and to focus more on the most effective pedagogical strategies for student learning about the program subject areas. The opportunity to practice teaching the same content to multiple classes, and to adjust and refine how the content was most effectively presented to students, allowed the pre-service teachers' to develop a flexible pedagogy.

Pre-service teachers also employed reflection-in-action and -on-action (Schön, 1987) to determine the appropriate pedagogical approach for each new class of students which contributed to their development of a flexible pedagogy. The development of a flexible pedagogy is a significant outcome in light of the naïve notions of some pre-service teachers that “teacher education can prepare teachers with a range of contingency strategies for the issues and challenges they will face throughout their career”, many of which cannot be anticipated (Graham & Phelps, 2003, p. 11).

**SWFG2-2-(45:02):** I thought it was kind of cool because even after teaching Newton's laws to my physics 11s in high school, I already know the different things that I'll be able to focus on next time I teach it, but when is that going to happen? Who knows? As opposed to Science World...I have another one this hour...What am I going to change this time? And you can make the changes immediately, so that was good.

**SWFG2-4-(39:24):** I found the material was so ingrained because you had already done it three or four times. You start doing the same workshop over and over again and you are so familiar with your material and where you are going to go with it that you can start

kind of tuning into some different things. Maybe changing things here and there and seeing if anything worked differently.

**SWFG2-1-(5:38):** I think my biggest highlight was being able to wade through what worked and what didn't work...what level you needed to present to kids so that their natural inquisitiveness came out, so that the fun was balanced with some critical thinking. At what level, at what situation did they have to be in, in order to get that response from them, or get that thinking from them?

#### **4.2.3 Pre-service teachers developed skills identified as directly applicable to the role of a Teacher-On-Call**

Pre-service teachers valued the opportunity to further develop their flexible pedagogies because they anticipated the need to be flexible in their potential future role as a Teacher-On-Call (TOC). TOC's provide classroom coverage for teachers unable to teach their regular classes, a role many new teachers fill after graduating and before taking on full-time contracts with their own school and classroom. Pre-service teachers identified their experiences establishing pedagogical relationships with new groups of students as being of use in the role of a TOC.

**SW-1-2:** I also spent a good portion of this week facilitating workshops. I found this to be extremely useful as a pre-service teacher. After all my experiences as a TOC, I'm sure, will not be unlike this: a bunch of children happy to not be in their normal routine, stuck with an instructor who is completely unfamiliar to them and who has a good possibility of not seeing them again. It was interesting to see the dynamic of these students and trying different methods to establish my pedagogical position with these classes.

**SWFG2-2-(19:28):** What I think is cool at Science world too is that you are getting new students and new classes every day. You are going to jump into a TOC job anywhere and it is the exact same thing - you need to read a class, know where they are at, you know

that you need to figure out a way to engage them and you have to be thinking on your feet and adjust pretty darn quickly if you're going to succeed with them.

#### **4.2.4 The opportunity to work with children of different age groups enhanced pre-service teachers' understanding of student development and cognition**

Pre-service teachers valued their opportunities to work with and teach students from a range of grade levels. Pre-service teachers felt they gained insights into the cognitive levels associated with students of different ages, and experience facilitating the learning of younger students.

**SWFG2-2-(34:57):** I can't remember the last time I have been surrounded by a class full of young people K-7 age. And just seeing how they interact with each other again, and how their brains function in an environment like Science World - it's kind of cool to know how high school students at one time built that knowledge. [To know] how ideas built, how they had the fun they did, the way they behaved or the way they even interacted socially. It was just cool to get a different viewpoint on a different age group for just their social and educational interactions.

**SWFG2-3-(14:52):** I learned a lot about the nature of young students with regards to how they learned, what they learn to do, how they act, what stage they're at, that they're still learning to talk in kindergarten and grade one - so something new for me. I guess I developed my personal philosophy on how they can learn and how I could organize lessons for that age group and more specifically, organize their play time and direct their play.

#### **4.2.5 Pre-service teachers gained insights into the value of play and fun in pedagogy**

Pre-service teachers gained insights into "fun" as a principle of pedagogy that can facilitate engagement and motivation. Pre-service teachers identified fun and play as



important for facilitating the retention of knowledge and motivating the pursuit of additional knowledge in students. Skamp (1995) identified the ability to spark students' interest as a characteristic of a competent instructor, as well as the ability to structure their lessons in a way that makes learning enjoyable.

**SWFG2-1-(13:42):** I learned that students, they need to have fun, and that it is their inquisitiveness that really drives their understanding and their learning, and retaining.

**SW-2-2:** I realized that making students laugh (in a controlled and organized manner) as a part of their learning is one of the best ways to engage them. Laughter in workshops relates two things: science and fun. For students who are in K-7, making that association will keep them asking the right questions... and seeking out that fun.

**SWFG2-4-(19:03):** And all those activities and games that you do with the younger grades, it's stuff like that where they are having fun. If you did that in a higher level class, they would be having fun with it for like five or ten minutes, but they would remember that. And if anything is going to stick in their heads like that, that you can reference back to when you are reviewing for a test or something, that is always good.

#### **4.2.6 Pre-service teachers learned about the role of teachers on field trips**

The EPBCO practicum at Science World allowed pre-service teachers to identify opportunities to observe visiting classes and teachers which contributed to an understanding of the role of the teacher in facilitating effective experiences for students on field trips. Pre-service teachers drew conclusions about the importance of post-visit activities and the role that structure should play in mediating the experiences of different ages of students. Anderson, Lucas, Ginns & Dierking (2000) documented the importance of post-visit activities for making curriculum connections to student experiences and to “detect and respond to alternative conceptions that may be produced or strengthened

during a visit to an informal learning centre” (p. 678). Knowing that the degree of structure a teacher provides can influence the success of a museum experience reflects an awareness of pedagogy that many teachers on field trips do not have (Falk & Dierking, 1997).

**SWFG2-1-(13:42):** Kids are going to walk away with all these experiences but as a teacher I think that your job is to make sense of it. The key thing for me is that it is much more powerful when they discover it on their own but the discovery needs to be complemented with some sort of order afterwards, a reflection on it with a teacher.

**SWFG2-2-(53:20):** If I was going to take a grade 8 or 9 class to Science World, there is no way that I would walk into that building without the structure...you would get more out of it [with] structure...I think the age of the students has a lot to do with it too...A grade 2 kid coming to Science World, to give them structure would be pretty pointless...and would be taking away the advantage that Science World has in that you can associate science and fun. You get them to even walk away with one scientific concept out of the entire day at Science World and I think you have succeeded.

**SW-1-3:** This week was an eye opener for me because I was able to see some high school students that came on field trips. I was great to see how they behaved and how their teachers reacted. These are things that I will need to know as a high school teacher if I am to take my students on field trips. What was lacking for these students was guidance and purpose. The students ran around without any purpose.

#### **4.2.7 Working with Science World staff fostered an appreciation for the value of working collaboratively**

Pre-service teachers expressed appreciation for the collaborative nature of the staff interactions they experienced at Science World. They felt supported by the staff as they prepared for workshops, and valued the opportunity to observe multiple educators teaching the same program as a reflective opportunity. Pre-service teachers also valued

the experience of working with staff developing educational programs as they felt the staff modeled the effective use of collaborative practices such as brainstorming. Lauriala (1997) recommended that the professional development of future teachers needed to include experiences that allowed pre-service teachers to develop new coping strategies for non-familiar problems and thereby avoid the lack of reflection that accompanies familiar problems with familiar solutions. The EPBCO practicum offered familiar problems for pre-service teachers to consider (e.g. developing a new lesson), while providing pre-service teachers with opportunities to practice with new solutions (e.g. brainstorming with other staff).

**SWFG2-4-(4:13):** The biggest highlight that I got out of the practicum was the experience was all of the brainstorming sessions they had amongst the staff and the people that work that there. And the fact that they use, they did it so often and they did it very effectively ...a really positive and collaborative sharing of ideas and supporting ideas, it was good.

**SWFG2-1-(41:12):** [Science World staff] got us to see two or three people do a workshop and, “Do you want to see someone else do it?” It’s so good to see different versions of doing a workshop - you know with your sponsor teacher and your FA you get one version as opposed to getting 5 or 6 different versions. Because you saw someone else doing the same thing, you could compare and reflect on your method versus their method and which was more effective...

### **4.3 Vancouver Art Gallery practicum context**

In this section I present eight major themes emerging from the data collected from the three pre-service teachers participating in the Vancouver Art Gallery EPBCO placement.

#### **4.3.1 Pre-service teachers' gained a greater appreciation of questioning as a constructivist pedagogical approach**

Pre-service teachers at the Art Gallery were able to observe multiple museum educators using questioning effectively. They concluded that using questions that created conversation between students and teachers by seeking input from the students, and that were effective with students of different developmental levels, promoted student engagement. The insights pre-service teachers gained from their observations are significant in light of Haney and McArthur's (2001) description of a constructivist classroom as one within which the questions and answers of students are highly valued and encouraged (p. 785). Pre-service teachers made their own connections between the questioning they observed and its appropriateness to the constructivist pedagogies advocated for by their teacher education program. They also indicated that these observations complemented their classroom-practicum experiences, one of the intentions behind the Schönian practicum.

**VAG-3-1:** I found that a successful tour didn't resemble a tour at all; it looked and sounded more like a conversation between docent and students. The most important thing in helping to facilitate good discussions and conversations, is asking questions. Even more important than just asking questions, is asking the right kind of questions.

**VAG-1-1:** [Museum educators] were able to impart the same level of information for everyone because questioning techniques first asked the students what they thought, and then they were encouraged to think about their own art making experiences. I found this to be particularly useful for works of art that had a complex concept.

**VAGFG2-2-(22:45):** I think they model what UBC is teaching, like the constructivist methods, like in the gallery setting obviously there is limitations that are different than in

a classroom setting. But they seem to model the drawing the information out of the students in a lot more active way than I personally witnessed in a school setting.

#### **4.3.2 Pre-service teachers developed a greater appreciation for relevance as a pedagogical principle**

Pre-service teachers were able to observe what they felt was a positive impact on student engagement when presented materials were made personally relevant for the students. They observed increased motivation in students to further engage with the museum educator and expressed the intent to use relevance in their own classroom pedagogies.

**VAG-1-1:** The students were able to make personal connections with the work, and therefore, enjoyed their experience more, and so wanted to know and learn more.

**VAG-3-2:** In my experience at the gallery, I learned that the most important thing in introducing a new topic to students is to make it relevant to their lives. This will greatly influence the way I speak about new ideas, processes and ideas in the classroom.

#### **4.3.3 Pre-service teachers developed a greater appreciation of structure as a pedagogical approach**

Pre-service teachers identified a difference between the successful and unsuccessful tours delivered by museum educators and attributed the difference to the way that museum educators structured the experience for students. Pre-service teachers recognized that educational objectives, when shared with students, provided a lens through which the students could view their experience. The pre-service teachers observed that sharing objectives appeared to increase and maintain student engagement more effectively than not stating objectives, which enhanced the educator's ability to

impart knowledge to the students. Witcher et al. (2001) identified the ability to clearly impart knowledge to students as characteristic of a good teacher, which pre-service teachers gained awareness of and appreciation for during the Art Gallery practicum.

**VAG-1-1:** Beginning with the end in mind was what made the majority of the tours I watched successful...Tours where I did not see this crucial step were not as successful. The students would find themselves distracted, not understand the work in full, and tended to move through the gallery at a much faster rate.

**VAGFG2-2-(13:49):** Watching the tours and the way [museum educators] would address the group...was a really nice illustration of teacher techniques that didn't happen or did happen, and [how it] affected the tour. People who established objectives right at the beginning said, "This is what I expect of you today, this is an overview of what we are going to do." And then the kids knew what to expect. Whereas those who didn't do that, you really could tell by the way that the tour went.

#### **4.3.4 Pre-service teachers developed insights identified as directly applicable to the role of a Teacher-On-Call**

Pre-service teachers believed that observations of docent program delivery contributed to their preparation for a potential experience as a Teacher-on-Call (TOC). They identified museum educators' abilities to quickly establish working relationships with the students they engaged, and the pedagogical approaches the museum educators used, as being applicable to the role of a TOC.

**VAGFG2-3-(11:24):** The docents, they gain a relationship with the students very quickly. They have to because they only have an hour. So as us going in to TOC, we are going to have the same kind of time frame, an hour class maybe, see these kids once and have to develop some kind of working relationship with them...asking their names, something about [themselves], just kind of how to get to know everyone because we are going to have to do the same thing.

**VAG-2-2:** Since the guides have such a limited time frame with the students, I could compare their role, to that of the [TOC]. The guides gave me a lot of ideas on how to set expectations early on so that the students' time spent with you is productive.

**VAGFG2-1-(12:05):** I really like the fact that, whether or not they had younger groups or older groups, the questions were still the same. And you could still learn so much information from the kids, like elementary students I found sometimes got more out of it than the older kids did. I think that was a big thing, especially for TOC-ing. Don't go into a classroom and expect that these kids just don't have that learning capability because they totally do - you just have to tap into it.

#### **4.3.5 Pre-service teachers experienced a greater appreciation of the Art Gallery's educational programs**

Observing the Art Gallery staff developing new educational programming contributed to a greater appreciation of quality of the educational programming offered by the gallery. Pre-service teachers also found the museum educators' level of preparation and research before planning educational programs to be inspirational for their own practices as educators preparing lessons for students. These inspirational insights are one of the benefits of a non-typical practicum experience which Cochran-Smith (1991) believes can explore the full scope of the teacher's role in a way that the typical practice of assigning pre-service teachers to a single classroom with one teacher does not.

**VAGFG2-3-(0:57):** We were really a part of their discussion; they made us feel really comfortable and welcome in their group. It was a great conversation and we went through brainstorming ideas ... to set up tours and also the school workshop activities. Just to know how much time, effort, thinking, and changing goes into developing the tours.

**VAGFG2-2-(12:37):** Another thing that really inspired me is how much preparation and research [museum education staff] do for those school tours...to strive for that level of preparation before you start a unit...They taught us to look at historical and contemporary things. They were just really good at teaching, and practicing research and planning, before they embark on something. That was really good to view and be a part of.

#### **4.3.6 The Art Gallery practicum experience lacked opportunity for real practice and thus had limited impact on pre-service teachers' pedagogies**

Pre-service teachers at the Art Gallery felt confident in their ability to deliver some form of educational programming at the Gallery and expressed concern that they would not have the opportunity to practice new skills until they were in a class of their own. This outcome was of concern because without the ability to test new teaching methods, pre-service teachers cannot appraise the effects of their practice in context, and the opportunity to refine their personal epistemological beliefs through reflection on that effectiveness will be lost (Kang, 2008). The ability to practice with real experiences is one of the key components of the Schönian practicum and without the ability to practice, the impact of the experience on pre-service teachers' epistemologies and pedagogies comes into question.

**VAGFG2-2-(50:37):** One thing that I think might be even a nicer link is if we were involved with the workshops, like instructing an art project. That's what we've been doing for the last three months right, so even if they weren't comfortable with us on the tour, how could we have been involved in a workshop?

**VAGFG2-1-(48:48):** I think that it would have been nice to team teach a little bit. Even to give us one station...even going around and doing the model tour with one of the docents - letting us have one station. Even that tiny little bit of time would have been



great I think. And that wouldn't have really hurt their tour because if they felt we weren't doing a good job they could step in.

**VAGFG2-3-(45:48):** Use us somehow, because now we have these ideas but we really aren't going to use them until...probably not as TOCs, but as an actual teacher.

#### **4.3.7 The EPBCO practicum at the Art Gallery impacted pre-service teachers understanding of pedagogy for teaching about First Nations art**

All three pre-service teachers felt that their comfort discussing First Nations art was impacted through their exposure to the Vancouver Art Gallery's preparations for an impending exhibition featuring First Nations art. Two of the pre-service teachers expressed feeling more empowered to teach about First Nations art with their students and one felt less so.

**VAG-2-1:** A highlight from the week was a guest lecture by Marcia Crosby. In her talk she advised and empowered me to address First Nations art and issues in my classroom from my own perspective.

**VAG-3-2:** We had lengthy discussions about ways to respectfully approach the topic of First Nations art. I realized that many Non-Native people are afraid to approach about First Nations culture, so they don't talk about it at all. In the classroom I want to be able to explore other culture's art, and the discussions we had gave me ideas into how to respectfully do this.

**VAG-1-2:** It was much easier for me to ask questions and dispel the 'myths' of work of people not of First Nations origins, than it was to talk about the work of First Nations artists. I felt very incompetent to talk about the artwork when I didn't have a lot of information, and not being very political myself, I didn't know much of the history of the First Nations people either. It's interesting to note that the more I learned about Native history, the more it became apparent to me that I would not feel comfortable talking about it, because [we] impose our own opinions and viewpoints.

#### **4.3.8 Pre-service teachers gained valued insights into the Vancouver Art Gallery as an institution and educational resource**

All three pre-service teachers gained a greater awareness of how the Art Gallery operated and believed that this information would be useful in future career-oriented conversations with students, and potentially their parents.

**VAG-1-1:** There were many more jobs at the art gallery than I first thought! This is good for me to know because I can build a stronger understanding of the art occupations available for career choices, and share that with my students.

**VAG-2-1:** I think that this week has given me a deeper understanding of all the different career opportunities that exist in public art galleries. This will help me to promote such careers to students and parents under the impression that jobs in the arts are limited.

**VAG-3-1:** I have gained insight into how a gallery is operated and the great number of staff and volunteers that it employs. Understanding the gallery as an institution is important for students in terms of gaining a better understanding of the art world. Having had this experience I will be able to better inform my students on art-based careers.

#### **4.4 An analysis across the Vancouver Aquarium, Science World, and Vancouver Art Gallery practicum contexts**

In this section, I analyze the outcomes of the three different EPBCO practica across contexts. The analysis re-examined the outcomes across contexts to identify themes emerging as significant across the contexts.

#### **4.4.1 The EPBCO practicum experience promoted a greater appreciation of the importance of the affective component of teacher-student relationships**

The literature suggests that pre-service teachers believe their ability to deliver content knowledge effectively has a greater impact on student performance than the affective dimensions of their teaching role (Witcher et al., 2001). The pre-service teachers participating in the EPBCO program appear to have had experiences that produced contrasting beliefs, as indicated by their comments about the importance of the affective aspects of teaching.

The EPBCO pre-service teachers concluded that friendly, caring, and enthusiastic teaching was important for student engagement in learning. Skamp (1995) identified the ability to spark a student's interest as a characteristic of a competent instructor. Pre-service teachers also recognized that they felt more engaged and excited about their role as a teacher when the students were excited. The pre-service teachers espoused epistemological beliefs about how associating fun with science facilitates the retention of knowledge and motivation in students. These outcomes indicate a more sophisticated level of awareness about the affective dimensions of a teacher's role than the literature may lead us to expect.

Witcher et al.'s (2001) conclusions about pre-service teachers' pre-occupation with the impacts of content knowledge on student performance do not agree with the outcomes of this study of the EPBCO program. However, the lack of a long-term relationship with the students that the pre-service teachers taught during the EPBCO practicum, and the knowledge that they will not be participating in an evaluation of the students' learning, may have contributed to these outcomes. Without the added

complexity of managing and assessing student learning (Ng et al., 2010), pre-service teachers in the EPBCO practica appear to have been afforded a significant opportunity to consider the affective dimensions of their future roles.

#### **4.4.2 The EPBCO practicum experience provided important opportunities for pre-service teachers to practice using constructivist pedagogies**

If teacher educators wish to aid pre-service teachers in the development of pedagogies more closely aligned with new theories of learning, then teacher preparation programs must develop practicum components that allow pre-service teachers to experience, evaluate, and incorporate those practices into their epistemological beliefs (Cheng, Chan, Tang & Chen, 2009; Kang, 2008). The EPBCO practicum in two settings provided important opportunities for pre-service teachers to practice using pedagogies that they felt were more closely aligned with constructivist theories. The pre-service teachers participating in EPBCO at the Vancouver Art Gallery were unable to practice using new pedagogies during their practicum.

Most pre-service teachers in the EPBCO practicum gained understanding of and practice with using relevance as a constructivist pedagogical strategy. Brophy (2006) describes the practice of using examples from the lives of teachers and of students to articulate understanding as one that contributes to the legitimization of students' feelings, that encourages students to share their insights, and that models the knowledge construction process. The pre-service teachers in the Aquarium and the Science World practicum were able to practice and refine their abilities to create relevance between the content materials presented and the students that they taught. The pre-service teachers in

the Art Gallery practicum expressed an awareness of and greater appreciation for relevance as a pedagogical principle that emerged from their opportunities to observe museum educators teaching.

Most pre-service teachers in the EPBCO practicum gained experience using hands-on activities as a constructivist pedagogical strategy. Hands-on activities have been identified by Saunders (1992) as one of four main foci to enhance the success of constructivist pedagogies as they facilitate the construction of knowledge through the questions they can raise and the answers they can provide. The pre-service teachers in this study noted that the education programs offered by a museum practicum setting regularly make use of objects and hands-on activities, something harder to integrate into classroom experiences as a pre-service teacher (Black, 2004).

Pre-service teachers in the Aquarium and Science World EPBCO practicum gained practice using effective questioning techniques while teaching students. While unable to develop questioning skills through practice, pre-service teachers at the Vancouver Art Gallery did develop a greater appreciation of the role of questioning in supporting constructivist epistemologies in the classroom. Pre-service teachers identified the dynamic nature of a “classroom” audience of varying ages and unique groups of students as contributing to a greater appreciation of effective questioning technique and its impact on student engagement. Pre-service teachers found that working with younger students allowed them to practice with simpler, more concise questioning techniques, and that they developed a greater appreciation for the role that questioning can play in engaging students effectively. Pre-service teachers also found that museum displays could facilitate the use of higher level questioning in a ways that were noticeably easier

than in the classroom. Haney and McArthur (2001, p. 785) described a constructivist classroom as one within which the questions and answers of students are highly valued and encouraged, and Skamp (1995), also identified the elicitation of students' ideas about topics as a quality of an effective teacher.

#### **4.4.3 The EPBCO practicum experience promoted the development of pre-service teachers' flexible pedagogies**

Pre-service teachers in EPBCO were able to move beyond concerns about teaching and to focus more on the most effective pedagogical choices for student learning by reflecting in-action and on-action (Schön, 1987). Pre-service teachers were able to “test” pedagogical approaches during repeat programs and were then able to make changes in their approach either during the program (reflection-in-action) or between programs (reflection-on-action). This illustrates how the short-term nature of museum visits by multiple school groups every day can provide unique practice opportunities featuring real experiences (Korthagen et al., 2001) of reduced complexity (Wilson and I'Anson, 2006) for the task of learning to teach (Schön, 1987).

I'Anson, Rodrigues, and Wilson (2003), encouraged reflective practice among their students by deliberately structuring some of their micro-teaching experiences for pre-service teachers in a fashion that “allows the comfort of a ‘fresh start’ for a student who has not had a good experience in any one microteaching session” ( p. 192). The researchers provided a fresh start by ensuring that pre-service teachers never taught the same group of students twice, which they felt was an effective way of reducing the complexity of the initial phases of the micro-teaching practicum experience. The pre-

service teachers during the EPBCO practicum experienced a fresh start with every class they taught. It was the opportunity to engage with a new class for every program that pre-service teachers felt contributed to their development of flexible pedagogies.

EPBCO participants demonstrated facility with flexible pedagogy that will help them to navigate unanticipated challenges. They also demonstrated the confidence to make autonomous decisions and alter their pedagogical approach to new situations. This is another notable aspect of the EPBCO practicum in that it contrasts with Waghorn and Stevens' (1996) observation that "student teachers usually comply with the status quo and carry out actions and routines preferred by their supervising teachers" (p. 50) during their classroom practicum.

#### **4.4.4 Pre-service teachers felt that the EPBCO practicum experience contributed to their preparation for the role of a Teacher-On-Call**

Pre-service teachers felt that their experiences during the EPBCO practicum were valuable because the practices they developed were applicable to the role of a TOC. Pre-service teachers identified their success in making meaningful connections and engaging students in a compressed timeframe and recognized this as comparable to the role of a TOC. The pre-service teachers' experience establishing pedagogical positions and relationships with different groups of students was also seen to be an important skill for a TOC. They learned about the effectiveness of establishing expectations with new groups of students, and that it is important to assess students' prior knowledge and capabilities when first meeting them. These practices are applicable to the role of a TOC. The

EPBCO program therefore provided pre-service teachers with skills they viewed as useful to their future careers.

#### **4.5 Summary**

The EPBCO practicum was able to provide many significant experiences for pre-service teachers, many of which can be viewed as complementary to their school-based practicum experiences. The Vancouver Aquarium and Science World practica, by providing the opportunities for pre-service teachers to observe museum educators teaching and to teach many different, visiting, student classes, allowed pre-service teachers to increase their knowledge about teaching and learning. Pre-service teachers described many of their experiences as enjoyable and beneficial and in cases expressed intent to transfer the pedagogical approaches and new beliefs they developed into their own future classrooms. Without the opportunity to engage in the delivery of educational program, the degree to which the Vancouver Aquarium practicum impacted the epistemologies and pedagogies of the participating pre-service teachers is questionable. However, despite the inability to test new pedagogies, the pre-service teachers also expressed new beliefs about teaching and learning that were attributed to their EPBCO experience.



## **Chapter 5: Conclusions, limitations, implications, recommendations, and questions for further research**

### **5.1 Overview**

In chapter 4, I presented my analysis of the data collected in this study of pre-service teacher practicum experiences in museum contexts. In the first section of this chapter, I summarize my research findings by revisiting the questions that guided my study. The second section will discuss the limitations of the study. The implications of this research for teacher educator and museum educational practice are then presented, followed by recommendations for researchers and future collaborators in EPBCO-like programs. The final section will include suggestions for future research.

### **5.2 Salient findings**

This section presents contextually the salient findings that answer the guiding research questions:

1. What are the experiences of pre-service teachers during a museum-based practicum?
2. How do the experiences of pre-service teachers during a museum-based practicum impact their personal epistemologies and pedagogies of learning and teaching?

### **5.3 Research question 1: What are the experiences of pre-service teachers during a museum-based practicum?**

- Pre-service teachers were able to teach classes of children from a variety of grade levels, the majority of whom were from different grades than the students that pre-service teachers taught during their school-based practica.
- Pre-service teachers were able to deliver the same lessons multiple times. Although secondary pre-service teachers may have the opportunity to teach lessons more than once during a school-based practicum if their schedule allows, the opportunity to deliver several versions of the same lesson is unique to the museum practicum.
- Pre-service teachers were able to observe museum educators teaching. Pre-service teachers identified the opportunity to observe additional educators teaching, beyond just their Classroom Supervising Associate, as uncommon in the school-based practicum.
- Pre-service teachers were able to observe students and teachers on field trips participating in museum educational programs.
- Pre-service teachers were able to teach educational programs that were prepared for them instead of being prepared by them.
- Pre-service teachers were able to experience working collaboratively with museum educational staff.
- Pre-service teachers were able to teach in a setting that provided a considerably less complex environment than they experienced during the school-based practicum.

- Some pre-service teachers were not able to teach during the EPBCO practicum.

#### **5.4 Research question 2: How do the experiences of pre-service teachers during a museum-based practicum impact their personal epistemologies and pedagogies of learning and teaching**

The salient findings for my second research question will be summarized contextually and highlights the conclusions from the data analysis.

##### **5.4.1 Salient findings across practicum contexts**

- The EPBCO practicum experience promoted a greater appreciation of the importance of the affective component of teacher-student relationships. The opportunities that pre-service teachers had to interact with students while teaching, and to observe student interactions with other museum educators, allowed the pre-service teachers to develop important insights into the impact of emotion on student engagement, learning, motivation and on the pre-service teachers themselves.
- The EPBCO practicum experience provided important opportunities for pre-service teachers to practice using constructivist pedagogies. Pre-service teachers' identified teaching multiple versions of the same programs to different grades and groups of children as providing opportunities to gain experience using hands-on activities and relevance to engage children, and for allowing pre-service teachers to develop their questioning skills.

- The EPBCO practicum experience provided pre-service teachers with the opportunity to teach different grades and groups of children which contributed to the development of pre-service teachers' flexible pedagogies. Pre-service teachers identified the process of establishing an effective pedagogical relationship with each new student group they encountered as significant in the development of a flexible pedagogy.
- The EPBCO practicum experience provided pre-service teachers with skills that they identified as being relevant to the role of a Teacher-On-Call, a likely future role for newly graduated teachers.

#### **5.4.2 Salient findings from the Vancouver Aquarium practicum context**

In addition to the salient findings described in section 5.2.1, the following findings were also identified as salient to the Vancouver Aquarium practicum.

- The degree of autonomy that pre-service teachers felt they had to interpret the educational program's curriculum affected their engagement with practicum opportunities.
- Pre-service teachers viewed some aspects of the educational programs they delivered as non-constructivist and counter to their established epistemologies and pedagogies.

#### **5.4.3 Salient findings from the Science World practicum context**

In addition to the salient findings described in section 5.2.1, the following findings were also identified as salient to the Science World practicum.

- The opportunity to deliver multi-age educational programming promoted pre-service teachers' understanding of student development and cognition.
- Pre-service teachers learned about the role of teachers on field trips. Their observations of student learning, and of other educators on field trips with their students, influenced their beliefs about field trip pedagogy.
- The experience of working with Science World staff fostered a deeper appreciation for the value of working collaboratively as educators.

#### **5.4.4 Salient findings from the Vancouver Art Gallery practicum context**

- The EPBCO practicum experience provided important opportunities for pre-service teachers to observe and develop an appreciation for constructivist pedagogies. Pre-service teachers' identified relevance and questioning as pedagogical approaches they valued, as well as the use of structure when teaching for focusing student engagement.
- Pre-service teachers felt that the opportunity to participate in the development of the Art Gallery's new school programs contributed to a greater appreciation of the programs and of the processes used in developing them.
- Pre-service teachers felt that their EPBCO practicum experience impacted their understanding of pedagogy for teaching about First Nations art. The impacts were facilitated by opportunities to attend Gallery lectures featuring First Nations artists and subsequent discussions with the education staff.
- Pre-service teachers felt their practicum experience lacked sufficient opportunity to impact their pedagogies through practice.

- Pre-service teachers gained valued insights into the Vancouver Art Gallery as an institution and educational resource but they did not attribute any significant impacts to them.

## **5.5 Limitations of the study**

The interpretive case study approach used in this research is, despite attempts to use professionally developed frameworks and criteria, ultimately subject to my personal judgments and understandings. The data that I was interpreting is also primarily self-reported, consisting of participants' perceptions and interpretations of experiences that had already taken place and were being recalled in order to answer interview questions. Not only are there possible biases in the data provided by the participants, but I must also acknowledge the possible biases inherent in my own interpretation and synthesis of that data. However, despite the potential limitations of the data, self-reporting provides arguably the truest version of the pre-service teachers' cognition and sense making of the context within which their experiences took place (Beattie, 1995).

Another potential limitation to address is the impact on pre-service teachers of knowing that they were part of a research process. This knowledge could have affected the way participants expressed their interpretation of the experiences they had. It could also have impacted the way the pre-service teachers expressed themselves in their weekly reflections and the focus group interviews in that they may have written what they believed the researcher wanted to hear.

Another identified limitation of this study was in the treatment of the transcriptions of the video-taped focus group interviews. The transcriptions were altered

to remove many unnecessary “verbal tics” and tangents within a spoken selection that may have distracted the reader from the “main point.” To preserve the conversational nature of the focus group interview, any removed text is represented by three dots “...” in the participants’ responses. While it was my intention to remain as true as possible to the ideas offered by the speaker, it is possible that aspects of these ideas were lost or altered by the removal of distracting verbage.

Although these three practicum settings shared many features, they differed significantly. Comparison across cases identified several salient findings that were only significant within a given context. While this does illustrate the uniqueness of each practicum context, the salient findings from the analysis across contexts does illustrate the significant learning experiences for pre-service teachers museum practica that appear to be independent of context.

A final limitation of this study is the relatively small number of participants. This was in part attributable to the relatively small number of pre-service teacher candidates that each museum practicum could accommodate. This number was further reduced when some of the originally accepted EPBCO candidates withdrew from the optional museum practicum. The limited number of participants each museum partner can accommodate individually is unlikely to expand and should therefore be acknowledged as inherent to the current design of this practicum experience.

## **5.6 Additional outcomes and implications of the study**

This section describes the implications of this study for teacher educators at UBC and beyond, for museum educators, and for researchers in both fields.

The findings from this study indicate that collaborations between programs of initial teacher education and museums are fruitful and can contribute significantly to the development of new teachers. Pre-service teachers participating in the EPBCO program were able to observe or gain experience with alternative pedagogies and to consider their implications for the practice of teaching. This occurred in a space free from many of the pressures of apprenticeship and other complexities often encountered by pre-service teachers during the traditional school-based practicum (Wilson and I'Anson, 2006). Pre-service teacher opportunities to dialogue with peers, docents and museum educators introduced them to different understandings and perspectives (I'Anson, Rodrigues and Wilson, 2003), which often drew attention to the pre-service teachers' own pre-conceived notions of teaching (Wilson and I'Anson, 2006). These findings suggest that teacher educators should consider museums as fitting contexts within which to create Schönian practicum experiences that can support pre-service teachers in learning to teach and reflect on practice (Schön, 1987).

A significant note for teacher educators considering museums as contexts within which to develop a Schönian practicum concerns the role of the coach. Schön (1987), emphasizes the importance of the role of the *coach* in the practicum setting for 'demonstrating, advising, questioning and criticizing' (p. 38). Within the EPBCO practicum contexts, none of the pre-service teachers spoke of any significant impacts that their interactions with the UBC Faculty Advisor (FA) had on pre-service teachers' experiences during the practicum. The experiences and impacts discussed in Chapter 4 of this paper highlight the many and significant ways that museums can provide the practicum experiences advocated for by Wilson and I'Anson (2006) in their description



of a Schönian practicum, but the role of the coach in such a setting was not satisfactorily illuminated by my research. This suggests that the role of the FA needs to be more carefully defined and articulated in the museum-based practicum setting.

Pre-service teachers also reported several gains that complemented the classroom practicum with regards to developing as a teacher. They reported: increased awareness and more consideration of the learning experience of students; increased awareness of, and appreciation for, the affective nature of pedagogical relationships; the development of self-initiated reflection about their own pedagogical practices; insights into the developmental and cognitive abilities of children; increased flexibility in their pedagogy; increased appreciation of the potentially collaborative nature of teaching; and, increased confidence in their ability to succeed in a role as a Teacher-On-Call.

Through studying the EPBCO experience and documenting its anticipated and unanticipated gains, I have become an advocate of this type of museum-based experience. Teacher education is a complex business such that no single methodology or theoretical approach can provide all that is needed to prepare teachers fully for the profession of teaching (Zeichner, 2005). The EPBCO practicum experience has been shown to offer the opportunity for pre-service teachers to develop competence not only in the traditional classroom context, but also in the effective use of museums as resources to complement classroom learning.

An interesting and unanticipated outcome of my research is with regards to the opportunity it provided for pre-service teachers to directly affect the experience of pre-service teachers following in their footsteps. Pre-service teachers were made aware that, as part of my research, the information they provided would be used to shape any future

EPBCO practica. It is likely that no other UBC practicum experience created situations within which pre-service teachers felt empowered and motivated to participate constructively in the education of future teachers (Cook-Sather & Youens, 2007).

The structure and timing of the EPBCO experience appeared to have been beneficial. In scheduling the practicum following the completion of the classroom practicum, pre-service teachers were interested in concentrating on developing the skills that they saw as necessary for success in the classroom. Further, the absence of the pressure of evaluation and lesson planning, allowed EPBCO participants to shift focus from their own performance and on to student engagement and learning. These attributes allowed pre-service teachers to attend to and reflect upon pedagogical approaches that they believed could transfer successfully from their museum practicum to their own classroom.

The EPBCO participants were emphatic about the structure of the museum practicum contributing to their successful use of quality reflective practices during the practicum. The less-threatening atmosphere of the EPBCO practicum and the opportunity to observe museum educators teaching the same programs contributed to pre-service teachers' use of reflection to guide their pedagogical decisions. However, another powerful structural component of the museum-based practicum experience is the repetitive nature of the programs that pre-service teachers were able to teach. Many of the pre-service teachers' reported experiences and impacts on epistemologies and pedagogies are attributable to this structural aspect of the museum-based practicum.

## **5.7 Recommendations arising from the research**

The recommendations arising from this research are provided for EPBCO administrators, museum collaborators, and contribute to questions for further research.

### **5.7.1 Recommendations**

- EPBCO administrators should work with Faculty Associates to assist them in fulfilling the role of a coach (Schon, 1987) in the museum practicum context.
- Museum partners should provide a variety of hands-on teaching opportunities for all EPBCO participants and should provide time for discussions about pedagogy between pre-service teachers and museum staff.
- The practicum structure designed for EPBCO pre-service teachers include opportunities for reflection-in-practice and reflection-on-practice by pre-service teachers as noted in the outcomes from the Science World practicum.

## **5.8 Questions for further research**

This study examined an exciting new approach to teacher preparation and provided many insights into learning to teach in a museum setting, some of which should be considered as areas for further research.

The impact of the museum context itself on the learning experiences of pre-service teachers should be considered. How did each individual museum context contribute to pre-service teachers' own learning? How did the animal displays impact the Aquarium cohort, the paintings and sculptures impact the Art Gallery cohort, and the hands-on exhibits impact the Science World cohort?

The role of a Teacher-On-Call, and the epistemologies and pedagogies that are the most suited to the role, should be considered in programs of teacher education. Many new graduates of teacher education programs will become a TOC and many of the experiences reported in my research were connected to this role.

The longitudinal impact of the EPBCO experience on pre-service teachers should be determined to inform future iterations of the EPBCO program, and to contribute to the small body of research that has looked at the longitudinal impacts of museum learning.

## **5.9 Concluding remarks**

Despite decades of research examining different approaches to the comprehensive preparation of pre-service teachers, “no single program has demonstrated a definitive solution” for aligning the practice of teachers more closely with current theories of learning (Lewis, 2007, p. 7). This study has shown that the traditional school-based practicum context, though highly valued by pre-service teachers, does not provide them with a complete understanding of teaching and learning. A Schönian practicum offers an important complement to the school-based practicum in that it provides opportunities for pre-service teachers to practice, reflect, and evaluate pedagogical approaches that are more aligned with sophisticated epistemologies of learning and teaching. This study has also shown that museum contexts can play a significant role in the education of pre-service teachers by acting as contexts within which teacher educators may develop Schönian practicum experiences.

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## Appendix A

### Recruitment flyer



### **EDUC 329 Extended Practicum Beyond the Classroom Option (EPBCO) @ Science World**



UBC Science Teacher Education is partnering with the Science World for an innovative practicum experience. This option offers six (6) Secondary General Science students all of the elements of the standard SIS cohort model, but integrates a three week placement at Science World into the EDUC 329 Extended Practicum. Students will be actively engaged in teaching and facilitating science-based educational programming to Science World School Program participants. The practicum experience will expand students to teaching pedagogies beyond the regular classroom setting, with a focus on Science Education in an out of school context. Working under the guidance of Science World School Program staff, practicum students will gain experience with program planning, operations, and delivery with K-12 school groups. Enrolment in this option includes participation in three-days of pre-practicum theory sessions to be held at the Science World (late January, 2007).

Students who are interested in this option can apply by forwarding an expression of interest in the form of a paragraph (not more than ½ page) explaining their interest and desire to elect to participate in this option.

Enquiries can be directed to:

Dr David Anderson, ([david.anderson@ubc.ca](mailto:david.anderson@ubc.ca)), 604 – 822 2086

Expressions of interest must include 1) your name, 2) student number, 3) science major instructor's name, and 4) contact details. **Applications must be e-mailed to Dr David Anderson – [david.anderson@ubc.ca](mailto:david.anderson@ubc.ca) before Friday, Sept 28<sup>th</sup>, 5:00PM**

### **EDUC 329 Extended Practicum Option @ Vancouver Aquarium**

UBC Science Teacher Education is partnering with the Vancouver Aquarium Marine Science Centre for an innovative practicum experience. This option offers eight (8) SIS Biology Majors all of the elements of the standard SIS cohort model, but integrates a three week placement at the Vancouver Aquarium into the EDUC 329 Extended Practicum. Students will be actively engaged in teaching and facilitating conservation-based educational programming to Aquarium School Program participants. From the Wet lab to the Amazon gallery, and many stations in between, the practicum experience will expand students to teaching pedagogies beyond the regular classroom setting, with a focus on marine science. Working under the guidance of Aquarium School Program staff, practicum students will gain experience with program planning, operations, and delivery with K-12 school groups. Enrolment in this option includes participation in three-days of pre-practicum theory sessions to be held at the Aquarium (late January, 2006).

Students who are interested in this option can apply by forwarding an expression of interest in the form of a paragraph (not more than ½ page) explaining their interest and desire to elect to participate in this option.

Enquiries can be directed to:

Dr David Anderson, ([david.anderson@ubc.ca](mailto:david.anderson@ubc.ca)), 604 – 822 2086

Expressions of interest must include 1) your name, 2) student number, 3) biology major Instructor's name, and 4) contact details. **Applications must be e-mailed to:**

**[blawson1@interchange.ubc.ca](mailto:blawson1@interchange.ubc.ca) before Thursday, Sept 22<sup>nd</sup>, 5:00PM**

### **EDUC 329 Extended Practicum Option @ Vancouver Art Gallery**

UBC Art Teacher Education is partnering with the Vancouver Art Gallery for an innovative practicum experience. This option offers six (6) Secondary Art Majors all of the elements of the standard practicum model, but integrates a three week placement at the Vancouver Art Gallery into the EDUC 329 Extended Practicum. Students will be actively engaged in teaching and facilitating art-based educational programming to Vancouver Art Gallery School Program participants. The practicum experience will expand students to teaching pedagogies beyond the regular classroom setting, with a

focus on Art Education in an out of school context. Working under the guidance of Vancouver Art Gallery School Program staff, practicum students will gain experience with program planning, operations, and delivery with K-12 school groups. Enrolment in this option includes participation in three-days of pre-practicum theory sessions to be held at the Art Gallery (late January, 2006).

Students who are interested in this option can apply by forwarding an expression of interest in the form of a paragraph (not more than ½ page) explaining their interest and desire to elect to participate in this option.

Enquiries can be directed to:

Dr David Anderson, ([david.anderson@ubc.ca](mailto:david.anderson@ubc.ca)), 604 – 822 2086

Expressions of interest must include 1) your name, 2) student number, 3) art major instructor's name, and 4) contact details. **Applications must be e-mailed to:**

**[blawson1@interchange.ubc.ca](mailto:blawson1@interchange.ubc.ca) before Thursday, Sept 22<sup>nd</sup>, 5:00PM**

## **Appendix B**

### **Focus group 1 interview questions**

#### *Focus Group Protocol 1 – 2006*

*Extended Practicum Beyond the Classroom Option: VanAqua, TWOS, VAG*

#### *Focus Group 1*

- 1) Describe how your 10 weeks practicum at school has changed you?
  
- 2) What were the key experience that changed you and why?
  

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- 3) What were the highlights / key things you gained from the training sessions?
  
- 4) What do you think should be changed about (or added to) the training sessions for next time?
  
- 5) How did the training complement (or conflict with) what you have been learning/experiencing in your B.Ed. program?
  
- 6) How has this training influenced your conceptions of teaching or being a teacher?
  

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- 7) In the context of being a beginning teacher, what do you anticipate to gain from the EPBCO practicum experience?



## Appendix C

### Focus group 2 interview questions

*Focus Group Protocol*  
*Extended Practicum Beyond the Classroom Option*  
*May, 2006 - Scarfe Room 2108*

- 1) What were the highlights of the EPBCO experience?
- 2) What are the key things that you learned from the EPBCO experience?  
[Probe: Pedagogy of teaching / Epistemology – nature of learning]
- 3) What do you see as the relation between the EPBCO experience and what you have been learning/experiencing in other parts of your Bachelor of Education program?
- 4) What did you think about the assessment that took place during the EPBCO experience? Was it effective? Why/ Why not? FA, Institutional staff, etc
- 5) How has the EPBCO experience influenced your conceptions of teaching or being a teacher?  
[Probes: FA, Institutional Staff, Peers]
- 6) How has the EPBCO experience influenced your ideas about learning in out-of-school settings?
- 7) What do you think should be changed about (or added to) the EPBCO experience for next time?

## Appendix D

### Behavioral research ethics board certificate



The University of British Columbia  
Office of Research Services and Administration  
**Behavioural Research Ethics Board**

### *Certificate of Approval*

PRINCIPAL INVESTIGATOR <b>Anderson, D.</b>		DEPARTMENT <b>Curriculum Studies</b>		NUMBER <b>B05-0228</b>	
INSTITUTION(S) WHERE RESEARCH WILL BE CARRIED OUT					
CO-INVESTIGATORS: <b>Jenkins, Jarrid, Educational Studies; Lawson, Bethan, Education; Mayer-Smith, Jolie, Curriculum Studies</b>					
SPONSORING AGENCIES					
TITLE: <b>Investigating the Impact of the Inaugural Secondary Integrated Science Extended Practicum Experience in Museum Settings</b>					
APPROVAL DATE <b>05-04-05</b> <small>(yr/mo/day)</small>	TERM (YEARS) <b>1</b>	AMENDMENT: <b>Jan. 12, 2006, Co-PI / Title / Subjects / Study location / Jan. 19, 2006, Consent form</b>		AMENDMENT APPROVED: <b>JAN 23 2006</b>	
<p>CERTIFICATION:</p> <p style="text-align: center;">The request for continuing review of an amendment to the above-named project has been reviewed and the procedures were found to be acceptable on ethical grounds for research involving human subjects.</p> <p style="text-align: center;"> <hr style="width: 50%; margin: 0 auto;"/> <i>Approved on behalf of the Behavioural Research Ethics Board</i>  <i>by one of the following:</i>            Dr. Peter Suedfeld, Chair,            Dr. Susan Rowley, Associate Chair            Dr. Jim Rupert, Associate Chair            Dr. Arminee Kazanjian, Associate Chair         </p> <p style="text-align: center;">This Certificate of Approval is valid for the above term provided there is no change in the experimental procedures</p>					