Abstract

Museum educators are critical human connectors who have a crucial influence in fulfilling the educational mission and social responsibility of museums. However, studies focusing on museum educators have mostly been conducted in museums based in Western cultural contexts. The voice of museum educators from non-Western museums are often ignored, marginalized, or underrepresented. Moreover, empirical studies of Chinese science museum educators are nearly non-existent.

Informed by a Communities of Practice (CoP) perspective and Cultural Historical Activity Theory (CHAT), this interpretive case study investigated 23 Chinese science museum educators’ self-concept as museum education professionals and their perceived needs for future professional development. The research focused on museum educators’ perceptions of their self-concept as museum education professionals, and how these perceptions were influenced by the local social and cultural context in which they work. This study used semi-structured face-to-face interviews as the primary method of data collection. These were complemented by informal conversations between participants and the researcher, as well as the researcher’s self-reflective journaling.

The study’s findings indicate that Chinese science museum educators’ self-concept as museum education professionals is multifaceted and contextual. Their self-concept includes their perspectives on work motivations, job responsibility, work competency, current professional development pathways, and desires for future professional development. Moreover, museum educators’ self-concept varies across different contexts. The sociocultural factors within the Chinese museum context that shape their self-concept as professionals include: a) a highly
hierarchical organizational culture, b) an authority-centered political structure, c) a highly competitive education reality, d) a hybridized educational philosophy that blends constructive teaching and the traditional teacher-centered didactic teaching pedagogies, and e) the contradictions emergent in the process of building a professional community and connecting with different stakeholders relevant to museum education work.

The research findings elucidate Chinese science museum educators’ self-concept regarding who they are as professionals and their place within the larger museum professional community. The revelation of contradictions within Chinese science museum educators’ perception of themselves as professionals will help shape future research, develop pathways to professionalization of museum education work, and build a professional museum educator community in China.
Preface

This dissertation is original and independent work by the author, J. Ji. Ethics approval for this research was provided by the UBC Behavioral Research Ethics Board, certificate number H13-01832. The research findings in Section 4.1 will be published in Adult Education Quarterly. The reference is:

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List of Abbreviations

AAM: American Association of Museums

CAST: Chinese Association of Science and Technology

CHAT: Cultural Historical Activity Theory

CoP: Communities of Practice

ICOM: International Council of Museum

S & T: Science and Technology
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Chapter 1: Introduction

Museums are contexts where designers give considerable explicit thought to assisting learning via symbol systems and tools… However, less thought has been spent on thinking about how to engineer the role of people, including parents, museum staff and other visiting children… Unless careful attention is paid to helping the helpers, the energy and resources devoted to deepening museum learning may be wasted, or at least, underexploited (Schauble, et al., 2002, p. 449).

1.1 Where the Inquiry Begins: a Personal Story

I was born in a small town located in the Southwest China. As my parents were working in another region when I was young, like most traditional Chinese families, I was raised by my grandparents, who had a huge impact on my future learning journey. My grandfather collected Chinese antiques such as jade, bronze ware, stamps, and ancient coins. His lifelong dream was to open a family museum to document his life experience through these antiques. Unfortunately, his dream had not come true before he passed away in 2011. I loved the stories behind each object. His narration depicted a vivid picture of traditional Chinese society, which was full of wisdom and mystery. By observing the interaction between my grandfather and his collections, I deepened my understanding of the history of my family and the history of China. Such interactions were far more interesting than the didactic lectures, of my school and university years, delivered by teachers through static textbooks. My grandfather taught me how to make sense of an object and an event through an understanding of lived experiences. The stories told by my grandfather shaped my early career desire to work in a museum-like environment.
When I was an undergraduate student in Beijing Normal University in 2007, I joined a museum education research group initiated by my future Master's supervisor. This group was recruited to evaluate a national museum education project entitled *Bridge Science Museums with Schools*, which was administered by Chinese Association of Science and Technology (CAST). This was the first project in mainland China that officially recognized the educational function of science museums. Since that time, I have worked with science museums in mainland China as a way of realizing my childhood dreams.

When reflecting on my work experience with Chinese science museum educators since 2008, I found, as a generalization, that their thoughts about museum education have gone through three stages. First, many Chinese science museum administrations have resisted collaboration with schools. Rather than identifying a science museum as a learning institution, museum educators preferred to perceive the museum as a public representation of the government, as a local landmark and/or tourist attraction.

Second, museum directors, administrators, and educators recognized the importance of visitor-centered approach. Accordingly, they began to value the educational function of museums, and they recognized that education should be developed in a sustainable way to help museums serve citizens. Thus, science museums in China turned to the local school system and sought opportunities for collaboration. Many science museums naively overlooked the difficulty in breaking down the historical boundaries between museums and schools. They took for granted that schools would cooperate with them without any hesitation, which proved not always to be the case.

Third, when museums found that building a productive relationship with school system was difficult, Chinese science museum educators began to reflect on their practices. These
museum educators also questioned the current state of museum education and the organizational culture in which they have worked. Science museum educators in China were of the view that the recruitment criteria for museum educators were unclear, an established promotion and professional development system were lacking, museum educator community was scarce, and their existed a deficiency of museum education experts. These issues and perceptions have all caused the de-professionalization of museum education work. The phenomenon in Chinese science museums is similar to what U.S. museum education scholar Tina Nolan (2009) described as a “profession … in the midst of an identity crisis” (p.2).

Overall, my observations and work experience with Chinese museum educators gave me a preliminary impression of the urgent need to address the concern of museum educators’ professional development in China. This initial understanding of the Chinese science museum context, coupled with my original dream to work in a museum, drove me to continue my learning journey as a graduate student at the University of British Columbia. Inspired by discussions with my doctoral supervisor and my committee members, I started to explore current Chinese science museum educators’ working experiences and their self-concept as museum education professionals.

1.2 Problem Statement

In 1992, the Education Committee of the American Association of Museums (AAM) published a report that required museums, of various kinds and levels, to “place education, in the broadest sense of the word, at the center of their public service role” (Hirzy, 1992, p. 8). This statement identified museums as places that have a central role to play in education and as spaces for lifelong learning. The centrality of museums in education had been acknowledged over the
decades, especially in North America and Europe (Anderson, 1994; Hirzy, 1992; Dierking, Falk, Rennie, Anderson, & Ellenbogen, 2003). However, such acknowledgement and recognition in China, which has been demonstrated through centrally mandated policies that require science museums to be used to popularize science and promote scientific literacy, is a very recent phenomenon (CAST, 2006, 2010, 2011, 2014). The Chinese government has recognized science museums as public agencies for science education by legislating their responsibility of fulfilling national goals of developing a more scientifically literate society in acts of policy and law.

In China and elsewhere, museum staff are in charge of operationalizing this responsibility, serve as a bridge that connects visitors with the content and meanings portrayed in and through museums (Jennifer, 2006). In this way, as educators, they play a crucial and influential role in translating museum’s educational mission and social responsibility into tangible and meaningful learning experiences for visitors (Munley & Roberts, 2006). Like teachers who facilitate learning in schools, museum educators facilitate learning in museums as “mediators, translators, and message keepers for museums” (Ash & Lombana, 2013, p. 70). Therefore, museum educators and teachers perform similar roles in facilitating learning for their visitors. The key difference is the contexts where they do such facilitation. As such, like teachers, museum educators are “professionals”. And, since they are a critical human connection between the public and museums, it is very important for the museum institution to develop museum educators as professionals (Tran, 2008). This has implications for the recruitment of qualified museum educators, and also the professional development of currently practicing museum educators in the field – Particularly in China, where the development of science museums have only a recent history and are also experiencing rapid growth because of the increased financial and political support from the central government.
As a very initial step of prompting museum educators’ professional development, it is of particular concern to understand how the self-concept of current Chinese museum educators as professionals is manifest in their work practices and perceived professional needs (Bailey, 2006; Reid, 2013), hence, the focus of this study. As Usher (1992) argued, in the field of adult education, “experience is at the centre of knowledge production and knowledge acquisition and it is also the foundation of a learner-centred educational practice congruent with the unique characteristics of adults” (p. 201). It can be inferred from Usher’s statement that understanding museum educators’ perception of their working practices and professional needs is an essential step in facilitating their continuous learning. As well, understanding their self-concept as museum education professionals is beneficial, and of value, to museum education stakeholders such as museum education administrators, policy makers, human resource specialists, and museum educator trainers. Such understanding sets up a foundation to demonstrate the uniqueness of museum education work, which can also be a reference for museum education stakeholders to enact necessary museum education policies, define adequate museum educator recruitment criteria, and carry out museum-educator-centered training programs (Bailey, 2006; Liu, 2004; Tran, 2008).

Despite the compelling argument, empirical research pertaining to museum educators’ professional development is not as extensive as the research that has been done with school teachers or with visitor studies in museum contexts (Kelly, 2011). Among the existing studies, focus is on addressing museum educators’ working beliefs, reflections, and practices (Bailey, 2006; Duff, Cherry & Sheffield, 2010; Grenier, 2005, 2011; Kelly, 2009; Kidd & Kidd, 1997; Liu, 2004; McIntosh, 2011; Reid, 2013; Spock, 2000). Four research themes regarding museum educators’ professional development can be discerned from the studies carried out within
museums in Western contexts. The first theme relates to museum educators’ previous and current working status (Duff, Cherry & Sheffield, 2010; Liu, 2004). The second theme describes museum educators’ perceptions of working practices and their thoughts and beliefs about being a museum educator (Bailey, 2006; Reid, 2013; Spock, 2000). The third theme is about the process of museum educators’ professional growth (Grenier, 2005, 2011). Lastly, the fourth theme is about critical empowerment of museum educators to exercise professional authority within the institutions in which they work (Kelly, 2009; McIntosh, 2011).

In summary, the previous studies highlighted above offer some limited insights into museum educators’ work practices and professional needs as well as self-concept of museum educators as professionals. Moreover, it is also important to recognize that most studies pertaining to museum educators which have informed the above themes have been conducted in the context of the United States (e.g., Bailey, 2006; Grenier, 2005, 2011; Kidd & Kidd, 1997; Nolan, 2009; Reid, 2013; Spock, 2000; Tran, 2007) and Canada (e.g., McIntosh, 2011; Nolan, 2009; Reid, 2013). Only a very small number empirical studies, focused on professionalizing museum education work, have been conducted in non-Western context, including studies in Taiwan (Liu, 2004), Korea (Young-shin, Jin-hee & Hyo-suk, 2014), and Israel (Tal & Morag, 2007). Currently, empirical studies pertaining to Chinese science museum educators are almost non-existent. In other words, a review of the existing literature demonstrates that current museum education studies are predominantly conducted in Western countries and have limited capacity to inform practices in China which has a very different social, political, and educational culture.

Some scholars have realized the culturally situated nature of museum education (Ash & Lombana, 2013; Kisiel & Anderson, 2010), and the limits of transferability of research findings
across cultural boundaries. Further, these scholars have also recognised that such understandings of museum educators from different cultural contexts may lead to new and interesting insights concerning their practices and working situations. Accordingly, scholars such as Ash and Lombana (2013) have alluded to the increasing concern for the underrepresented cultural groups such as museum visitors, educators, and administrators. Similarly, Kisiel and Anderson (2010) have also called for studies in non-Western cultural contexts because such studies hold the promise to broaden our understandings, which are otherwise restricted by cultural boundaries.

Chinese science museum educators are one of the culturally underrepresented and under-researched groups in the published English research literature. Although some Chinese scholars have written articles in the Chinese literature, with a focus on museum education and museum educators in China, most of these articles were in formats of introductions, reviews, discussions, arguments, and/or positions (Xu, 2007; Zhang, 2012; Zheng, 2009; Zheng, Zhang & Meng, 2011; Zhu, 2009), rather than empirical research studies. Accordingly, very few scholars have conducted empirical studies to explore museum educator related issues in China. In spite of the fact that Chinese science museums have been constructed and developed at an astonishing pace in recent years\(^1\), the grand buildings and exhibitions in most government-supported Chinese science museums do not often equate to the grandness of professional skills of the museum educators who work in these institutions (Ren, Zheng & Sun, 2012; Zheng, Zhang & Meng, 2011). The lack of museum education professionals and the lack of professional skills of the existing museum educators point to the difficulty Chinese science museums have in fulfilling their educational mission. Therefore, as an initial step to better understand and help museum educators’ practices in China, this empirical study explored how the self-concept of current

\(^1\) A total of 1,511 science museums existed in mainland China in 2010 (Xinhua News, 2012).
Chinese museum educators as professionals is manifest in their work practices and perceived professional needs.

1.3 Research Questions and Research Designs

The investigation of how Chinese science museum educators’ self-concept of museum educators as professionals is manifest in their work practices and perceived professional needs was guided by the following research question and sub-questions:

Research Question: How does Chinese science museum educators’ self-concept as professionals manifest and transform in their work practices and professional needs within the local social and cultural Chinese science museum context? Specifically,

- In what motivational factors to pursue work in museums does Chinese science museum educators’ self-concept as museum education professionals manifest?
- How has Chinese science museum educators’ self-concept as professionals been shaped by their museum related work experience?
- How is Chinese science museum educators’ self-concept as professionals manifest in their perceived professional needs?
- How is change in the manifestations of Chinese science museum educators’ self-concept of being museum education professionals influenced by local social and cultural contexts?
- What opportunities, conflicts, dilemmas, and tensions experienced by Chinese science museum educators are perceived to be indicative of their self-concept as professionals?
In order to provide answers to these research questions, this study employed Community of Practices (CoP) (Lave & Wenger, 1991; Wenger, 2010, 2011; Wenger & Snyder, 2000) as a perspective that views museum educators as a community of professional educators and Cultural Historical Activity Theory (CHAT) (Engeström, 2001, 2011; Engeström & Kerosuo, 2007) as a theoretical framework for the guidance of the research process and the interpretation of data.

This study adopted an interpretive framework drawing heavily from phenomenological methods (Glesne, 2011; Patton, 2002; Pring, 2000) to answer the above research questions. Therefore, face-to-face semi-structured in-depth interview was the dominant method for data collection. This was complemented by informal conversations from time to time with the participants. A total of 23 museum educators from five science museums in mainland China participated in the study. They were interviewed between September and November in 2013. The interview data were complemented by data from informal conversations with the museum educators. As well, the researcher maintained reflexive journals that served as supportive data sources. The data were analyzed from two levels, individual and community, in order to understand how the self-concept of current Chinese museum educators as professionals is manifest in their work practices and perceived professional needs. Details of the research design, methodology, methods, and procedures are discussed in detail in Chapter Three.

1.4 Significance

Understanding museum educators’ self-concept as professionals, and their perceived professional needs, is a preliminary but essential standing point in museum education studies. Investigating this research topic has several implications and point of significance for the field. First, understanding museum educators’ self-concept in relation to roles and professional needs
offers researchers opportunities to explore the compatibility between the self and the occupation (Betz, 1994). Since previous researchers have revealed that self-concept as professionals has positive influences on job decision, self-management, and other job-related performances, clarifying museum educators’ self-concept enables individuals to formulate and/or reformulate expectations, desires, decisions, and regulations for personal career development (Markus & Wurf, 1987; Weng & McElroy, 2009).

Second, facilitating museum educators’ reflection on their self-concept as professionals is a fundamental step to further transform museum education work into a profession, thereby longitudinally having impacts on protecting museum educators’ monetary and intellectual interests over time (Tran, 2008). As indicated by Tran (2008), through the revelation of the embedded conflicts and contradictions, understanding museum educators’ self-concept as professionals empowers museum educators with institutional authority, motivates current museum educators to improve their educational service, and attracts individuals who have strong intrinsic motivation to work in museums.

Third, documenting museum educators’ self-concept as professionals and their perceived professional needs is an effective way to demonstrate the uniqueness of museum education work. It is a channel for the public to recognize the importance of museum educators, and an opportunity for museum educators to establish their social status (Bailey, 2006; Liu, 2004).

Finally, this exploratory study will make a fundamental and significant contribution to professionalizing museum education work in Chinese science museums. This study offers a cultural consideration to enrich our understanding of museum educators’ self-concept from a Non-Western perspective. This study will also add new insights to the body of knowledge concerning recruitment, training, and motivating museum educators, and will eventually help
create a cooperative and positive organizational culture to fulfill the educational mission of science museums in China.

1.5 Glossary of Terms

In order to clarify the research background and context, a number of terms that have been frequently used in this dissertation are defined as follows.

- **Chinese**, in this study, refers to the mainland territory of China that does not include Hong Kong, Macau, and Taiwan.

- **Science Museums**, in this research, includes two kinds of museums: science and technology museum and natural history museum.

- **Museum Educators** are the group of museum staff who predominantly conduct education-related work. In Chinese science museums, there are a variety of titles to describe an education staff, such as a science teacher (科学教师, Pinyin: ke xue jiao shi), a science and technology tutor (科技辅导员, Pinyin: ke ji fu dao yuan). The title changes within different museum contexts and according to different institutional needs. In order to keep consistency, the term *Museum Educator* is borrowed to inclusively describe museum staff, in this study, that work in education-related departments and are primarily responsible for museum education programs. A museum educator can be either a frontline museum educator or a museum education administrator such as an education director.

- **Social and cultural Background** is the individual’s characteristics that are shaped by the social and cultural environment in which she/he is situated. In this dissertation, I classify the social and cultural background into two levels. One is an individual level, including a museum educator’ gender, age, educational level, academic major, working history, and
position title. The other level of social and cultural background factors refers to the level of museum institutions. In this study, three levels of science museums are included: one museum from the national level, three museums from the provincial/municipal level, and one museum from the city level.

- **Self-concept** is a descriptive portrait of how people think about the self (Markus & Wurf, 1987). In this study, museum educators’ self-concept is described as their reflection and declaration of their working experience in museums in relation to their sense of self.

### 1.6 Structure of the Dissertation

This dissertation consists of seven chapters. Chapter One begins with the introduction of the researcher’s personal story in relation to Chinese science museums and Chinese science museum educators. The childhood and higher education experiences that drove the researcher to conduct research in Chinese science museum contexts are documented at the beginning of this chapter, which is followed by the research problem statement. The research problem statement is discussed from four perspectives: a) museum educators are a critical linkage between museums and public society; b) empirical studies with a topic on understanding museum educators’ working experiences are mostly conducted in Western museums; c) from a cultural perspective, adopting the European-American, middle-class standards as a universal norm is inappropriate in a non-Western museum context like China; and d) Chinese science museums are deficient in museum education expertise. After the research problem statement, a brief introduction of the research question and research designs is provided. Chapter One concludes with an illustration of research significance and the definition of key terms used in this dissertation.
Chapter Two reviews the theoretical perspectives and relevant empirical studies. This chapter begins with the conceptualization of museum educators. Then, the origin, development, and current situation of science museums, museum education, and museum educators in China are discussed. This section is followed by the introduction of Communities of Practices (CoP) and Cultural Historical Activity Theory (CHAT), and discusses how CoP and/or CHAT have informed museum educator studies.

Chapter Three describes the methodology that has been used for this study. This chapter begins with the introduction of an interpretive case study. Next, the research design is described by depicting the research context, participant background, data collection method, data analysis, and methods of ensuring the quality of data.

Chapter Four reports five areas that embodied museum educators’ self-concept as professionals. These five areas include museum educators’ work motivation, job responsibilities, perceived work competency, current pathways for professional development, and desires for future development.

Chapter Five reports the social and cultural influences on museum educators’ self-concept as professionals and the contradictions and conflicts museum educators encountered as indicative of their self-concept as professionals. These contradictions and conflicts emerged during museum educators’ communication and negotiation with other museum education stakeholders.

Chapter Six discusses research findings in two ways: a) building a boundary to construct a professional community; and b) resolve boundaries and contradictions to make connection between different but relevant communities in relation to museum educators.
Chapter Seven is the final chapter of this dissertation. It includes the conclusion, implication, limitations and concluding thoughts. The conclusion restates the main research findings of this study. Implications are discussed from three aspects, including implications for future research, practice, and theory. Finally, the limitations of this study and concluding thoughts are discussed.
Chapter 2: Literature Review and Theoretical Perspectives

Understanding museum educators’ self-concept as professionals has been an emerging topic in the field of museum education in recent years, often with an aim to prompt the further professionalization of museum education work. In particular, from a sociocultural perspective, exploration of museum educators’ thoughts and ideas about their roles and professional needs is almost non-existent in Chinese science museum context. This study, with a focus on Chinese science museum educators, has been informed by scholarship in a number of areas that relate to museum studies, informal and adult education, human resources management, and sociocultural theories (Allen & Crowley, 2014; Anderson, 2013; Ash & Lombana, 2013; Bailey, 2006; Castle, 2006; Kelly & Kassing, 2013; Spock, 2000; Theresa & Bubp, 2008; Tran, 2013).

This chapter begins with an interpretation of the notion of museum education and identifying science museum educators’ uniqueness. This follows with a description of the history and current situation of Chinese science museums, museum education, and museum educators. This chapter concludes with a discussion of the frameworks that inform this study, Communities of Practices (CoP) and Cultural Historical Activity Theory (CHAT), which have utility to analyze an activity, phenomenon, and practice from a sociocultural perspective.

2.1 Conceptions of a Museum Educator

This section conceptualizes the notion of a museum educator from two aspects: a) defining a museum educator and the roles played by a museum educator, b) demonstrating the uniqueness of a museum educator.
2.1.1 Define a Museum Educator

A museum is defined by the International Council of Museum (ICOM, 2006) as,

A non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment.

Implied in the above definition is the notion that, a museum, as a social unit, reflects the history and development of local sociocultural, economic, and political contexts. As a public sphere that provides people with lifelong learning opportunities, museums help visitors to construct personal understanding of their living reality in terms of contextualized environment. Thus, ICOM’s definition (2006) considers education as one of three key purposes of a museum in serving the public. In order to embody its educational value, museum educators, as connectors, take responsibility to build connections between museums and different museum education stakeholders such as communities, schools, cultural institutions, universities, other museums, and the general public (Munley & Roberts, 2006). Based on the analysis of museum job postings, researchers have also found an increasing demand, by museums, for education experts, which reflects an evolution of the function of museums; moving from a collection-solely-based approach to also value an educational approach (Duff, Cherry & Sheffield, 2010; Fuller, 2005).

Although all museum staff contribute in some way to the fulfillment of a museum’s educational mission, the term museum educator does not appropriately describe all museum staff. For example, those who predominantly work in curatorship, customer service, and exhibition
development, would not necessarily be recognized as museum educators. Hence, it is reasonable to ask what personalities, backgrounds, specializations, and skills should a museum educator reasonably hold? What activities should a museum educator be in charge of? In order to address such professional-identity related issues, museum education researchers and practitioners articulated the definition of museum educator in different ways. For example, Tran (2007) regarded museum educators as “paid staffs working in museums with education responsibilities that predominantly involve face-to-face interactions with the public” (p. 278). Adams, Tran, Gupta, and Greedon-O’Hurley (2008) perceived the role that a museum educator plays as “the interface between the museums’ collections, the knowledge and culture that are represented, and the visiting public” (p. 444), and they also emphasized museum educators’ direct educational contributions to the public. Munley and Roberts (2006) argued that museum educators should be “critical point of connection between the community and the museum” (p. 36). AAM (2005) provided the following principle and standard to define a museum educator,

Museum educators are specialists who help museums fulfill their educational mission. They recognize that many factors affect the personal, voluntary learning that occurs in museums. They seek to promote the process of individual and group discovery and to document its effect. On museum teams, museum educators serve as audience advocates and work to provide meaningful and lasting learning experiences for a diverse public (p. 6).

Regardless of the different articulations of what a museum educator is, or what a museum educator should be, a consistent conclusion drawn from the above definitions is that, a museum
educator is a human mediator among museum collections, visitors, and other communities. Since they are the point of contact that visitors may be able to approach to in a museum, museum educators’ working attitudes and work performance may have significant impact on museum institutions’ reputation within society and sustainable development (Nolan, 2009).

2.1.2 The Uniqueness of a Museum Educator

In addition to defining what a museum educator is, and in order to professionalize museum education work, it is important to construct and establish professional boundaries to highlight the significance and uniqueness of museum educators and the necessity for museum education work. In the existing literature, museum education scholars often highlight the uniqueness of a museum educator in two ways: a) differentiation of museum educators from other relevant but different occupations; and b) demonstration of the unique attributes and characteristics of museum educators’ work roles, responsibilities, and competencies.

2.1.2.1 Differentiation of Museum Educators from Other Relevant but Different Occupations

It is meaningful to compare museum educators with other related but different occupations. As indicated by museum education scholars like Tran (2008), such relevant but different professional groups could be museum staff who hold position titles other than museum educators, and school teachers.

Museum educators and other museum staff, such as exhibit designers, exhibit developers, and technician support are all embedded in the same working environment and are usually embraced by the same organizational culture. However, the roles they play, the responsibilities
they undertake, and the authorities they wield may be vastly different. Museum educators create education experiences based on constant and direct communication with visitors, and they utilize such teaching knowledge and skills to achieve the educational mission of serving the public society (Cunningham, 2009). In other words, although it is unquestionable that all museum staffs engage in educational work to certain degrees, it may be argued that museum educators take leadership and prominent roles in strengthening the educational function of museums.

Although museum educators and school teachers share similar educational responsibilities (Tal & Morag, 2007), museum educators encounter different working contexts from school teachers, which may lead museum educators to develop different education philosophies, perform different education activities, and build different relationships with students (audiences). For example, compared to students in schools, the composition of visiting groups in museums are more diverse in terms of age range, visit motivations, and preferences to different exhibitions. Moreover, since exhibition areas are always filled with distractions, visitors may leave an education program at any time they desire (Taylor & Caldarelli, 2004). Due to the self-regulated nature and the limitation of visiting time, it is more challenging for museum educators to establish a trusting and harmonious relationship with visitors (Tran, 2007). Moreover, since learning in museums is more implicit, self-motivated, and less structured (Tran, 2007), compared to education practice in schools, the activities designed and implemented by museum educators should be more flexible and adaptable in order to meet visitors’ various needs and expectations. Then, professional development systems also vary for school teachers and museum educators (Taylor & Caldarelli, 2004). Compared to the well-established formal training and promotion mechanism for school teachers, museum educators experience a relative lack of professional communities and training opportunities (Bailey, 2006; Tran & King, 2007). In
addition, museum education work does not require professional certification, which to some extent indicates that such work is not well-professionalized, and museum educators are not afforded appropriate pre-service and/or in-service training from higher education or workshops (Dragotto, Minerva, & Nichols, 2006; McIntosh, 2011).

2.1.2.2 Museum Educators’ Unique Attributes and Characteristics

In the existing literature, researchers often conducted empirical studies to explore and understand some of the important competencies that embody the uniqueness of museum educators (e.g., Bailey, 2006; Duff, Cherry, & Sheffield, 2010; Grenier, 2011). In addition, scholars also write self-reflection articles, commentaries, and discussion reports to analyze and prognosticate about this topic (e.g., Anderson, 2013; Johnson, 2005). The review of these two bodies of literature reveals that museum educators have taken particular job responsibilities and they also embody some peculiar attributes that characterize their identity as museum educators. In addition, such a review provides important analytical constructs for both data analysis and interpretation within this study.

Regarding museum educators’ particular job responsibilities, one of their key responsibility is to make educational resources in museums accessible and available to a diversity of visitors across their life span – that is, the general public that museums serve. Specifically, it has been reported in the literature that museum educators organize, deliver, and adjust educational programs to satisfy the needs of a broad range of visitors (Anderson, 2013; Bailey, 2006; Dragotto, Minerva, & Nichols, 2006; Tran, 2008). They also guide tours in exhibition halls (Ballantyne & Hughes, 2001; Kletchka, 2006), and perform experiments and raise meaningful questions to engage visitors in educational programs (Johnson, 2005; Taylor &
Caldarelli, 2004; Grenier & Sheckley, 2008). In addition, they evaluate programs and provide professional development opportunities for other educational practitioners like volunteers and school teachers (Bailey, 2006; Dragotto, Minerva & Nichols, 2006; Munley & Roberts, 2006). Last but not least, museum educators work in cooperation with the other departments within a museum, as well as with different cultural institutions (Dragotto, Minerva, & Nichols, 2006; Munley & Roberts, 2006). For example, they convey their educational perspectives in designing museum exhibitions (Roberts, 1994). They are also involved in marketing, budget, fund raising, and program management (Bailey, 2006).

Regarding the important competencies that museum educators have embodied, several groups of attributes emerged in the existing literature from a Western museum perspective. Specifically, high levels of commitment indicate that museum education work is highly valued and deeply internalized by museum educators. As revealed by several studies, selecting museum education as an occupation fits museum educators’ personal interest, help them realize their occupational dreams, and facilitate the building of a sense of belongingness to their job (Bailey, 2006; Bruyere, & Rappe, 2007; Duff, Cherry & Sheffield, 2010).

Creativity is another working attribute necessary in an informal educational environment like museums. Museum educators have more flexibility to design informal education activities in multiple formats like drama, storytelling, role playing, and games (Tran, 2007), for the mediation of visitors’ learning experiences.

Communication skills as desirable attributes are also identified in the literature (Grenier, 2011; Dragotto, Minerva & Nichols, 2006). As museum educators act as a joint to connect museums with visitors, it is important for museum educators to demonstrate their excellent communication skills with a diverse public (Bruyere & Rappe, 2007).
Being knowledgeable is recognized as an important attribute to conduct museum education work (Grenier, 2011; Skanavis & Giannoulis, 2009). Although not all museum educators agree that they should be subject matter experts, it is still important for them to acquire extensive multidisciplinary knowledge. The emphasis on the knowledge dimension of a museum educators’ self-concept may be a serious challenge in an educational environment that relies heavily on knowledge transmission, as is common in China.

Finally, the capacity for self-directed learning is an important attribute of being a museum educator (Ash, Lombana, & Alcala, 2012; Bailey, 2006; Grenier & Sheckley, 2008). As a work space filled with creativity and challenges, museum educators are encouraged to conduct self-reflection in terms of peer discussion, writing personal reflective journals, and keeping portfolios (Kelly, 2009; Grenier & Scheckley, 2008; Spock, 2000).

Apart from the aforementioned attributes of being a museum educator, other personal qualities like a sense of humor, enthusiasm, and versatility are also highlighted in the existing literature relevant to museum educators (Castle, 2006; Grenier, 2011).

2.2 Science Museums, Museum Education, and Museum Educators in China

The site of this study is positioned in Chinese science museums, which are in many ways different from previous studies conducted in the context of Western museums (Bailey, 2006; Grenier, 2005, 2010, 2011; Kelly, 2011; Tran, 2008). It is important to understand the history and development of Chinese science museums as a way to better know the background, social and cultural contexts in which Chinese science museum educators have worked.
2.2.1 History and Origin

Although the idea of collection and exhibition has a long history in China, the concept of museum was exported to China in the late 19th century when a French priest and a British naturalist founded Western style museums in Shanghai (Abasa & Liu, 2007). Moreover, the “first domestically conceived, managed and developed museum” in China was Nantong Museum that was opened in 1905 (Claypool, 2005, p. 568). This museum located in Jiangsu Province, approximately 60 miles northwest of Shanghai (Abasa & Liu, 2007). Shao (2004) systematically reviewed the formation of Nantong Museum from a socio-historical perspective. Nantong museum was a non-governmental museum that was supported and operated by Zhang Jian, a Chinese entrepreneur, social reformer, and scholar. Zhang Jian understood that “libraries and museums could supplement and support the school system” (quoted in Shao, 2004, p. 691). Therefore, Nantong Museum functioned in service of students from local schools, foreign visitors, and local groups affiliated with governmental institutions. While conservation and education were two fundamental functions, the core agenda of Nantong Museum was political; fostering Chinese nationalism by disseminating dominant culture, cultivating socially desirable behaviors, and demonstrating the glorious history of China. Originally, Zhang Jian wanted to create a “successful, active, Chinese adoption of a modern institution” (Shao, 2004, p. 700), which was expected to push back at the Western museum model. However, his desires did not lead to a real Chinese way of practice. Actually, Nantong Museum followed the Western taxonomy to classify and specify exhibitions.

Notably, the phenomenon that Nantong Museum imitated from the Western museum model was a typical social practice influenced by the sociocultural environment of that period. According to a comment made by a leading Chinese scholar Liang Qichao, traditional China was
characterized as a non-scientific and anti-scientific country before the 18th century (Shao, 2004). Western scientific modern thought was exported to Chinese culture in the 18th Century. As a result, respect for Western science reached its peak in the early 1900s, which led to the breakout of the New Culture Movement in China. In the New Culture Movement, “de xian sheng” (德先生, Mr. Democracy) and “sai xian sheng” (赛先生, Mr. Science), imported from the Western philosophy, were two ideologies that facilitated scholars, students, politicians, social activists, and social reformers to deeply reflect on, compare, and think about Chinese history and future development (Wang, 1995). The New Culture Movement opened the door for Western ideology to impact on and entangle with traditional Chinese philosophy and society. Therefore, in 1905, the birth of Nantong Museum, as the first domestic Chinese museum, cannot avoid the impact of Western modernity. The development of Nantong Museum was embedded in a sophisticated social and cultural context with cultural conflicts from West to East and from modernity to traditionalism and indigeneity.

Unfortunately, Nantong Museum was closed in 1930 due to a combination of political, social, and economic reasons. Since then, traumatic wars and the instability of the new government, as well as the Cultural Revolution, drastically impeded scientific and technological innovation in China (Abasa & Liu, 2007; Zheng, 2009). These disasters precipitated the lack of government resources and an unwillingness to build and maintain science museums. Luckily, science popularization work had never stopped, though the current conception of a science museum did not exist in China until 1980. In particular, the Chinese government and citizens admired the Soviet Union as a role model to pursue social development and transformation in early 1950s (Ou, 2014). During this period, learning from the Soviet Union, science researchers and retired scientists were informal science educators who were responsible for popularizing
science to local citizens. After 1958, the relationship between China and the Soviet Union deteriorated. In the meantime, in China, the Cultural Revolution started growing and the social status of scientific intellectuals decreased. Those who possessed certain living skills, like workers, peasants, and soldiers, took over the role of science researchers and scientists who popularized science to the general public. The Cultural Revolution was “Ten-Years of Turbulence” (Barnouin & Yu, 1992) that blocked citizens’ positive perception about knowledge, national ideology, and the world, which subsequently hindered the scientific development in China and reduced people’s awareness and consciousness about science (Ou, 2014; Zheng, 2009).

The Cultural Revolution was an obstacle that stopped the development of science and technology in China, which then further impeded the construction and maintenance of science museums.

After the end of the Cultural Revolution, and the recognition of the importance of international connections, the Reform and Opening Policy proposed by Deng Xiaoping, who was the second Chairman of the new Chinese government, was enacted in 1978 by a new generation of the Chinese government. This policy endorsed the market economy and valued the advancement of science and technology developed by Western countries. The development of science and technology was accordingly acknowledged as a fundamental policy to empower China to compete with Western developed countries. Within this socio-political context, science museums attracted the Chinese government’s attention to exhibit modernity (Xu, 2007). In the mid-1980s, the Chinese Association of Science and Technology (CAST) sent several delegation groups to visit Western science museums in order to learn how science museums were constructed, managed, and operated. After that, the construction/reconstruction of modern science museums began again in China (Zhu, 2009).
2.2.2 Development and Current Situation

The development of science museums is deeply influenced by social transformation and national ideology (Zheng, 2009). As alluded in Chapter One, it is important to note that constructing new buildings for science museums does not directly represent high quality educational services offered by museums. In the Chinese context of the 1990s, the national strategy of economic development distorted people’s recognition of knowledge and education to some extent, which resulted in science museums functioning and working for alternate purposes. For example, many Chinese science museums functioned as places for hospitality catering, accommodation, and other commercial operations (Zhu, 2009). The educational value of science museums was not recognized in China until the enactment of a national policy entitled the *Outline of the National Action Scheme of Scientific Literacy* (2006-2010-2020). This policy was aimed at enhancing the scientific literacy of Chinese citizens, and directly pushed the Chinese government to renovate and construct, for the citizenry, lifelong learning facilities, like science museums (Ren, 2006). In response to the policy, a total of 1511 Chinese science museums, covering an average area of over 500 square meters, had been built or renovated by the end of 2010 (Xinhua News, 2012).

Several sociocultural factors, for example the traditional Chinese understanding of education, the competitive, hierarchical-based and examination-driven educational reality, and the lack of museum education professionals, have challenged meaningful cooperation between Chinese science museums and local k-12 school systems. Such challenges have impeded both visitors and China’s school aged students from gaining meaningful learning experiences in Chinese museums (Kang, Anderson & Wu, 2010; Mo, Shen & Wen, 2013). By means of reflecting on museum educators’ working performance, several Chinese museum scholars
acknowledged that museum education in China has arguably fallen far behind that of developed
countries such as Canada, the United States of America, Australia, some European countries, and
Japan (Chen & Xiang, 2014; Liang, 1987; Zheng, Zhang & Meng, 2011). These authors found
that Chinese museums suffer from a lack of education experts to innovate, develop, and deliver
education programs. Moreover, in Chinese science museums, learning is often conceptualized as
knowledge transmission from authoritative knowledge holders, such as museum educators, to the
public (Zhu, 2009). Although Chinese science museums announced that they are learning from
Western museums, it is worth noting that such learning seems to be direct duplication, which
lacks reflection on the underlying rationale and cultural difference. This phenomenon
demonstrates the deficiency of systematic and theoretical understanding of museum education by
Chinese museum education scholars and practitioners (Chen & Xiang, 2014; Gong, 2013).

In order to overcome the aforementioned challenges, the demand for museum education
professionals has recently been recognized by government, science museums, and universities in
China (CAST, 2010; Chen & Xiang, 2014; Gong, 2013; Xinhua News, 2013). In China, science
museum educators are regarded as an indispensable part of science popularization professionals
(科普人员, pinyin: ke pu ren yuan). The current number of science museum educators is actually
insufficient for realizing government objectives for improvement in community science literacy.
According to the six national wide census in China (Population Census Office of the State
Council, 2010), the whole population in China is around 1.3 billion. Based on a statistical report
released in 2010, Ren, Zheng, and Sun (2012) claimed that for every ten thousand Chinese
citizens there are fewer than two science popularization professionals. Therefore, it is can be
inferred that the number of educators in Chinese science museums cannot meet the needs of the
current number of visitors nor the government objectives.
The academic backgrounds of current Chinese science museum educators are quite diverse, yet very often lack of relation to education, and the higher education they have received cannot commensurately match their career needs. Unfortunately, the science museum educators usually have few opportunities for professional development (Chang, 2011; Gong, 2013; Ji, Anderson & Wu, 2014; Liang, 1987; Zhang, 2012). In addition, positions for museum education work are hierarchically categorized (Chen & Xiang, 2014; Gong, 2013). For example, at China Science and Technology Museum, there are three types of museum educators: museum educators with tenured positions, museum educators with contract positions, and volunteer educators. Such categorization is very common in Chinese science museums. Generally speaking, the payment, welfare, and promotion pathways are very different for museum educators with tenured positions and contract positions, although job responsibilities and working hours for the two types of paid museum educators are almost the same. The low salary and unstable working environment induce a high turnover rate for museum educators with contract positions. Due to the authority-centered political context, science museums in China do not have the authority to offer a permanent position. The provision of such a stable and desired position in a museum is not decided at the local museum level, but instead by officials in governmental institutions such as the local Bureau of Human Resource and Social Security or the local Association of Science and Technology (Mo, Shen, & Wen, 2013).

In other words, recruitment of qualified science museum educators in China is undermined by lack of clear criteria, the lack of autonomy of museums, and the lack of transparency. As Liang (1987) stated, “in contrast to Western countries, new personnel do not enter the museum through job advertisement, but are assigned there according to a central plan” (p. 291). The tone of this excerpt suggests that museum education work in China is highly
politicalized and given less professional consideration. Some Chinese scholars argued that the unclear and often obscure evaluation on museum educators’ working performance undermines the attempt to professionalize museum education in China (Chen & Xiang, 2014; Gong, 2013; Mo, Shen, & Wen, 2013; Zhang, 2012). As a number of Chinese scholars suggest, the lack of professionalization may hinder museum educators’ appreciation of and positive attitudes toward museum education as a career, and further negatively affect the current museum educators’ willingness and commitment to museum education work (Chen & Xiang, 2014; Zhang, 2012). Unfortunately, these arguments are usually from researchers or museum education decision makers, while the voice of Chinese science museum educators who are real education practitioners is often marginalized, neglected, and ignored.

2.3 Frameworks

In the field of adult and workplace learning, influenced by a sociocultural theoretical framework, a Communities of Practice (CoP) perspective (Lave & Wenger, 1991; Wenger, 1998, 2010, 2011; Wenger & Snyder, 2000) and Cultural Historical Activity Theory (CHAT) (Engeström, 2001, 2011; Engeström & Kerosuo, 2007) have played an important role in guiding researchers to investigate museum educators’ perceptions about their professional identity as well as shared common goals and values as a community. Learning and practice in this community is a constellation of collective, dynamic, and contextualized activities. The activities that such a community is engaged in are best understood culturally, historically, and contextually. Hence, this study uses CHAT as a framework to explore research question such as the ones proposed in Section 1.3.
The issues around identity, empowerment, learning communities, and cultural context regarding to museum educators’ professional development have not been extensively investigated in China or in other national jurisdictions. In order to further professionalize museum education work, it is important to understand how the self-concept of museum educators as professionals is manifest in their work practices and perceived professional needs. This necessarily requires understanding of museum educators’ working context, the social rules, and power relationships within their local context (Ash, Lombana & Alcala, 2012). The understanding of such issues is critically influenced and shaped by the social, political, and education context in which the museum itself is situated. In the context of this study, CoP perspective and CHAT afford unique analytical lenses to make sense of how the self-concept of current Chinese museum educators as professionals is manifest in their work practices and perceived professional needs in the context of China.

2.3.1 Communities of Practice

The Communities of Practice (CoP) perspective (Lave & Wenger, 1991; Wenger, 2010, 2011; Wenger & Snyder, 2000) has been employed in this study to conceptualise museum educators as a community of those whose practice is guided by shared common goals and values and understanding of the activities within their community should be analysed and interpreted with the understandings of the notion of community. This section first conceptualizes the notion of Communities of Practice (CoP), and then, discusses two important issues in Communities of Practice, namely a) identity and belongingness, and b) issues of power.
2.3.1.1 Conceptualization of Communities of Practice

Communities of Practice (CoP) perspectives have their origins and roots in sociocultural theories of learning, and an anthropological approach (Blaka & Filstad, 2007; Wenger, 2010). Lave and Wenger coined the term CoP when they studied apprenticeship as a learning mode (Lave & Wenger, 1991; Wenger, 2010). On the basis of Lave and Wenger’s series of studies, the idea of CoP has been developed, influenced different domains, and is now playing an important role in workplace learning, organizational learning, and adult education. CoP is “a set of relations among persons, activity, and the world, over time and in relations with other tangential and overlapping communities of practice” (Lave & Wenger, 1991, p. 98). Individuals in a community of practice “share a concern, a set of problems, or a passion about a topic, and deepen their expertise in this area by interacting on an ongoing basis” (Wenger, McDermott, & Snyder, 2002, p. 4). In other words, members in a community of practice are engaged in collective learning and social practices. In this community, members request information, seek experience, reuse assets, discuss development, solve problems, document projects, cooperate with others, map knowledge, and identify gaps (Wenger, 2011). Members learn community discourses and frame community identities in terms of observation and interaction with other community members.

Wenger (2011) argued that not all communities can be perceived as a community of practice. Instead, a community of practice should be considered as containing three important elements: domain, community, and practice. The notion of domain indicates that members in a community of practice construct identities in terms of shared interests, membership, competence, and expertise. Wenger (2011) clarified that external groups may not recognize such community entities. In other words, some intangible and non-geographical boundaries are established to
distinguish the membership of a community of practice, to highlight the uniqueness of this community, and to protect authority and benefits of members involved in the community of practice (Wenger, 2010, p. 183).

The notion of community indicates members’ participation in a collective environment, in which they establish networks, build relationships, share information and interact with each other. However, it is not necessary for community members to conduct daily work together. The community is defined by a sense of belongingness, responsibility, and commitment.

The notion of practice indicates that community members are gathered together because they not only share similar interests, but also take part in common practical activities. In collective learning, members develop and utilize tools, and artifacts in social interactions. In other words, these tools and artifacts may have existed before the interaction starts or be an emergent product and reification of collective learning (Wenger, 2010; Kelly, 2011). These tools and artifacts are embodied in both physical and non-physical manners such as language, rules, customs, social norms, and experiential stories.

According to CoP, a community of practice cannot be established or developed without clearly identifying the above three elements. As the community evolves, learning becomes more autonomous, practitioner-oriented, less-structured, and self-directed (Wenger & Snyder, 2000). Generally, a community of practice takes time “to come into being” and can “linger long after the official group has disbanded” (Wenger, 1998, p. 96). Overall, CoP is a useful perspective to examine the establishment and maintenance of a community of practices in terms of understanding how community members define the domain, the shared community, and shared common practices.
2.3.1.2 Identity and Belonging

In terms of consistent engagement in a community of practice, community members work towards building a sense of belonging to their community (Lave & Wenger, 1991; Kelly, 2011). Pursuing belonging and connectedness represents the process of shaping/reshaping a community identity and membership (Ash, Lombana & Alcala, 2012; Blaka & Filstad, 2007; Fenwick, 2001).

Formulating the identity of a community contains three modes: engagement, imagination, and alignment (Wenger, 1998, 2010, 2011). Engagement means that community members participate in social activities. It is a meaning making process in which practitioners make use of cultural and sharable tools/artifacts. Such sociocultural tools/artifacts can also be produced during a learning process. Imagination provides an opportunity to envision different possibilities and potential development as a community. Thus, imagination is a meaningful way to identify the concerns, expectations, and desires of being a member of community. Alignment indicates “coordination of community efforts” (Kelly, 2011, p. 90). Wenger interpreted the alignment as a way to “make sure that activities are coordinated, that laws are followed, or that intentions are communicated” (Wenger, 2010, p. 5). The alignment shows rules, cultures, norms, or customs that have influence on social practices within a community.

As a means of working through the three modes, individuals build relationships with other members working in the same community (Wenger, 1998). Hence, such relationships represent togetherness, solidarity, and collaboration (Fenwick, 2001). Meanwhile, positioning oneself in a community of practice is a process of empowerment, and this process may be full of conflicts and contradictions (Ash & Lombana, 2013; Ash, Lombana & Alcala, 2012;
Cunningham, 2009). Resolving contradictions provides an opportunity for individuals to rethink and develop a community identity.

2.3.1.3 The Issue of Power in CoP

An important issue in CoP is power distribution. Wenger (2010) distinguished the existence of two types of power distribution in an organization: vertical power and horizontal power. Vertical power is perceived of as traditional and bureaucratic power hierarchies. Horizontal power indicates equal, harmonious, and respectful relationships among community members. Since a community of practice represents a dynamic and autonomous environment, it can be inferred that the idea of CoP is difficult to realize in a strictly hierarchical institution with vertical power as a dominant power source (Wenger, 2010). In other words, a community of practice resists supervision and interference in a top-down relationship (Wenger & Snyder, 2000). However, it does not indicate that the horizontal power in a community of practice definitely precedes the vertical power in a traditional and hierarchical institution.

Wenger argued against idealizing the notion of CoP. As he described, “a self-governed community of practice is not heaven” and may produce undesirable results like corruption or racism (Wenger, 2010, p. 13). It is unquestionable that the CoP perspective emphasizes negotiation, interaction, and communication among members. However, vertical commands, without negotiation, may be useful to simplify the communication procedure when the system becomes too complicated or sophisticated and too many stakeholders are involved (Wenger, 2010). From a sociocultural perspective, the establishment and development of a community of practice is intertwined with power conflicts and influenced by diverse sociocultural norms, rules, and values. Therefore, in terms of collectives’ conscious efforts to formulate a community of
practice, they need to be cautious when establishing a community of practice within a traditional and hierarchical institution (such as in some Chinese public institutions) that holds a different ideological understanding of power from the philosophy advocated by CoP perspective.

It should be pointed out that CoP has been differently used by different scholars. Some (e.g., Ash, 2014; Kisiel, 2010) have employed CoP as a theoretical framework, but these are the minority works in the field. Others have used it to understand events in a community as defined by Lave and Wenger (1998). In this study, CoP has been employed as a perspective to understand a group of Chinese science museum educators who share common values and desires as they perform their routine responsibilities as museum educators. In this way, the principles embellished in the framing of CoP were applied as a perspective in the proceeding sections above and CHAT was used complementarily to understand museum educators’ self-concept as museum education professionals.

2.3.2 Cultural Historical Activity Theory

Cultural Historical Activity Theory (CHAT) is shaped by a social constructionist paradigm and a sociocultural theoretical framework (Engeström, 2001, 2011; Kelly & Kassing, 2013). CHAT was framed by Vygotsky in the 1920s and 1930s, and further developed by him, his students, and colleagues, including Leont’ev (Engeström, 2001; Toth, 2012). Michael Cole introduced CHAT to Western academic research in 1970s (American Psychological Association, 2006). Yrjö Engeström popularized the theory in adult education, workplace learning, organizational management, and other related fields (Nussbaumer, 2012). As an important theoretical framework to analyze learning in “non-traditional, hybrid multi-organizational and
multi-cultural settings” (Engeström, 2011, p. 75), CHAT has been recognized as a powerful theory of learning mediated through social and cultural interaction in an educational system.

2.3.2.1 The Development of CHAT

CHAT has been developed through three generations and it is still in transformation (Ash, 2014; Engeström, 2001). This study was mainly informed by the second generation of CHAT.

The first generation of CHAT is embodied in a triangle with three elements: subject, mediating artifact, and object (Engeström, 2001) (See Figure 1). In order to reach certain object(s), individuals make use of materials, semiotic or implicit tools, to mediate human action (Ash, 2014; Engeström, 2001; Nussbaumer, 2012). Overall, the contribution of first generation of CHAT is the emergence of the concept of mediation, which indicates that learning is mediated by cultural artifacts (Ash, 2014; Engeström, 2001).

![Figure 1. First generation of CHAT.](image)

In the second generation of CHAT, the idea of learning was expanded to six elements: subject, tools, object, rules, community, and divisions of labor, all of which are included in an activity system (Engeström, 2001) (See Figure 2). The lines linking two elements indicate the social connectedness and relatedness. In other words, a subject’s action towards an object is mediated and regulated by tools/signs, community context, rules, norms, conventions and customs, and divisions of labor. It is worthwhile to mention that an object is positioned in an
oval, which means that the object is changeable and in dynamic (Engeström, 2001). The object within an activity system is “the problem space at which the activity is directed” (Engeström & Sannino, 2010, p. 6). This object represents the motivation and meaning of an action. It should not be fixed and predetermined; rather, it is more ambiguous and requires individuals’ interpretation and understanding (Engeström & Kerosuo, 2007). The dynamic nature of the object deviates from the traditional view of learning that asserts that the learning goals is predetermined and learners should be motivated or facilitated towards a certain predefined object (Engeström, 2011). In the second generation of CHAT, the object is negotiable and the negotiation procedure is full of tensions and contradictions, which are recognized as “sources of change and development” (Engeström, 2011, p. 137). The second generation of CHAT treats one activity system as a minimal analytical unit for researchers to understand the individuals’ learning practices, meaning making process, and social interactions in that system.

Comparatively, the first generation of CHAT does not clearly point out the relationship between the subject and the social context in which they are situated. The object in the first generation of CHAT is perceived as fixed without flexibility. The third generation of CHAT expands a minimal analytic unit from one activity system to two activity systems, which aims at

Figure 2. Second generation of CHAT.
understanding multiple perspectives and interactions between different activity systems from an intra-organization scope (Engeström, 2001). This study only generates museum educators’ perception about their self-concept as museum education professionals and the sociocultural influences on such perceptions. Although the voices from other museum education related stakeholders could offer meaningful arguments about museum educators, due to the limitation of the research time, they are not the focus of this study. Therefore, among the three generations of CHAT, the second generation of CHAT offers an appropriate analytical framework to inform this study.

2.3.2.2 Five Principles of CHAT

Engeström (2001) identifies five principles for researchers to use CHAT for analyzing and understanding work place learning from an expansive learning perspective. The first principle is that an activity system is perceived as a unit of analysis. An activity system is a “collective, artefact-mediated and object-oriented” system (Engeström, 2001, p. 136). This definition identifies that CHAT focuses on authentic organizations with concrete human subjects whose learning behavior is mediated by sociocultural artefacts (Engeström, 2011). In CHAT, human subjects are real and identifiable participants who become “resources central to building understandings of a target concept” (Ash & Kelly, 2013, p. 590).

The second principle highlights the multi-voicedness nature of activity. Different divisions of labour constitute an activity system, which creates a community with diverse viewpoints, discourses, values, histories, interests, and other cultural embodiments (Engeström, 2001). Since an activity system is correlated to, embedded in, or embracing other activity systems, the dialogue within an activity system should be complicated (Toth, 2012). Human
individuals with different motivations, emotions, concerns, desires, and agendas formulate the multi-voiced nature of an activity system (Engeström, 2011). The multi-vocality brings different positions and arguments, which are the sources for community development, transformation, and innovation.

The third principle emphasizes the historicity of an activity system. An activity system is constructed and then evolves over a long period of time. As Engeström (2001) stated, “their problems and potentials can only be understood against their own history” (p. 136). Hence, the historical principle reminds researchers to understand an activity system by knowing its previous history, current status, and future possibilities from a historical and longitudinal perspective.

The fourth principle recognizes contradictions as driving force for transformation (Ash, 2014; Engeström, 2001; Kelly, 2009). Contradictions may be accumulated historically and/or generated from multiple perspectives. In an activity system, contradictions can be represented in a format of conflicts, dilemmas, disturbances, and other conflictive representations (Engeström, 2001, 2011). In the second generation of CHAT, contradictions may appear within any node of an activity system and between two nodes within an activity system (Engeström, 2011).

The fifth principle identifies expansive cycles as a possible form of transformation in activity. CHAT argues that the process of identifying and resolving contradictions leads to expansive learning. This expansive learning process begins with questioning, identifying, and analyzing the existing practice and contradictions (Engeström, 2001). Then, new solutions are modelled and implemented with practitioners’ reflection on the new model. Furthermore, the reflexive practices result in consolidation of new practices. This is how expansive learning happens in a process of questioning, negotiating, modelling, and reflecting. In other words, rather
than accepting existing knowledge, CHAT regards learning in a more expansive way, and the attainment of knowledge is intertwined with knowledge construction (Engeström, 2011).

2.3.3 CoP, CHAT, and Museum Educators

In the field of museum education research, key and influential scholars such as Doris Ash, Elsa Bailey, M. Christine Castle, LA DeGregoria Kelly, Judith Lombana, Lynn Uyen Tran, and several other researchers are pioneers in adopting CoP and/or CHAT to conceptualize museum education studies and facilitate professionalizing museum education practices. In comparison between the discussion about CoP and CHAT in Section 2.3.1 and Section 2.3.2, it is inferred that both CoP perspective and CHAT understand human behaviors in a collective community circumstance (Ash, 2014) and emphasize the importance of understanding individuals’ behavior through the lens of how they make use of cultural artifacts. As well, both CoP perspective and CHAT are also concerned with the power relationship within a community. Although both CoP and CHAT are originally constructed from a sociocultural perspective, comparatively, each of them has its own unique advantages and disadvantages. As ways to interpret and understand focused collectives, respectively, in the field of museum education, CoP offers an appropriate lens to examine the community where museum educators are engaged and their professional identity as museum educators is formulated/reformulated. In particular, the issue of identity, creating professional boundaries, and envisioning future possible selves is recognized as highlighted features of CoP that are also valued by this study. However, as argued by Wenger (2010), CoP perspective takes the risk to connote “harmony and homogeneity rather than disagreement and conflict” (p. 8). In other words, the weakness of CoP might be that, it does not “address the contradictory issue in a straightforward manner” (Ash, 2014, p. 112).
It is apparent that the establishment and the development of a community cannot avoid contradictions, difficulties, challenges, disagreements or conflicts. As argued by Ash (2014), in CoP “there was no theoretical framework for addressing conflict as a regular part of community activity” (p. 112). Comparatively, CHAT draws our attention on the activities happening in a museum educator community and deepens our understanding of contradictions embedded in museum education practices. In particular, CHAT not only reminds us to be concerned with museum community rules and norms, but also helps us identify contradictions encountered by museum educators with other museum education related stakeholders during their interactive communication process. These contradictions should be triggers, opportunities, and motivations for museum educators’ professional development.

Given the focus of this study is to investigate how the self-concept of museum educators as professionals is manifest in their work practices and perceived professional needs, it is necessary to understand the museum educator community and museum educators’ activities in that community in terms of their interpretation of their professional self-concept. Accordingly, although both CoP and CHAT have disadvantages of being employed alone (or to the mutual exclusion of the other), the integration of CoP and CHAT offers a relatively comprehensive framework to guide this study and the interpretation of the data. In particular, CoP is used as a perspective to understand the group of museum educators as embedded in a community circumstances; whereas, CHAT is a theoretical framework to understand museum educators’ activities, practical events, and contradictions in that professional community.
2.4 Summary

Chapter Two discusses the relevant literature and articulates the theoretical perspectives that informed this study. This study focuses on museum educators’ self-concept as museum education professionals in Chinese science museums. Accordingly, Chapter Two reviews the literature from empirical, sociocultural and socio-historical, and theoretical perspectives. Specifically, from an empirical perspective, this chapter begins with a conceptualization of the definition of a museum educator. Then, from a sociocultural and socio-historical perspective, this chapter reviews the origin and history of Chinese science museums, and also depicts the current status of science museum educators and museum education in China. From a theoretical perspective, this chapter concludes with a discussion of CoP and CHAT and the integral application of CoP and CHAT in this study.
Chapter 3: Methodology and Research Design

This study was situated in the context of Chinese science museums and framed by Communities of Practice (CoP) perspective (Lave & Wenger, 1991; Wenger, 2010, 2011; Wenger & Snyder, 2000) and Cultural Historical Activity Theory (CHAT) (Engeström, 2001, 2011). Informed by CoP and CHAT, this study investigated 23 Chinese science museum educators’ perceptions of being museum education professionals. It also examined the social and cultural influences on museum educators’ self-concept of being museum education professionals. Methodologically, this is an interpretive case study (Pring, 2000; Morehouse, 2013; Maggs-Ropport, 2000; Schwandt, 2001; Willis, 2007) which largely employed phenomenological methods to understand how the self-concept of museum educators as professionals is manifest in their work practices and perceived professional needs. Accordingly, this study adopted face-to-face semi-structured in-depth interview as the principle method to collect much descriptive data. Informal conversation and the researcher’s reflexive journals were complementary data sources to support research findings. Specifically, the main research question that guided this study was:

How does Chinese science museum educators’ self-concept as professionals manifest and transform in their work practices and professional needs within the local social and cultural Chinese science museum context?

This chapter begins with a brief introduction to the interpretive case study informed by phenomenological methods, then describes the research context, and finally explains the specific research procedures. Ethical considerations and the limitations of this study are addressed at the end of this chapter.
3.1 An Interpretive Case Study

This interpretive case study (Maggs-Ropport, 2000; Morehouse, 2013; Pring, 2000; Schwandt, 2001; Willis, 2007) largely employed phenomenological methods for data collection. Generally, under an interpretive research paradigm, phenomenological methods are employed to collect and interpret data regarding individual’s subjective meaning making of their own lived experience (Pring, 2000; Schwandt, 2001; Willis, 2007). Schwandt (2001) defined individuals’ interpretation of experience as “a description of ‘things’” (p. 191) that should be “the essential structure of consciousness” (p. 191). As Schwandt (2001) described, these “things” include perceptions, beliefs, memories, decisions, feelings, judgements, evaluation, and all experiences of bodily action. Among such “things”, perception has been recognized as a primary source to understand experience (Bailey, 2003; Schwandt, 2001), and it is also a vital concept in guiding this study of museum educators.

Many interpretive researchers agree to abandon the “God’s eye” or the “Spector’s view” as a way of opposing a traditional epistemological assumption of the reality in a positivist way. Generally, qualitative researchers assert that reality is not static, universalized, or pre-determined; instead, it is socially-constructed, complex, and relational (Angen, 2000; Marsick, 2009). Therefore, social realities under investigation should be multi-faceted as they are constructed by individuals’ different experiences, along with their subjective meaning making process. In other words, in order to make sense of the phenomena within a larger social context, it is necessary to investigate individuals’ perceptions about the social world in which they have lived (Creswell & Miller, 2000; Garrick, 1999; Morehouse, 2012). The interpretation of individuals’ lived experience is the deconstruction of the context in which they have lived and may reflect some common cultural patterns, social rules, values, and beliefs of that context (Garrick, 1999).
Although many scholars believe the existence of different research paradigms, such as interpretive, critical, and post-modern (Merriam, 2004; Lopez & Willis, 2004; Willis, 2007), scholars like Merriam (2004) also assert that all qualitative research to a certain degree is phenomenological in nature. As Merriam (2004) argued that “because phenomenology as a school of philosophical thought underpins all qualitative research, some assume that all qualitative research is phenomenological, and certainly in one sense it is” (p. 7). Therefore, from a broad sense, methodologically, this interpretive study is informed by phenomenological methods to collect, analyze, and understand museum educators’ interpretation of their experiences of being museum education professionals. However, this study is not pure phenomenological research that traditionally requires intensive and rounds of data collection (Lopez & Willis, 2004; Willis, 2007; Wiersma, 1986). But rather, it focused on lived experiences of museum educators, looking purposefully at a limited set of cases. In addition, the principle data collection method was face-to-face interview complemented with follow up informal communications and the researcher’s reflexive journals. Therefore, this study is not a pure phenomenology study in the traditional sense, but rather is guided by phenomenological principles to make sense of a snapshot of communities of Chinese science museum educators, their work practices experiences, and perceived professional needs. This study has been guided by select phenomenological principles as has been the case in numerous other studies (Candy, 1989; Creswell, 2005; Crist & Tanner, 2003; Garrick, 1999; Pring, 2000). These principles include:

a) Any social events and practices are explainable. As indicated by Pring (2000), that the “social world is nothing other than our interpretations” (p. 96). And, understanding individuals’ interpretations and discourses are important to make sense of a social phenomenon.
b) Complete objectivity is difficult to attain (Candy, 1989; Crist & Tanner, 2003). Individuals make sense of social phenomena in terms of the subjective understanding of their interaction with the social world. Since different people are situated in different contexts, a phenomenological study avoids revealing universal laws or makes generalizations.

c) A group of realities are perceived as a whole and interrelated (Garrick, 1999; Pring, 2000). Therefore, both the wholeness and uniqueness of individuals should be explored (Eisner & Peshkin, 1990; Malim et al., as cited in Pringle et al., 1992; Patton, 2002). The wholeness refers to the common patterns or modes of a set of social norms, rules, and cultural values, and the uniqueness refers to the idiosyncratic aspects of a perceived phenomenon.

d) A phenomenological study is heavily value-laden. Schwandt (2001) argued, “the inquirer’s own lived experience functions as a meaning of access to the experience of others” (p. 84). Therefore, researchers often reflect on their positionality in relation to a research context, and themselves as principal interpreters.

One general critique of a qualitative study is that the small number of participants often makes generalization difficult. As Malim, Birch, and Wadeley (as cited in Pringle, Drummon, McLafferty, & Hendry, 2011) pointed out, such studies are potentially “subjective, intuitive and impressionistic” (p. 21). However, working with a small number of participants also offers opportunities for researchers to generate rich, thick, and in-depth descriptions. As mentioned before, the purpose of this study is not to make a broad generalization. Therefore, due to the contextual, emergent, and naturalistic nature of this study, this study was framed under an interpretive paradigm, and largely employed phenomenological methods for data collection.
3.2 Research Design

This section provides details of the researcher’s positionality, research context, general research procedures, ethical consideration, and the challenges and limitations encountered in research process of this study.

3.2.1 Researcher’s Positionality

A researcher’s positionality reflects their relationship with the research context. The documentation of their positionality includes, for example, how they approach gatekeepers, negotiate admission to the research context, establish a rapport with participants, and obtain permission to conduct research in that context. Section 3.2.1 documents my access to the research sites, my subjectivity, and my position in this study. This section serves to make transparent my strengths and weaknesses in conducting this study.

As introduced in Chapter One, in 2008, when I was pursuing my Master’s degree at Beijing Normal University in China, I joined with my supervisor to take part in a national project entitled *Bridge Science Museum with Schools*. The Chinese Association of Science and Technology (CAST) and the China Science and Technology Museum had advocated, across China, for this project since 2006. Along with the enactment of the policy *The Outline of the National Scheme for Scientific Literacy* in 2006, this was the first national project that officially expressed concerns about the educational function of Chinese science museums and their cooperation with formal school systems. A project office, affiliated with CAST, is responsible for administering and monitoring the ongoing progress of this project.

My role, as a research assistant, was to evaluate the effectiveness of the project. I participated in designing evaluation instruments, arranging the research process, conducting
focus group interviews, and writing reports. Through the conduction of fieldwork in science museums, as well as attending conferences, I have maintained a connection with a project manager in CAST, several museum education administrators, and a few museum educators across different institutions. These official connections provided me with opportunities to know the “gatekeepers” of this national project and the gatekeepers of potential research sites. Through my work as a research assistant in the Bridge Museums with Schools project, I also developed friendships with several museum educators and museum education administrators who shared similar museum education values and personal interests with me. In order to establish a reciprocal relationship, I shared my overseas learning experience about museum education with them, and as well, I helped some museum educators refine funding applications, and gave suggestions on their annual plans and museum education practices. These informal connections helped me build a trusting and stable relationship with these museum education professionals and also brought me opportunities to invite them to my doctoral study.

In summary, my previous connections with a CAST project manager, museum education administrators, and frontline museum educators helped familiarize me with the research context, which brought me an “emic” lens when I conducted this research. In addition, such connections also assisted me in gaining access to the sites and participants in the study in a way that did not compromise the ethical standards that governed the recruitment of participants. Furthermore, my previous work experience with Chinese science museum educators shaped my self-identity as a student researcher and external evaluator, and also made the participant museum educators perceive me as a researcher and external evaluator. This created some distance between them and me as a researcher, and enabled an outsider’s perspective in order to understand museum educators and make impartial comparisons among different research sites. In summary, my
unique hybrid identity was one where I was neither a complete insider nor an complete outsider; rather, I moved across the border between insider’s and outsider’s perspectives during the research process to comprehensively understand this sophisticated and unexplored research topic in the context of Chinese museums.

3.2.2 Research Context

The museum educators in this study were from five science museums in mainland China, which included A) China Science and Technology Museum (Beijing), B) Guangxi Science and Technology Museum (Guilin, Guangxi Province), C) Chongqing Science and Technology Museum (Chongqing), D) Beijing Natural History Museum (Beijing), and E) Zhengzhou Science and Technology Museum (Zhengzhou, Henan Province). The locations of the five science museums are marked on Figure 3. All of the five science museums have been regarded as local landmarks and tourists attractions. In addition, the local Education Bureau has regarded them as extracurricular sites where K-12 schools should guide student field trips, on average, twice per year.

![Figure 3. The location of five science museums in China.](image-url)
These five science museums were defined as potential study sites based on discussion among a CAST project manager, potential research sites administrators, and me according to three criteria: the accessibility and familiarity of science museums to the researcher, the representativeness of the region, and the history of museum education service. Among the five science museums, Museum A, B, C, and E are science and technology museums and Museum D is a natural history museum. Exhibitions were similar across four science and technology museums and covered the topics of physics, chemistry, geography, mathematics, and biology as the themes of their exhibitions. Exhibitions in Museum D portrayed “…biodiversity and its relationships with the environments and establishing a panorama of the emergence and development of the life on Earth” (Beijing Museum of Natural History, 2015). Museum A is a national level science museum supported by the central government, which represents the highest science museum standard in China. Museum B, C, and D are provincial/municipal level science museums supported by the provincial/municipal government. Museum E is a city level science museum supported by the local city government. Table 1 demonstrates the background information of five science museums.
Table 1
Background information of five science museums

<table>
<thead>
<tr>
<th>Research sites</th>
<th>Types</th>
<th>Levels</th>
<th>Yrs. of running</th>
<th>Yrs. in “Bridge Science Museum to School” project</th>
<th>Display area (m²)</th>
<th># of exhibits (sets)</th>
<th># of museum educators in the educational department where participants came</th>
<th># of participants in this study</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>S &amp; T Museum</td>
<td>National</td>
<td>Since 1988</td>
<td>Since 2010</td>
<td>Around 40,000</td>
<td>Around 800</td>
<td>Around 150</td>
<td>8</td>
</tr>
<tr>
<td>B</td>
<td>S &amp; T Museum</td>
<td>Provincial /Municipal</td>
<td>Since 2008</td>
<td>Since 2009</td>
<td>13,500</td>
<td>457</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>C</td>
<td>S &amp; T Museum</td>
<td>Provincial /Municipal</td>
<td>Since 2009</td>
<td>Since 2010</td>
<td>30,000</td>
<td>$\geq 400$</td>
<td>Around 60</td>
<td>8</td>
</tr>
<tr>
<td>D</td>
<td>Natural History Museum</td>
<td>Provincial /Municipal</td>
<td>Since 1959</td>
<td>Since 2007</td>
<td>8,000</td>
<td>$\geq 200,000$ collection items</td>
<td>14</td>
<td>1</td>
</tr>
</tbody>
</table>

A) China Science and Technology Museum, Beijing (The population in the city of Beijing is 15, 563, 215)
B) Guangxi Science and Technology Museum, Nanning (The population in the city of Nanning is 6,661,600)
C) Chongqing Science and Technology Museum, Chongqing (The population in the city of Chongqing is 8,681,611)
D) Beijing Natural History Museum, Beijing (The population in the city of Beijing is 15,563,215)
E) Zhengzhou Science and Technology Museum, Zhengzhou ((The population in the city of Zhengzhou is 9,191,000)
3.2.3 Research Participants

A purposeful sampling strategy was employed to recruit participants for this study. This research focused on understanding how Chinese science museum educators make sense of their lived experience pertaining to museum education work. Therefore, research participants should have a certain level of engagement in museum education work, and have ideas and thoughts about museum education. Three criteria were set up to recruit participants. The potential museum educators for this study should be:

a) a full time museum staff member who worked in education-related department such as Department of Education Activity, Department of Public Education, and Department of Exhibition and Education;

b) experienced in implementing education programs like *Bridge Science Museums to Schools* project;

c) primarily in charge of designing, developing, and organizing educational activities, contacting with school teachers and administrators from the local educational bureau, training school teachers, volunteers, and frontline interpreters.

On the basis of these three criteria, maximum variation sampling strategy was adopted to select participants with different backgrounds and personal experiences (Patton, 2002). This strategy aims to select a wide range of variation in dimensions of interest (Patton, 2002). In this study, maximum variation sampling generated broad knowledge about museum educators’ perceptions, beliefs, and expectations about their work as well as identified important common patterns across variation. Ultimately, a total of 23 museum educators voluntarily participated in this study based on a recommendation from CAST, the research sites, and the researcher’s personal connections with them.
Table 2 shows the distribution of participants’ demographic information. Table 3 expands upon the background information for each participant. In summary, the museum educators in this study were well-educated and the sample was balanced by gender. Museum educators with a graduate degree were clustered in the national level science museum. Most museum educators were young, not only because of their age, but also in their working experience in museums. Also, the museum educators in this study constituted a hybrid group in terms of a combination of different job titles regarding museum education and from science museums at different levels.

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>Category</th>
<th>N (Total=23)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institutional Level</td>
<td>National</td>
<td>8</td>
<td>34%</td>
</tr>
<tr>
<td></td>
<td>Provincial/Municipal</td>
<td>10</td>
<td>44%</td>
</tr>
<tr>
<td></td>
<td>City</td>
<td>5</td>
<td>22%</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>10</td>
<td>43%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>13</td>
<td>57%</td>
</tr>
<tr>
<td>Age Group</td>
<td>Below 30</td>
<td>13</td>
<td>57%</td>
</tr>
<tr>
<td></td>
<td>31-40</td>
<td>7</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>Over 40</td>
<td>3</td>
<td>13%</td>
</tr>
<tr>
<td>Education Level</td>
<td>Undergraduate</td>
<td>12</td>
<td>52%</td>
</tr>
<tr>
<td></td>
<td>Graduate</td>
<td>11</td>
<td>48%</td>
</tr>
<tr>
<td>Major</td>
<td>S &amp; T</td>
<td>12</td>
<td>52%</td>
</tr>
<tr>
<td></td>
<td>Education</td>
<td>5</td>
<td>22%</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>6</td>
<td>26%</td>
</tr>
<tr>
<td>Status</td>
<td>Frontline Educator</td>
<td>18</td>
<td>78%</td>
</tr>
<tr>
<td></td>
<td>Administrator</td>
<td>5</td>
<td>22%</td>
</tr>
<tr>
<td>Working History in Museum</td>
<td>Below 3 years</td>
<td>3</td>
<td>13%</td>
</tr>
<tr>
<td></td>
<td>4 - 6 years</td>
<td>17</td>
<td>74%</td>
</tr>
<tr>
<td></td>
<td>7 years and above</td>
<td>3</td>
<td>13%</td>
</tr>
<tr>
<td>Museum Educator as a first job</td>
<td>Yes</td>
<td>13</td>
<td>57%</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>10</td>
<td>43%</td>
</tr>
</tbody>
</table>
### Table 3
Demographic information for every museum educator

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Museum</th>
<th>Institution level</th>
<th>Title</th>
<th>Gender</th>
<th>Age group</th>
<th>Education level</th>
<th>Major</th>
<th>Museum educator as a first job</th>
<th>Work history in museums</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fan</td>
<td>Museum A</td>
<td>National</td>
<td>Administor</td>
<td>Male</td>
<td>31-40</td>
<td>Master</td>
<td>Laws</td>
<td>No. He used to make science popularization-related films and TV programs in the CAST.</td>
<td>Since 2010</td>
</tr>
<tr>
<td>Lin</td>
<td>National</td>
<td></td>
<td>Frontline Staff</td>
<td>Male</td>
<td>&lt;30</td>
<td>Bachelor</td>
<td>Laws</td>
<td>Yes.</td>
<td>Since 2007</td>
</tr>
<tr>
<td>LuLu</td>
<td>National</td>
<td></td>
<td>Frontline Staff</td>
<td>Female</td>
<td>&lt;30</td>
<td>Bachelor</td>
<td>Broadcasting and Hosting Physics</td>
<td>Yes.</td>
<td>Since 2007</td>
</tr>
<tr>
<td>Ming</td>
<td>National</td>
<td></td>
<td>Frontline Staff</td>
<td>Male</td>
<td>31-40</td>
<td>Master</td>
<td>Physics</td>
<td>Yes.</td>
<td>Since 2011</td>
</tr>
<tr>
<td>Shang</td>
<td>National</td>
<td></td>
<td>Frontline Staff</td>
<td>Female</td>
<td>31-40</td>
<td>Master</td>
<td>Management Science and Engineering Physics</td>
<td>No. She used to be a programmer in an IT company.</td>
<td>Since 2007</td>
</tr>
<tr>
<td>Chong</td>
<td>National</td>
<td></td>
<td>Frontline Staff</td>
<td>Male</td>
<td>31-40</td>
<td>Doctor</td>
<td>Agricultural Engineering Physics</td>
<td>Yes.</td>
<td>Since 2008</td>
</tr>
<tr>
<td>Lian</td>
<td>National</td>
<td></td>
<td>Frontline Staff</td>
<td>Female</td>
<td>&lt;30</td>
<td>Master</td>
<td>Life Science</td>
<td>Yes.</td>
<td>Since 2009</td>
</tr>
<tr>
<td>Zhou</td>
<td>National</td>
<td></td>
<td>Frontline Staff</td>
<td>Male</td>
<td>&lt;30</td>
<td>Master</td>
<td>Early Childhood Education Physics</td>
<td>Yes.</td>
<td>Since 2008</td>
</tr>
<tr>
<td>Chao</td>
<td>Museum B</td>
<td>Provincial/Municipal</td>
<td>Administor</td>
<td>Male</td>
<td>&lt;30</td>
<td>Bachelor</td>
<td>Physics</td>
<td>Yes.</td>
<td>Since 2007</td>
</tr>
<tr>
<td>Xiaohui</td>
<td>Museum C</td>
<td>Provincial/Municipal</td>
<td>Administor</td>
<td>Male</td>
<td>&gt;50</td>
<td>Master</td>
<td>Computer</td>
<td>No. He used to work in university and then in a company.</td>
<td>Since 2007</td>
</tr>
<tr>
<td>Dan</td>
<td>Provincial/Municipal</td>
<td>Administor</td>
<td>Female</td>
<td>&gt;50</td>
<td>Master</td>
<td>Chemical Engineering Physics</td>
<td>No. She worked in a chemistry company.</td>
<td>Since 2009</td>
<td></td>
</tr>
<tr>
<td>Yan</td>
<td>Provincial/Municipal</td>
<td>Frontline Staff</td>
<td>Female</td>
<td>31-40</td>
<td>Master</td>
<td>History Education Physics</td>
<td>No. She used to be a history teacher in a public high school.</td>
<td>Since 2009</td>
<td></td>
</tr>
<tr>
<td>Ting</td>
<td>Provincial/Municipal</td>
<td>Frontline Staff</td>
<td>Female</td>
<td>&lt;30</td>
<td>Bachelor</td>
<td>Automation</td>
<td>Yes.</td>
<td>Since 2009</td>
<td></td>
</tr>
<tr>
<td>Ping</td>
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<td>Frontline Staff</td>
<td>Female</td>
<td>&lt;30</td>
<td>Bachelor</td>
<td>Biology</td>
<td>No.</td>
<td>Since 2009</td>
<td></td>
</tr>
</tbody>
</table>
Table 3. Cont.

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Museum</th>
<th>Institution level</th>
<th>Title</th>
<th>Gender</th>
<th>Age group</th>
<th>Education level</th>
<th>Major</th>
<th>Museum educator as a first job</th>
<th>Work history in museums</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jing</td>
<td></td>
<td>Provincial/Municipal</td>
<td>Frontline Staff</td>
<td>Female</td>
<td>&lt;30</td>
<td>Bachelor</td>
<td>Physics</td>
<td>No. She used to be a physics teacher.</td>
<td>Since 2009</td>
</tr>
<tr>
<td>Qing</td>
<td></td>
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<td>Frontline Staff</td>
<td>Male</td>
<td>31-40</td>
<td>Bachelor</td>
<td>Tourism Management</td>
<td>No. He used to do sales in an electrical company.</td>
<td>Since 2009</td>
</tr>
<tr>
<td>Ray</td>
<td></td>
<td>Provincial/Municipal</td>
<td>Frontline Staff</td>
<td>Male</td>
<td>&lt;30</td>
<td>Bachelor</td>
<td>Marketing</td>
<td>No. He used to work in a Press company and IT company.</td>
<td>Since 2009</td>
</tr>
<tr>
<td>Minyan</td>
<td>Museum D</td>
<td>Provincial/Municipal</td>
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<td>31-40</td>
<td>Master</td>
<td>Biology</td>
<td>Yes.</td>
<td>Since 2009</td>
</tr>
<tr>
<td>Hong</td>
<td>Museum E</td>
<td>City</td>
<td>Administrator</td>
<td>Male</td>
<td>&gt;50</td>
<td>College Diploma</td>
<td>Chinese</td>
<td>No. He used to be a school teacher and deputy of a science and technology institute.</td>
<td>Since 2000</td>
</tr>
<tr>
<td>Juan</td>
<td>City</td>
<td>Frontline Staff</td>
<td>Female</td>
<td>&lt;30</td>
<td>Bachelor</td>
<td>Education</td>
<td>Education</td>
<td>No. She used to be a school science teacher and math teacher.</td>
<td>Since 2010</td>
</tr>
<tr>
<td>Jie</td>
<td>City</td>
<td>Frontline Staff</td>
<td>Female</td>
<td>&lt;30</td>
<td>Bachelor</td>
<td>Education</td>
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<td>Yes.</td>
<td>Since 2009</td>
</tr>
<tr>
<td>Bei</td>
<td>City</td>
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<td>Female</td>
<td>&lt;30</td>
<td>Master</td>
<td>Artistic Design</td>
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<td>Yes.</td>
<td>Since 2005</td>
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<tr>
<td>MengMeng</td>
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<td>Female</td>
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<td>Bachelor</td>
<td>Science Education</td>
<td>Yes.</td>
<td>Yes.</td>
<td>Since 2008</td>
</tr>
</tbody>
</table>
3.3 General Procedures

This section describes the process of data collection and data analysis. Methods for data collection included face-to-face semi-structured interviews, informal conversations with participants, and the researcher’s reflexive journaling. In this study, a hybridized analytical method that includes both inductive and deductive analysis was used to analyze data. The data quality was ensured by four criteria: credibility, transferability, dependability, and conformability.

3.3.1 Data Collection

In this study, the in-depth face-to-face semi-structured interview was the dominant method for data collection. The interview data was further supported by the informal and casual online communication with participants and reflexive journals written by the researcher.

3.3.1.1 Face-to-face Semi-structured Interview

In-depth face-to-face semi-structured interview was adopted as a primary method to capture museum educators’ insights of self-concept as museum education professionals (Creswell & Miller, 2000). Every interview was conducted according to an interview protocol, which is presented, in detail, in Appendix C (English Version) and D (Chinese Version). The interview protocol was developed on the basis of a literature review and my working experience with Chinese science museum educators (Bailey, 2006; Blaka & Filstad, 2007; Reid, 2013; Wenger, 1998, 2010, 2011). Indicated by the existing literature, museum educators’ self-concept as museum education professionals is constituted by multifaceted aspects, which derives from museum educators’ self-reflection, thoughts, ideas, and imagination of their practical working
experience (Bailey, 2006; Reid, 2013). Therefore, this interview protocol was designed to follow museum educators’ working experience, with the intention to capture museum educators’ perceptions of their pre-existing identity (why they select to be a museum educator), current existing identity (how they conduct museum education work), and imagined future identity (what do they expect from museum education work) (Blaka & Filstad, 2007; Reid, 2013; Wenger, 2010).

Informed by Anderson (2012), who asserted that research methods (tools) should be “critically honed through successive rounds of data collection” (p. 15), the interview protocol was continuously refined with the emergent topics that arose during each subsequent interview. Each interview lasted between 40 to 90 minutes according to situational factors, such as the quality of the rapport between the researcher and participants, participants’ public communication skill, and self-reflexive ability. The interview was held in different locations, as negotiated with the museum gatekeepers and the museum educators. Museum educators from Museum A, C, and E were interviewed in a private meeting room at their work place. Museum educators from Museum B and D were interviewed in a private meeting room after a national museum education annual conference held by CAST.

The museum educators were requested to fill out a demographic information checklist before the interview began. This checklist collected their demographic information including age, gender, educational background, previous working experience, working history in museums, and basic information about museum education in research sites (See Appendix A and Appendix B). This checklist collected preliminary information of every museum educator’s background, previous working history, and basic information about the museum in which they worked. Such information facilitated an interview starting in an appropriate and comfortable way between the
researcher and museum educators. During the interviews, museum educators depicted their perception of being museum education professionals. Specifically, museum educators described how they made decisions on working in a science museum, what museum-education-related job tasks they had performed, what qualities they felt a good museum educator should have, and their aspirations and desires for future professional development. Every interview was digitally recorded with participants’ permission.

One challenge that emerged from the interview was the difficulty in encouraging museum educators to recall their previous working experience, in particular, at times when they were requested to share successful events from their museum education practice. Although they were made to understand that the purpose of collecting successful stories was to understand their perception of the work they have implemented, several museum educators still resisted sharing and regarded this sharing as a self-flattering and self-promotion or self-aggrandisement. In Chinese culture, individuals would like to be regarded as modest and self-effacing. In accordance with this cultural uniqueness, museum educators in this study often attributed their success to the upper level director’s leadership, and they preferred to share their weaknesses and disadvantages when conducting museum education work. This external way of attribution might be a method for museum educators to receive political safety in a highly hierarchical society, even though they were continuously made to understand that their privacy and confidentiality would be strictly protected.

3.3.1.2 Informal Conversation with Participants

In addition to face-to-face semi-structured in-depth interviews, the researcher’s informal conversations with several museum educators were also documented. As these informal
conversations happened spontaneously without any premeditated intention, they were not digitally recorded. Instead, the conversations were documented in the researcher’s reflexive journals as described in 3.3.1.3. During the interview, tape recording seems not only a technical way of documenting the interview process but also a cultural tool that affects the interview process. Two museum educators claimed that, the action of turning on the recorder sometimes prevented them from expressing “true” feelings. Indeed, it is noticeable that in many instances when the recorder was turned off, museum educators shared more contextualized events, personal feelings, and ideas that would not appear in the formal recorded interview process. It seems that the action of turning on a recorder is a political representation that would lead participants to speak in an official tone. However, the act of turning off a voice recorder declared that an official relationship between a researcher and participants was over, which encouraged them to chat with the researcher in a more friendly and authentic manner.

In addition to face-to-face informal conversation, museum educators contacted the researcher through online social networks and online chatting programs, such as QQ (similar to Skype), which allowed the researcher to access their recent reflection on their working performance. It is important to point out that such access was not equally informative across all museum educators in the study. With the consideration of ethical issues, museum educators gave the researcher permission to quote their statements, from informal conversations, as data for this dissertation.

3.3.1.3 Researcher’s Reflexive Journaling

The researcher maintained reflexive journals throughout the research process. The reflexive journal mainly covered the process of my access as a researcher, the process of
establishing rapport relationship with gatekeepers and research participants, interview techniques, informal conversations with participants, reflection on data analysis, and other cultural issues including any meanings discerned from momentary experiences. For example, during the whole research process, many challenges and cultural uniqueness emerged. The researcher depicted these issues in the reflexive journal, which constituted the content of Section 3.5. Overall, this was a complementary data source that contributed to my understanding about Chinese science museums, museum education, and museum educators.

3.3.2 Data Analysis

This section firstly documents how a hybridized inductive and deductive analytical framework was used to analyze research data in this study, and secondly, describes the step by step coding process.

3.3.2.1 A Hybridized Inductive and Deductive Analytical Framework

This study employed a hybridized method that involves the balance of both inductive and deductive coding process to analyze data (Fereday & Muir-Cochrane, 2006; Gibbs & Taylor, 2005). Qualitative data analysis starts from the time one starts collecting data, and this is also the point in an interpretive research study when themes start forming. These themes are further resolved during data transcription and processing phases (includes organizing, sorting, comparing and contrasting). Such emergent themes could resemble categories previously encountered during the study’s literature review phase, and might rightly be employed in subsequent stages the analysis. Therefore, strictly dichotomizing deductive and inductive processes is not necessarily a fruitful approach in this kind of study. As Hodson (1986) has
argued, all observations are theory laden. Therefore, it is considered in this study that the literature reviewed and theoretical frameworks and perspectives employed together have influence on the researcher’s perceptions and meaning making of encounters during data collection and processing. In a way, there is always deductive reasoning in what is apparently an inductive process and vice versa. However, inductive approaches tend to dominate subsequent data analysis.

Generally, inductive analysis requires careful and in-depth reading and understanding of the raw data to develop codes, categories, themes, and a model (Merriam, 2002; Strauss & Corbin, 1998; Thomas, 2006). Traditional qualitative researchers often prefer to use a general inductive approach to analysis qualitative data in situations where research seeks to abstract meaning by progressively examining cases (Merriam, 2002; Strauss & Corbin, 1998). For example, Merriam (2002) argued that the inductive process is an important characteristic of qualitative study as “the lack of theories or an existing theory fails to adequately explain a phenomenon” (p. 5). However, some qualitative researchers also proposed deductive way of analysis (Gibbs & Taylor, 2005; King, 2004). As Thomas (2006) introduced, deductive analysis “sets out to test whether data are consistent with prior assumptions, theories, or hypotheses identified or constructed by an investigator” (p. 238).

Fundamentally, this study was under an interpretive paradigm to understand Chinese science museum educators through their perception and interpretation of their lived working experiences. The purpose of this study is not to create a theory. Instead, CoP and CHAT provide a framework to understand and analyse data in particular ways. Accordingly, data analysis was started in a deductive fashion. In this sense, deductive analysis means that a theoretical coding strategy (Gibbs & Taylor, 2005; King, 2004) was used in terms of borrowing some codes and
categories from CoP, CHAT and relevant empirical studies that were seen continually pop up throughout the data collection and processing. This is a rarely acknowledged part of qualitative data analysis, where researchers experience or sense existence/presence of what the already know in the data they collect. In this study, this was followed by in-depth and several rounds of reading of the transcripts, with a purpose of finding or detecting and constructing new emergent codes/categories/themes in an inductive fashion not reported in the literature. Therefore, for pragmatic purposes, both inductive and deductive analytical approaches were integrated in the data analysis.

It is important to note that the inductive and deductive analysis was not conducted sequentially. Instead, the whole data analysis was an iterative and reflexive process. Some priori codes were influenced by CoP, CHAT, and previous studies, some were recoded according to the research context in this study, and some codes inductively emerged from the iterative reading process. It is worth noting that, in this study, some codes/categories were identified as important common patterns emerged from museum educators’ interpretations, which demonstrated a general phenomenon of how museum educators interpret their self-concept as museum education professionals and perceived needs. However, some interesting codes/categories/themes raised by a comparatively small proportion of museum educators were also reported in this study. The rationale of including such findings in results is because the purpose of this study was to offer a holistic and comprehensive description of museum educators’ perception about their identity and working practices, which is in accordance with the maximum sampling strategy in selecting participants. In addition, reporting this group of codes/categories/themes is also recognized as a way to respect, empower, and anti-marginalize museum educators who participated in this study. Finally, categories which are not manifest ubiquitously across the studies’ participants should not
be excluded to the research findings. Indeed, some insights, unique to a few maybe inherently interesting and if explored can provide additional layers of insights.

In summary, in this study, a hybridized inductive and deductive analytical framework was employed to make sense of raw data, which reflected “a contextual constructivist position” (Madill, Jordan, & Shirley, 2000) to understand how museum educators make meaning of their lived experiences.

### 3.3.2.2 Coding Process

The interviews, informal conversations, and reflexive journals were manually transcribed and coded in Chinese, and then transcriptions were translated from Chinese to English. Due to the difference between two languages, there were some challenges regarding exact translation. These are discussed in Section 3.5.

The coding process in this study includes two main steps. As a first step, the data were analyzed individually in order to examine how museum educators’ self-concept as professionals was understood or interpreted depending on their work-related practices, thoughts, and feelings. During the process of data analysis, five categories of themes appeared, which followed a timeline from previous, present, and to future of a museum educators’ career development (See Figure 4). Briefly speaking, work motivation referred to museum educators’ pre-existing identity, which represented their perception about why they made the decision to work in museums. Then, museum educators’ description of their job responsibilities, work competency, and current ways of professional development represented their perception of their current identity as museum education professionals. Next, the description of desires for future professional development
represents museum educators’ imagined possible selves of being museum education professional in future.

![Diagram](image)

*Figure 4. Data analysis step one: From an individual level.*

It is worth noting that, in keeping with the hybridized data analysis approach that was documented previously in Section 3.3.2.1, the five themes with sub-categories were generated iteratively between inductive and deductive analysis. For example, “Work motivation” was one of five priori codes derived from CoP (Lave & Wenger, 1991; Wenger, 2010, 2011; Wenger & Snyder, 2000), as CoP has already identified motivation as an important component that constituted individuals’ identity of being a community member. Indeed, as discussed in Chapter Two, previous research studies have already found that the internal attachment and belongingness to museums keeps museum educators’ passion and enthusiasm towards this profession (Allen & Crowley, 2013; Bailey, 2006; Bruyere & Rappe, 2007; Kidd, & Kidd, 1997; Marcus, 2006), which represents as a cluster of “intrinsic motivation” in this study. Along with the data analysis, a new category different from intrinsic motivations emerged. Participants frequently reported external incentives that drove them to select museum as a preferred working context, which was different from the pre-existing studies. These new motivational factors, such
As “fallback career”, “job security and geographic location preference” and “family issues”, were categorized under as “extrinsic motivation”. Therefore, “work motivation” finally became a theme to answer the first sub research question, and extrinsic and intrinsic motivations with the emergent sub-categories demonstrated the diversity of the pre-work identities of current museum educators in Chinese science museums. These priori and emergent codes were both deductively and inductively constructed during the process of data analysis.

As a second coding step, the data were analyzed from a collective scope. The second round of analysis was guided by the model of second generation of CHAT (See Figure 2 in Chapter Two). The model of second generation of CHAT provided a preliminary sketch to visualize the collective and interrelated relationship encountered by Chinese science museum educators. On the basis of second generation of CHAT, an analytical model specific to this study emerged (See Figure 5). This new model contributed to the investigation of the social and cultural context in which museum educators worked and how these contexts impacted their perception of museum-education-related working experiences.
Figure 5. Data analysis step two: From a collective scope.
Inferred from the second generation of CHAT, the model in Figure 5 included the following six elements: subject, object, cultural mediation, cultural factors, community, and division of stakeholders. Here are the interpretations for each element in Figure 5.

**Subject** refers to museum educators who were the focus of this study.

**Object** includes two categories, initial object and evolved object. The initial object emerged as the action(s) to enhance museum educators’ professional ability. The evolved object demonstrated that, the professionalization of museum education work does not solely depend on museum educators. It is a long-term practice that requires multifaceted cooperation. The initial and evolved objects demonstrate that the object in a museum educator community is not static and pre-defined. Instead, the evolution of the object indicates that the professionalization of museum education requires a well-run community with the cooperation among different stakeholders.

**Cultural Mediation** is the cultural tools/artifacts utilized by museum educators in their daily life. In this study, two categories of cultural mediation emerged, tangible/material cultural artifacts (educational programs, museum exhibitions) and psychological artifacts (working motivation, task-based self-concept, quality-based self-concept, and professional development pathways). Two types of cultural artifacts mediated subjects’ meaning making process.

The term **Cultural Factors** was used to replace **Rule** in the original model of second generation of CHAT. Many cultural factors emerged in this study, which strongly influenced museum educators’ perceptions of their roles and professional needs. Other than “Rule”, there are diverse cultural factors that can be categorized into three levels: individual factors (such as museum educators’ diverse background), organizational factors (such as highly hierarchical organizational culture), and macro-social context (such as authority-centered political context,
the contemporary education reality in China, and the hybridized educational philosophy in China). Therefore, *Cultural Factors* in Figure 5 is a notion that is more inclusive than “Rule”.

*Community* refers to museum educator groups who shared similar values, attitudes, and practices of museum education work. This community is not restricted to museum educators working in the same museum. It can be a collective museum educator group across different science museums.

The term *Division of Stakeholders* replaced the term *Division of Labor* in the original model of second generation of CHAT. The stakeholders in Figure 5 represent a collaborative relationship with museum educators. In this study, the Division of Stakeholders includes visitors, museums, museum departments, external supports, and museum educators’ families.

In the process of visualizing the collective and complicated nature of the museum educator community, Figure 5 further demonstrated the contradictions and conflicts encountered between the subject (museum educator) and other elements. Specifically, the contradictions and conflicts primarily remained between the subjects (museum educator) and community (museum educator community), and between the subjects (museum educators) and divisions of stakeholders (such as visitors, working institutions, departments, external supports, and museum educators’ families).

**3.3.3 Ensuring the Quality of Data Collection and Research Findings**

In traditional empirical studies, validity, reliability, and generalizability are described as the scientific “holy trinity” (Angen, 2000). Some qualitative scholars have questioned adopting positivist evaluation criteria and standards in qualitative studies (Mackenzie & Knipe, 2006; Maxwell, 1992; Shenton, 2004). However, Denzin and Lincoln (1998) argued that the notion of
validity and reliability are still appropriate in qualitative research, but these two concepts should not be limited to the narrow interpretation described in positivistic terms. More specifically, rather than determining the objectivity and certainty of research outcomes, qualitative researchers suggest that, “evaluating the quality or trustworthiness of a study becomes an ‘open-ended, always evolving, enumeration of possibilities that can be constantly modified through practice’ and disseminated through exemplary models” (Smith, 1990, p. 178). Thus, the term validity and reliability collectively embody the notions of authenticity, trustworthiness, credibility, and the “goodness” of the study (Creswell, 2005; Shenton, 2004). Among various terms, the four criteria proposed by Lincoln and Guba (1985) have been widely accepted as a basic rule to evaluate qualitative research findings and the process of data collection. They are credibility, transferability, dependability, and conformability. Specifically, these four criteria are used in qualitative studies to demonstrate the notions of internal validity, external validity/generalizability, reliability, and objectivity from a positivist paradigm (Lincoln & Guba, 1985). These four criteria were adopted as principles to guarantee the quality of the whole research process.

The credibility criterion ensures that the information generated from the research is what researchers intended to collect. The investigation of credibility is to examine the congruence between the research and the reality (Shenton, 2004). Moreover, credibility is one of the most important criteria that help to establish the trustworthiness of research findings.

The transferability criterion investigates to what extent the research findings are applicable to a wider situation. Although some qualitative researchers have strongly objected to any transferable possibilities, some scholars recommended a notion of “naturalistic generalization” (Shenton, 2004; Stake, 1995; Stake & Trumbull, 1982; Tran, 2007). From their
viewpoint, each case is neither isolated nor independent, but rather originates from a broader situation. Therefore, Stake (1995) argues “people can learn much that is generated from single cases” (p. 85). However, such generalization calls for attention to use, which not only relies on researchers’ provision of rich description of contexts but also depends on readers’ judgement on the similarity and the relevance between research findings and the situation that they intend to compare (Denscombe, 2003).

The dependability criterion evaluates the description of the ever-changing research contexts (Lincoln & Guba, 1985; Shenton, 2004). Instead of repeating research findings, rich description of research contexts can enable other researchers to understand the boundaries of this research, testify the effectiveness of research methods, and evaluate the possibility to repeat research process in other situations.

The conformability criterion evaluates the degree to which research findings can be confirmed or corroborated by others (Lincoln & Guba, 1985; Shenton, 2004). In a qualitative study, researchers’ subjectivity may lead the interpretation of research findings in a particular direction. In order to ensure the conformability, it is important to recognize the researchers’ subjective roles and perceptions, as well as try different ways to triangulate informants’ perspectives, experiences, and ideas. It is also important to discuss the cases that have not been supported by previous research findings, preliminary theories, or other research participants.

In summary, these four criteria do not exist independently, but rather in an interrelated and relevant manner. The quality of research data in this study was ensured across the whole research process. Borrowing Shenton’s (2004) summary of research techniques to enhance the quality of a qualitative study, these four evaluation criteria have been embodied in many ways in this study. Table 4 shows how these four criteria were utilized to ensure the quality of this study.
<table>
<thead>
<tr>
<th>Quality criterion</th>
<th>Possible provision made by the researcher</th>
<th>The location of each provision in this research</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Credibility</strong></td>
<td>Adoption of appropriate, well recognised research methods</td>
<td>See 3.3.1</td>
</tr>
<tr>
<td></td>
<td>Development of early familiarity with culture of participating organisations</td>
<td>See 3.2.1</td>
</tr>
<tr>
<td></td>
<td>Triangulation via use of different methods, different types of informants and different sites</td>
<td>See 3.2.1, 3.2.2, and 3.3.1.</td>
</tr>
<tr>
<td></td>
<td>Tactics to help ensure honesty in informants</td>
<td>See 3.3.1.2</td>
</tr>
<tr>
<td></td>
<td>Peer scrutiny of project</td>
<td>Discussion was conducted between me, Chinese research colleagues and with my supervisor</td>
</tr>
<tr>
<td></td>
<td>Use of “reflective commentary”</td>
<td>See 3.3.1.3</td>
</tr>
<tr>
<td></td>
<td>Description of background, qualifications and experience of the researcher</td>
<td>See 3.2.1</td>
</tr>
<tr>
<td></td>
<td>Examination of previous research to frame findings</td>
<td>See Chapter 2: Theoretical Framework and Literature Review</td>
</tr>
<tr>
<td><strong>Transferability</strong></td>
<td>Provision of background data to establish context of study and detailed description of phenomenon to allow comparisons to be made</td>
<td>See Chapter 2: Theoretical Framework and Literature Review and Chapter 3: Methodology</td>
</tr>
<tr>
<td><strong>Dependability</strong></td>
<td>Employment of “overlapping methods”</td>
<td>See 3.3.1</td>
</tr>
<tr>
<td></td>
<td>In-depth methodological description to allow study to be repeated</td>
<td>See Chapter 3: Methodology</td>
</tr>
<tr>
<td><strong>Conformability</strong></td>
<td>Triangulation to reduce effect of investigator bias</td>
<td>See 3.2.1, 3.2.2, and 3.3.1.</td>
</tr>
<tr>
<td></td>
<td>Recognition of shortcomings in study’s methods and their potential effects</td>
<td>See 3.5 along with discussions scattered in research findings</td>
</tr>
<tr>
<td></td>
<td>In-depth methodological description to allow integrity of research results to be scrutinised</td>
<td>See Chapter 3: Methodology</td>
</tr>
</tbody>
</table>

*Note.* This table is adopted from “Strategies for ensuring trustworthiness in qualitative research projects” by A. K. Shenton, 2004, *Education for Information*, 22, 73.
In order to improve the credibility of this study, a thick description of previous research was documented, which offered a sketch on which to frame the findings. I, as the researcher, developed early familiarity with the research sites, the research gatekeepers, and the participating museum educators before I conducted this research. In order to maintain the transparency of the research data, my background, qualifications, and experiences were also documented. Several data collection methods were used to triangulate the research data, such as face-to-face semi-structured interview, informal conversation, and researcher’s reflexive journals. In addition, I also discussed the research process constantly with my Chinese research colleagues and my PhD supervisor from the University of British Columbia (UBC).

In order to keep the transferability, the background data and a detailed description of the phenomenon was provided to establish context of this study. In particular, Section 2.2 depicted the origin, development, and current status of museum education and museum educators in Chinese science museums. This section offered cultural-specific background information and set a foundation to make sense of museum educators’ interpretations in this study. In addition, the criteria to identify potential participants and their background information were also documented in detail in Section 3.2.3, which helps other readers to understand the boundary of this study.

In order to maintain dependability, several methods were employed to collect data, such as face-to-face semi-structured interview, informal conversation, and researcher’s reflexive journals. These methods were described as “overlapping methods” (Shenton, 2004). In addition, an in-depth description of the methodology was documented in this chapter.

In order to maintain conformability, several methods were employed to collect data, with the intention of reducing researcher bias. An in-depth description of the methodology was documented in this chapter in order to allow the integrity of the research results to be scrutinised.
In addition, my positionality and the challenges and limitations associated with that positionality were also documented in Section 3.5.

3.4 Ethical Consideration

This interpretive case study collected rich, extensive, and deep description about Chinese science museum educators’ self-concept as museum education professionals. This research did not collect any personal information of museum educators except for their background information, personal working experience, and perspectives. This study was regarded as a minimum risk study and has been approved by the UBC research ethics board.

Although some museum educators were recommended by museum directors, all of them participated in this study voluntarily. Before participating in this research, the museum educators received a consent form and research protocol with the intention of explaining the purpose of this study, the research members, the research procedures, the potential risks and benefits, the future use of data, issues of confidentiality, and contact information. Before each interview started, the participants were told that they were free to withdraw from the research at any time without any consequences, should they desire. During the interview process, the conversation was recorded with museum educators’ permission. In order to protect the participants’ privacy and confidentiality, every museum educator was given a pseudonym or a unique coding in this dissertation and future reports.

Currently, there is no formal ethical board or institution to monitor the research procedures in the Chinese research context or in Chinese science museum context. This study followed the ethical guiding principles enacted by the University of British Columbia, Canada.
3.5 Challenges and Limitations

This study was situated in a Chinese cultural context. In a highly authority-centered and hierarchical cultural context, I encountered many challenges and difficulties in implementing, analyzing, and interpreting research findings. I attributed such cultural and practical challenges and difficulties to my complicated roles in this study. As aforementioned, I perceived of myself as an early-career researcher during the research process. In addition, museum gatekeepers and participants also perceived me as an external evaluator working for CAST, as well as a museum education professional with overseas learning experience. These different titles endowed on me by others permitted me to more fully recognize the challenges and limitations of this study.

The first challenge related to the unique Chinese political culture that is featured as highly-centralized and hierarchical top-down power distribution. As mentioned previously, although the privacy and confidentiality of the museum educators would be protected, a few of them still refused to express their “true” feelings. They often preferred to use an official tone when they perceived of me as an evaluator who was sent by CAST to monitor their working performance. Therefore, we were situated in a more sophisticated power relationship. My previous experience had brought me opportunities to connect with museum educators; however, it also created distance between some participants and me as a researcher. Therefore, in a highly authority-centered Chinese culture, I sometimes found difficulties in building a trusting and equal power relationship with participants. However, even if this hierarchical relationship could lead to the difficulty in approaching to the actual state of affairs (Guba & Lincoln, 1981), it also, to some extent, reflected the organizational culture of museums that was depicted as Culture Factors in Figure 5.
Another challenge was the capacity to derive consistent meaning between the original Chinese transcripts and the English translation. The translation of transcripts is more than a technical task; rather it is based on cultural understandings. In this study, the original interview transcripts, the researcher’s reflexive journals, and the informal conversations were all in Chinese. Each interview was transcribed in Chinese. Afterwards, the researcher translated the transcripts into English and asked a native speaker to proofread the translated transcripts in order to improve the readability and grammatical correctness of the excerpts quoted in this dissertation. Then, the translated transcripts were compared to the original Chinese transcripts to prevent potential biases or loss of meanings. However, there still exist some words/phrases/sentences that have cultural meaning in China, such as 关系户 (pinyin: guan xi hu) (individuals take advantage of their working titles to make personal benefit), 红头文件 (pinyin: hong tou wen jian) (The rules, policies, or documents enacted by the government with red title, which indicates that the enactment of that document is mandatory), 事业单位 (pinyin: shi ye dan wei) (Public institutions) and so on. As an insider of Chinese culture, I understand the meaning of these words; however, as a researcher having to describe the phenomenon and convey information, an insider’s perspective may induce some risks by ignoring the contextualized and extensive description that may facilitate readers’ understanding of the exact meanings.

3.6 Summary

Chapter Three addresses the methodology, research design, and research methods that were used for this study. Specifically, this chapter starts with a description of interpretive case study. Then, the chapter documents the research design of this study, including a description of the researcher’s positionality, the research context, and the research participants. In addition, this
chapter depicts the general research procedures in terms of describing three data collection methods (face-to-face semi-structured interview, informal conversation, and researcher’s reflexive journal), data analysis framework, and the methods of ensuring the quality of data collection and research findings. Finally, this chapter concludes with a discussion of the ethical consideration and challenges and the limitations of this study.

The two chapters four and five, which follow, report the data analysis and findings. Chapter Four reports the data analysis as a response to the first three subquestions that guided the study, while Chapter five reports the data analysis as a response to the last two subquestions.
Chapter 4: Data Analysis and Findings

This chapter reports the analysis and findings to the first three sub-questions of the overarching Research Question: How does Chinese science museum educators’ self-concept as professionals manifest and transform in their work practices and professional needs within the local social and cultural Chinese science museum context?

- In what motivational factors to pursue work in museums does Chinese science museum educators’ self-concept as museum education professionals manifest?
- How has Chinese science museum educators’ self-concept as professionals been shaped by their museum related work experience?
- How is Chinese science museum educators’ self-concept as professionals manifest in their perceived professional needs?

The chapter focuses mainly on areas in which museum educators’ self-concept as museum education professionals are embodied. The analysis is based on museum educators’ reflections on their working practices and activities, from which professional boundaries, competencies, and responsibilities of museum education work are inferred.

This chapter comprises six sections. Section 4.1 reports the analysis of museum educators’ self-concept as professionals as manifest in work motivation by demonstrating how museum educators were driven by different motivational factors to make occupational decisions in science museums. Sections 4.2, 4.3, and 4.4 report the analysis of museum educators’ self-concept as professionals as manifest in their current job description responsibilities, work competencies, and professional development pathways. Section 4.5 analyzes their perceptual
selves in terms of their professional needs and desires for future career development. Section 4.6 summarizes the research findings of this chapter.

4.1 Work Motivation Experience

In this study, museum educators’ perception of their work motivation was seen as a trigger for them to reflect on the reasons that influenced them to work in science museums and perception of their self-concept as museum education professionals. Ten extrinsic and intrinsic motivational factors in which the science museum educators’ self-concept as museum education professionals manifested were identified. It is important to point out that, in this study, extrinsic and intrinsic motivations were internally and contextually intertwined. Figure 6 shows the specific motivational factors included in the two emergent motivational spectra.

![Figure 6. Work motivation perceived by museum educators.](image-url)
4.1.1 Extrinsic Motivation

In this study, extrinsic motivations included fallback career, academic preparation and relationship to museum education, connections with prior experiences, job security, preference for geographic locations, and family concerns.

4.1.1.1 Fallback Career

Out of 23 participants, 17 museum educators attributed their decisions to work in museums to some external reasons, such as dissatisfaction with their previous jobs and/or higher education majors, and the difficulty in securing a teaching position at a school. For example, Ping narrated her story of becoming a museum educator. As she noted,

My first job was a cell culture technician in a biology company… Compared to working as a biological technician, I prefer to be a teacher. However, a teacher position requires a teaching certificate that demands many examinations. I do not think I can pass those tests. Incidentally, I read a job poster from my museum. They were recruiting educators for science popularization. I applied and I got the job.

Ping perceived of the position of a museum educator position as a substitute choice to that of being a teacher, which required higher standards. In addition, Ping’s choice was indicative of a widely held view that she did not perceive museum educators as real teachers. Although she was in favour of working with students, it was difficult for Ping to obtain a position as a teacher. Therefore, Ping decided to work in a museum where she could also realize her teaching dream. For Ping, working as a museum educator was a trade-off between her expectation and the job
market reality. Ping’s story is consistent with the notion of “Fallback career” raised by Watt and Richardson’s (2007) - an extrinsic motivation that makes people not perceive of an occupation as a first-choice career. It was evident in this study that motivations do not exist independently; rather, they are contextualized and interrelated.

4.1.1.2 Academic Preparation and Relationship to Museum Education

The study revealed that academic preparation and its relationship to museum education influenced the participants’ decision to compete against other applicants for museum education work. They assessed how their academic background fitted with the requirement of science museums in two aspects: educational degree and academic major from post-secondary education. For instance, Bei attributed her success in garnering a museum education job to her bachelor’s degree, which met the requirements for her employment in the institution. As Bei illustrated, “Before I graduated, I was looking for a job. And this museum opened a position. One key requirement was a bachelor’s degree. I had one. Then I came”.

Apart from the fact that a higher degree was an added advantage to working in science museums, ten participants made working decisions by considering the relationship between their majors and museums’ requirements. They felt it was an opportunity to contribute their professional knowledge and skills in museum education. As Ming described, “Well, I think my physics background definitely helped me a lot, for example, in understanding and reciting the interpretation transcripts”.

Several other museum educators shared similar considerations as Bei and Ming when they made occupational decisions. Inferred from Bei and Ming’s statements, it seems that a
higher education degree and relevant academic background make museum educators feel competitive and competent to be museum education professionals.

### 4.1.1.3 Connections with Prior Life Experiences

Participants reported that previous life experience had strong and long-term impacts on their career decisions. These previous life experiences included childhood fieldtrips to museums, volunteering at museums, working in informal settings, and teaching at schools. The results were consistent with both Spock’s (2000) and Falk and Dierking’s (1990) studies, which showed that museum professionals could retrieve concrete early museum experiences and these previous memories partially influenced museum educators’ career choices. Furthermore, the link between participants’ previous experience and current working practice brought them confidence in job transition. For example, as Hong expressed,

> There is continuity between my previous and current job. Before I came here, I was working with kids and science education. When I started working here, I found many overlaps between what I had done before and museum education work. I think it should be very easy and joyful for me to start the work, and it is also easy for me to gain achievements with the help of my previous working experience.

In another example, MengMeng compared her school internship experience with her current museum education work. In terms of the comparison, MengMeng noticed the weaknesses of school science education and the inconsistency between theory and practice. In addition, she
also experienced the contradictions between current school education and her internalized teaching epistemology. MengMeng conveyed this by stating,

I did internships both at an elementary school for one year and here for one month. I recognized a huge difference between what I have learned about education and practical teaching experience at school. When I was working at the museum, I found museum environment more compatible to a [constructive] teaching pedagogy advocated by researchers.

Inferring from MengMeng’s statements, it is suggested that her internship experience, in two different educational contexts, pushed her to think deeply about the theoretical meaning of teaching and learning.

Ming and MengMeng were not the exclusive museum educators who found connections with prior life experience as a motivation that drove them to work in science museums. Given the examples offered by Ming and MengMeng, it seems that a related previous life experience helped museum educators’ transition into the work. Reflecting on the connectedness between what they did before and the museum education work provided an opportunity for museum educators to be introspective and reflective, which is an indispensable component for museum educators to shape their professional identity as museum educators.

4.1.1.4 Job Security and Geographic Location Preference

Some participants in this study perceived of a museum educator as professional in terms of job security and geographic location, especially when indicating preferred work locations. In
this study, participants expressed their concerns about job security and preferential geographic location simultaneously. Participants did not directly articulate their desires for job security; instead, the term “shi ye dan wei” [public institution entirely financially supported by the government] emerged from their interpretation. As Minyan expressed,

When I was looking for a job, I found there was a job posting from my museum. I had an interview and then got the offer. You know, the work place is in Beijing, and it is a public institution. I had no other better choices. Then I stayed.

Similarly, Liz commented,

My preference is to work in a public institution or a state-owned enterprise without strict requirements about major. From a female perspective, museum as a public institution is very attractive because of its stability and the work load should be very low.

Minyan and Liz suggested that work aspirations included the stability of museum education work to be based in big cities like Beijing. These sentiments were echoed by several other participants.

From a sociocultural perspective, the interrelated nature of job security and geographic location preference emanates from the fact that in China, science museums, as local landmarks, are located in cities where citizens live under harsh conditions and work under pressure. Thus, a stable job with the considerable benefits of a public institution, like science museums, would be very attractive. This is different from the findings in Bailey’s research (2006) in American
museums. Although museum educators in her study expressed a desire to “make a difference”, they still encountered many inevitable difficulties including the changing work climate, lack of resources, and feelings of stress under demanding workloads. The lack of conformity between the results of this study and Bailey’s (2006) strongly demonstrates the unique organizational culture of Chinese science museums. Most Chinese science museums are entirely government-funded, which is different from many Western museums that sustain their operation via commercial activities such as entry fees, venue hires, or social donations. In China, museum educators in a tenured position have substantial welfare benefits and their salaries are not determined by work performance, but by their seniority as a function of working years. Therefore, as indicated by museum educators in this study, the stability and benefits are strong incentives that attract them to search for a tenured position. However, it is questionable that if these museum educators could still maintain a positive attitude towards museum education work once they get a tenured position. In other words, if a museum educator is working in the museum context only because of the external benefits, it might be difficult for them to shape a positive perception and improve their working performance to be a museum education professional.

4.1.1.5 Family Concerns

In this study, four participants partially attributed their decision to work in science museums to their desires to allocate time with families. As Yan noted, “I was young and I did not have a clear career plan at that time. My husband and I lived in different places. To be together, well, I guess is the most important reason [to work in this museum]”. Yan’s statement indicated that the challenge of balancing work and family affects some participants’ job decisions. In this study, participants who regarded family concerns as an important motivation were all females.
Meanwhile, family concerns were also taken into account by older museum educators. It seems that family concerns reflected participants’ perception of science museums as a family friendly working environment.

4.1.2 Intrinsic Motivation

The proportion of participants who expressed self-concept as museum education professionals through intrinsic motivations was, by comparison, fewer than those who expressed this perception through extrinsic motivations. Through intrinsic motivation, museum educators’ internal attachments and recognition to museum education were explicated. In this study, four intrinsic motivational factors in which the self-concept as museum education professionals manifested emerged: satisfying personal interests, pursuing feelings of self-fulfillment, curiosity, and pursuing opportunities for professional enhancement.

4.1.2.1 Satisfying Personal Interests

A total of seven museum educators thought that working in science museums suited their personal interests well. For example, Chao shared in his story of being engaged in museum education work. As Chao said,

In 2003, when I was an undergraduate student, I incidentally volunteered at this museum. I was fascinated by the work here. Before I graduated, I was deeply involved in working with other staff. Then I came in with a contract position.
Similar to Chao, another six museum educators were also motivated to work in science museums by their internal interest. In addition, Chao’s statement also showed the influence of previous life experience on making job decision. It was interesting to find that most participants who valued satisfying personal interest as a motivation were older people and without any science museum education related academic background. Overall, their personal interests drove these museum educators when they made the decision to work in science museums, which may have a positive impact on their self-concept as professionals.

4.1.2.2 Feelings of Self-fulfillment

Feelings of self-fulfillment were revealed as a motivation that represented museum educators’ happiness and accomplishments when they conducted museum education work. As Xiaohui shared, “In my 70s’ or 80s’, I will take my grandchild here and proudly tell him: this is the institution to which I dedicated myself. What I have done is really very meaningful.” It seems that Xiaohui felt very proud of his work and he had a strong attachment to the museum where he worked. Similar to Xiaohui, another two participants also claimed self-fulfilment as a motivation, and none of them were from the national level science museum. They were male museum educators and over 50 years old. In addition, they worked in different fields before they became a museum educator. From the participants’ perception, working as a museum educator was a good way for them to realize self-actualization.

4.1.2.3 Curiosity

Only two participants expressed curiosity as a work motivation. Both of them had education background and were less than 40 years old. For example, before working in a
museum, Yan taught history in a public high school for three years and she later earned a Master of Education degree. She described a novel feeling of museum education work, “[Museum education work] is really a very new occupation and it has never existed in my city before”. Overall, curiosity was implicated in participants’ eagerness in investigating the uniqueness of museum education work, which may be a strong force to keep their learning enthusiasm to enhance their working ability.

4.1.2.4 Pursuing Professional Enhancement

Pursuing professional enhancement was implied in participants’ desires for professional growth. In this study, only Yan perceived the opportunity for professional growth as a work motivation. In comparison with her previous school teaching experience, Yan anticipated more external exchange opportunities,

Why do I implement the “Bridge Science Museums with Schools” program in my institution? I found this is a window for me to attain going out opportunities. I can learn, bring back new ideas and communicate with peers. These interactions make me grow. I am happy.

Yan’s statement indicated her willingness to communicate with colleagues from other museums. It is inferred that working as a museum educator may bring her professional development opportunities and a community for professional communication. Although Yan is a unique case in this study who valued the professional development opportunities museum education work could bring her, it is still worth noting that such external communication opportunities may be an
incentive to attract potential museum educators with passion about museum education, and deepen their understanding of the essence of being a museum education professional in future.

4.2 Job Responsibilities

This section explains the job responsibilities perceived by museum educators as embodying museum educators’ self-concept as museum education professionals. Sharing a common practice is a significant feature in CoP (Wenger, 2010, 2011). The common practice is constituted by a set of common tasks, which develops the integrity and coherence within the community (Kisiel, 2012). In this study, accordingly, thirteen types of job responsibilities emerged from museum educators’ descriptions, which indicated the complexity and diversity of museum education work in Chinese science museums. This result is similar to Tran’s (2008) findings in a study with 24 museum educators in the U.S., in which museum educators took on numerous working responsibilities and described themselves as “wearing many hats” (p. 137). Overall, these thirteen types of job responsibilities fell into four categories, which included: a) highly-correlated-museum-education work, b) general administrative work, c) routine work in exhibition halls, and d) external communication with other museums.

4.2.1 Highly-correlated-museum-education Work

From museum educators’ perception, a cluster of job responsibilities were highly correlated to museum education. These job responsibilities included: design and develop educational programs, organize and implement educational programs, establish a museum education community, and evaluate museum education programs.
4.2.1.1 Design and Develop Educational Programs

Design and develop educational programs was reported by fifteen museum educators, which took the largest proportion across all science museums in this study. In order to offer visitor-centered educational programs, museum educators in this study asserted that they identify prospective visiting groups, analyze features of different groups, seek out social hotspots, and collect program ideas from different sources. As the museum educators articulated, they usually generate creative ideas from online resources, brainstorming within departments, concerning about educational policies, borrowing ideas from other departments and overseas science museums, and carrying out educational directors’ demands. In addition, writing was also perceived by museum educators as an important responsibility to prepare for educational programs. The formats of the materials they wrote were very diverse. For example, they wrote scripts for education activities, prepared museum education curriculums, documenting meeting minutes, reflective journals, working reports, and research papers.

4.2.1.2 Organize and Implement Educational Programs

A total of fourteen museum educators in this study shared their experience in delivering both in-site and off-site educational programs to general visitors and school groups. As they shared, they invited experts to address lectures, performed science experiments, demonstrated scientific shows, led summer/winter camps, conducted science classes, facilitated thematic activities on the basis of exhibitions, ran science clubs, organized museum teaching competition for local school teachers, and displayed mobile science exhibitions by caravan. When organizing and implementing educational programs, museum educators contacted and negotiated with different stakeholders, mostly with school teachers. For example, as Bei explained,
I communicated with that teacher again and again…When he was rehearsing in the exhibition hall, I observed his performance and made notes…If there was something that I did not agree with him, I stopped him directly…After negotiation for several times, the teacher understood our educational belief, and his teaching style was appreciated by museum side and local education bureau.

Similar to Bei, several other museum educators also reported their interaction with school teachers in terms of exchanging ideas relevant to teaching beliefs, curriculums, formats, materials and teaching examples. It is inferred that, the mutual interaction between museum educators and school teachers brought both sides opportunities to deepen their understanding of education and bridge the boundaries between two sides. However, such intellectual exchange was not a common practice reported by the museum educators in this study.

In addition to implementing educational programs to general visitors and students, museum educators from Museum E reported teacher training as work featured in their daily practice. The director and frontline museum educator from Museum E were engaged in training local school teachers from an informal learning perspective, and they were in charge of different training responsibilities. As MengMeng described, “Our director [Hong] was usually invited to address lectures in local universities and teacher colleges. If teachers came to our museums, we would demonstrate them [the educational activities]”.

It appears that museum educators took on different responsibilities in organizing and implementing educational programs. For example, Hong, as an educational director, was always invited to share his informal learning thoughts to school teachers and pre-service teachers. He often introduced teachers to the uniqueness and advances of museum education, connections and
cooperation possibilities between museums and schools, and other relevant informal learning concepts and beliefs. Since Hong had taught school before, he was familiar with teachers’ language and school culture. His lectures can both resonate to school teachers’ current educational belief and guide them to think about a new teaching paradigm. As frontline museum educators, Juan and MengMeng were usually assisting Hong by means of demonstrating how an informal education belief guides museum education practice. They delivered educational programs and performed science experiments for school teachers in museums.

Different from museum educators at Museum E, who performed educational programs for school teachers, Chao offered consulting services to schools when they organized scientific festivals and science competitions. During the first year in Museum B, Chao supervised a group of students as they attended a national robot competition. He became familiar with competition procedures, facilities, and the equipment required by the competition. Local schools frequently inquired Chao with regards to organizing similar robot festivals at school. Chao sometimes recognized himself as a technical specialist to school science activities. Here is his statement as evidence,

For example, some schools planned to implement robot activity for students. However, they had no idea to organize such activity. For example, they did not know what kind of equipment they need to prepare. I helped them… I usually asked them about the activity objectives. Then, I made recommendations accordingly.

Chao’s experience as a technical specialist was very unique in this study. Rather than attracting students to museums directly, Chao took advantage of his previous working experience to help
local schools understand informal learning concept and implement relevant activities. His previous working experience helped him mediate the interaction between schools and museums. As the segregation between schools and museums was very severe in many Chinese science museums, Chao’s example may incite museums to search for an appropriate way to initiate cooperation with local schools. Since museum educators demonstrated more diverse backgrounds than school teachers, it would be necessary for museum educators to reflect deeply on their occupational self-identity. The analysis questions, such as “who we are”, “where we come from”, and “what our uniqueness is” may be a starting point for museum educators to recognize their strengths, which school teachers do not have, may help museum educators to further develop professional self-esteem, and expand their influence on the local school community.

4.2.1.3 Establish a Museum Education Community

From museum educators’ perception, another important responsibility that highly correlated to museum education work is the establishment of a museum education community. The museum educators in this study organized volunteer groups to support museum education work. They also attempted to cooperate with other cultural institutions in order to expand the influence of informal education on local citizens. For example, a total of nine museum educators reported that they connected with government, schools, universities, science and technology companies, press houses, zoos, and other related resources for the purpose of cooperation. They were looking for partners and experts to enhance the contents and formats of educational programs. Qiang shared his experience of relying on an extracurricular magazine to find appropriate science experts to address lectures in his museum. As he expressed,
Currently, we have very limited ways to find proper experts for our lectures. I do not know if you have ever heard of *Open Class* [the name of a magazine] before… We cooperated with that magazine and they helped us to find appropriate experts. We do not know many experts in science field, but they know.

Qiang’s description reflected the deficiency of education specialists in newly built science museums in China. Like Museum C, some new science museums may have some difficulty in finding appropriate experts from different fields to help them accomplish the educational mission. Therefore, as indicated by Qiang, museum educators often turned to other cultural institutions who may have already established a mature social network with experts from different fields. Museum educators regarded it is a good way to build a professional community and to expand the museum education human resources.

In addition, Bei also shared her experience of working with the local education bureau. As she indicated,

> We are now organizing a competition for school teachers. We need an authoritative document from the local education bureau. My work is to make up the document draft and get the signature from the head of that education administrative department. After the agreement from the head, the document can be in force.

The example provided by Bei reflected a common phenomenon across Chinese science museums, and especially for museums that had difficulty building relationship with schools. Some museum educators in this study suggested that, collaborating with local education bureau to enact policies
was an effective way to demand schools to organize field trips to museums. They named such policies as 红头文件 (pinyin: hong tou we jian) [The rules, policies, or documents enacted by the government with red title, which indicates that the enactment of the document is mandatory]. They perceived such policies as a strong political support and regulation to break the boundary between schools and science museums. Therefore, museum educators in this study thought that cooperating with the local education bureau was an important responsibility in effectively implementing museum education practices.

4.2.1.4 Program Evaluation

A total of eight museum educators from five museums perceived of program evaluation as an indispensable job responsibility for museum educators. In this study, museum educators reported their experience of establishing evaluation criteria, monitoring education processes, and conducting reflection after an activity completed. It is worth noting that, both Minyan and Lin objected to utilizing questionnaires as an evaluation instrument. Minyan showed her preference for conversational assessment and she often communicated with visitors at the end of a museum education program. As she said, “Currently, our main evaluation method is communicating with audiences, not through questionnaires. It is through informal conversation”. As shared by Minyan, she preferred to use a conversational way to understand visitors’ learning experience in museums. Minyan’s preference of evaluation methodology somehow reflected her understanding of museum education as a learning process rather than a product.

In addition to ordinary evaluation, five museum educators from the national level and provincial/municipal level science museums also perceived of project-based research work as an important responsibility. They claimed that doing research could help them better understand,
design, and conduct practical work. For example, museum educators reported their experience in investigating the effectiveness of different worksheets, enriching types of science experiments, and exploring visitors’ perceptions of visiting museum for free. As Minyan introduced,

I applied for a research project with a focus on training museum educators. I found currently we have many short-term training opportunities. However, such training opportunities were lack of specific training goals… They just invited some experts to address lectures. I hope my research can offer a systematic framework for training museum educators.

From Minyan’s interpretation, it seems that her working experience brought her research ideas. In addition, her observation also brought her driving force to change the current training system. Museum educators like Minyan combined multiple roles like museum education practitioners, researchers, and research participants, which offered them various lenses to investigate museum education work.

4.2.2 General Administrative Work

In addition to the highly-correlated-museum-education work, eight museum educators in this study also mentioned ordinary administrative work as part of their job responsibilities. Administrative duties could include: planning working schedules, human resource management, and training novice museum educators. For example, during the opening year, Yan led a team of several colleagues as they set up museum educator recruitment criteria, helped the human resources department to recruit qualified museum educators, defined museum education job
responsibilities, and formulated education program plans. In another case, Liz and Chao were even in charge of designing museum classroom environment, such as furnishing or refurbishing museum classrooms, as well as purchasing educational facilities and equipment.

### 4.2.3 Routine Work in Exhibition Halls

A total of fourteen museum educators reported that they were required to work in the exhibition hall; maintaining displays, keeping the exhibition area clean, acting as security, playing movies, resolving conflicts between visitors, and providing interpretation service to visitors. As discussed by the museum educators, the interpretation service can be offered through different formats, like encouraging casual visitors to play with interactive displays, answering visitors’ questions, and guiding group visitors. According to their description, such formats were quite passive and most questions raised by visitors had nothing to do with exhibitions. For example, as Lin complained,

Frankly speaking, over 80% questions had little relevance to education. There were three types of questions [raised by visitors]. Visitors usually asked for the location of dining hall and washrooms, which indicated that our customer service was not good. Then, they concerned the performance schedules. They also asked for lost and found service. Although the remaining 20% questions had some relation to exhibitions, they were often superficial, such as checking if the machine worked or inquiring for operation guidance.

Moreover, museum educators reported that not every visitor could have the interpretation service. Interpretation service was usually offered to group visitors, in particular to colleagues.
from other science museums and leaders from authoritative institutions. This bureaucratic phenomenon was even prevailing in newly opened or high-level science museums in this study. Given their routine work in exhibition halls, in addition to the role of a museum educator, it appears that they also played roles like security guard, audio-visual technician, or visitor service center staff. Even worse, such education-irrelevant tasks were performed by over two thirds of the museum educators in this study.

4.2.4 External Communication with Other Museums

In addition to working with visitors, museum educators also reported that their job included their official communication with colleagues from other museums (e.g., visiting informal institutions, attending conferences, and participating in contests). They perceived these external communications as one part of museum education work, which helped them extend educational resources, seek for cooperation, and evaluate their own working practice.

Another external communication task was to attend contests related to museum education and interpretation. From the museum educators’ perspective, attending occupational contests and receiving admiring achievements in a contest was usually valued by science museum directors. Several museum educators in this study were required to compete in national level contests that were organized by CAST every year. Since taking a top rank in national competitions was perceived as an authoritative way to demonstrate the museum’s reputation and the quality of their educational work, science museums often invested strong support in preparing museum educators to attend such contests. For example, museum educators like LuLu and Juan indicated that they were required to devote maximum efforts to preparing, practicing, and rehearsing performances for a contest. During that time, they did not need to take on other education
responsibilities, such as serving audiences. This phenomenon again resonated of an authority-centered working environment. Situated in a hierarchical and power-centered Chinese culture, museum educators felt that the recognition from upper level science museum administrative authorities was more valuable than the recognition from visitors.

4.3 Work Competency

This section explains how museum educators in this study perceived of work competency as part of their self-concept as professionals, in terms of a discussion of competencies they believe a science museum educator should obtain and/or they have already demonstrated through educational practice. As reviewed in Chapter Two, previous scholars have identified several ideal characteristics that a museum educator should embody, such as commitment, creativity, communication skills, being knowledgeable, and capacities for self-directed learning (Castle, 2006; Dragotto, Minerva & Nichols, 2006; Grenier, 2011; Tran, 2013; Trinkley, 2014). Such characteristics were also identified in this study. Moreover, this section documented the working competency perceived by Chinese science museum educators in a more systematic way. A total of thirteen competencies, within four categories, emerged in this study, which included professional knowledge, professional ability, professional skills and professional attitudes (See Figure 7).
4.3.1 Knowledge

Knowledge as a fundamental requirement was mentioned by more than half of the museum educators in this study. Museum educators perceived that they needed to grasp two types of knowledge, pedagogical knowledge that regarding educational theories and practices, and content knowledge that regarding general science and technology.

4.3.1.1 Education Theories and Practices

Only eight out of 23 museum educators valued the importance of understanding educational theories. From their experience, they thought that a good museum educator should have a basic understanding of informal education, science education, developmental psychology, and teaching and learning theories. They recognized that understanding students (audiences) through a theoretical perspective is very meaningful, as it provides a fundamental framework to
understand students’ (audiences) needs, personal interests, and learning styles. Accordingly, museum educators felt such theoretical understanding can help them design and conduct culturally appropriate programs to different audiences. However, several museum educators also expressed that the educational theories they needed were “simple but not complicated”. For example, as Minyan stated,

If theories are too complicated, we cannot understand. For example, rather than learning [from books], we accumulated our knowledge of students’ psychological development in terms of working with them. You cannot truly understand them through books. Rather, it is through longitudinal working practice.

It is inferred that Minyan perceived museum education as an ongoing, continuous, and experiential process. She regarded the theoretical understanding of museum education as derived from practice. Therefore, she was interested in practical wisdom generated from fieldwork. Inferred from Minyan’s description, it seems that museum educators prefer to formulate theoretical understanding in an experiential and context-based way, not learning through books, lectures, or other second-hand resources.

Among eight museum educators who valued education theories for museum education work, only one of them worked in Museum A, the only national level science and technology museum in China. In a hierarchical and authority-centered context, Museum A with the best exhibition resources and strongest financial and political support from the government has always been regarded as a professional model across Chinese science and technology museums. Therefore, museum educators’ educational beliefs and practices in Museum A should be
perceived of as “dogma” by lower level science museums. Indeed, several museum educators from provincial (municipal) and city level museums described their willingness to follow education practice from Museum A. However, in this study, most museum educators from Museum A did not raise their awareness of designing museum education from a theoretical perspective. It is not appropriate to generalize this conclusion to the whole museum educator community in Museum A. However, it is still an important signal to remind museum directors that the ignorance of museum education theories in practical work by museum educators from top level science museums does not set a positive working model, which could impede an essential enhancement of museum education practice in China.

4.3.1.2 Comprehensive Understanding of General Science and Technology

Gaining a comprehensive understanding of scientific knowledge in relation to exhibitions was highly emphasized by museum educators in this study. However, they did not indicate that a museum educator should be an expert in a certain scientific or technological field. As Fan commented,

My personal feeling is that, doing museum education work does not demand specialization in a certain field but rather a general understanding of science. Exhibitions in our museum are connected to so many scientific fields. Questions raised by audiences were really diverse. In other words, as a museum educator, you do not need to be an expert in a certain field, but you must know many things.
Several museum educators like Fan preferred to be generalists with a broad understanding of scientific knowledge, rather than to be an expert who specializes in a particular field.

Another aspect that emerged from museum educators’ interpretation was many of them perceived of science in a very traditional way. They regarded scientific knowledge as understood by means of continuously reciting and repetitively memorizing. For example, Ming illustrated, “the work here does not require too much original thoughts. If you can understand and recite the interpretation scripts, then it is done”. Several other museum educators shared similar opinions on scientific knowledge. They focused on “knowing the content and being able to deliver it” rather than concerning with how people learn (Ash & Lombana, 2012, p. 37). As they reflected, if they did not have a broad knowledge pool, museum educators would feel stressed when students, teachers, and peer colleagues challenged them during educational practice. For example, MengMeng explained,

When a student asked you a question, you can say “sorry I don’t know” for the first time. If another student asked you another question that you have no idea, you could say “Let’s explore together”. In this case, however, you would find half students lost interests in your activity. If you were challenged three times or even more in a 30 minutes program, nearly all students and teachers did not trust you anymore.

MengMeng was not an exclusive example of a participant who expected that a museum educator should have broad understanding of scientific knowledge. It seems that, the more knowledge they have grasped, the more confidence, and less anxiety museum educators would feel. However, their perception on scientific knowledge reflected that they did not value the nature of
knowledge as an ongoing and constructive process. They showed more interest in knowing scientific facts. The issue of understanding how science is constructed and/or reconstructed and understanding science by connecting to individuals’ daily life had not caught museum educators’ attention in this study.

4.3.2 Ability

Abilities are generally understood as “enduring attributes of an individual that influence performance” (O*NET Resource Center, 2014). From museum educators’ perspectives in this study, abilities in relation to science museum education refer to creativity, learning ability, flexibility, and consciousness of self-reflection.

4.3.2.1 Creativity

Existing literature has already revealed that museum educators perceived of creativity as an important ability in designing, developing, and delivering educational programs (Bailey, 2006; Bevan & Xanthoudaki, 2008; Tran, 2007). Similarly, ten museum educators in this study recognized the importance of creativity in helping them implement museum education practices. From their point of view, to be creative implied that museum educators can engage audiences with novelty and astonishment, as well as keeping visitors’ attention through different educational activities. Adopting museum educators’ own language, creativity represented the consciousness of pursuing “changeability” and “diversity”. The participants of this study reported that, a museum educator with creative ideas should be a good observer who can make connections between museum education and visitors’ daily life. For example, Ray described his way of being creative,
You should be active… You can search for hot topics concerned by local people. You should understand audiences and know their needs. For example, when I was at home, I enjoyed watching documentaries like Discovery and Law Education. My family members did not understand me. But I know it is my interest. And I find something that I can utilize for my work. In other words, you need to observe our everyday life.

Ray demonstrated his way to be creative in terms of observing people’s daily lives and social hotspot events. Several museum educators pointed out other ways of being creative. For example, Hong designed a museum education class with a topic on sexual education for adolescent in an exhibition related to human development. This museum class attracted the attention of local and overseas media and also attracted the local educational bureau and local junior high schools. Hong attributed the success of this class to his focus on the local school policy. He made connections between local educational policies with museum exhibitions.

Based on the above examples, it can be inferred that to be creative implies that individuals should be encouraged to make connections between museum education and other related fields. In other words, museum educators thought they should not restrict themselves to a small domain. Rather, they advocated adopting an integrative scope to break boundaries, make connections, expand educational resources, and flourish educational activity formats to foster a sustainable relationship with visitors, schools, and other public cultural resources.

4.3.2.2 Learning Ability

Museum educators described learning ability as a willingness to accept new educational beliefs that vary from traditional Chinese education philosophy. In addition, museum educators
also regarded learning ability as the ability to understand different stakeholders’ needs and requirements, and the ability to excavate diverse, informal learning resources. A total of thirteen museum educators recognized the importance of learning ability for museum educators to conduct their work. For example, Chao elucidated his understanding of learning ability from a cultural perspective,

The way of valuing museums in science education has never occurred in our traditional educational belief. How can a museum educator treat these new beliefs and teaching strategies? First, we should not reject new ideas. Please do not be complacent and feel you do not need to learn any new ideas. It is a self-learning ability.

It was inferred from Chao’s interpretation that museum education is different from traditional ways of learning in China. Most Chinese science museum educators were brought up in a traditional education system that emphasized examination, knowledge transmission, and a teacher-centered approach. It is worthwhile to remind museum educators to perceive the gaps between schools and museums and the difference between traditional thoughts and constructivist educational belief. Instead of adopting a “one-size-fits-for-all” strategy, as Chao stated, a better way could be to cultivate museum educators with an open and critical mind.

4.3.2.3 Flexibility

Four museum educators identified flexibility as an indispensable ability for museum education work. As argued by Fenwick (2011), flexibility is an effective way to keep the organization competitive. In this study, flexibility referred to the strategies museum educators
adopt to cope with some emergent, unexpected, and novel situations. In addition, to be flexible
also referred to a museum educator’s self-adjusting ability. As Ray explained,

For our Mobile Science Laboratory program, we had already negotiated and arranged the
logistics with local schools. However, the government needed us to conduct an
interactive activity for them. The time for two events was in conflict. What should we do?
Either side would be unhappy if you go to the other one.

LuLu gave another example to show the necessity of flexibility, which was the context of
preventing job burnout. As she said,

In summer, many visitors poured into our museum. As an educator, you have to stand
here, face the same exhibition and be immersed in a noisy environment all day long. Day
after day, you would feel tired of job and perceive the job as very dull. I found a method
to avoid such negative feeling. I observed visitors’ behaviors and thought of the
motivations that drove them to perform in certain ways…It was interesting…And it
helped me, for example, to deal with conflicts between customers.

The above two exemplars demonstrated that, many external constraints, unexpected
events, novel circumstances, and museum educators’ personal feelings would all intervene in the
ongoing working practice. Therefore, museum educators thought they needed to be able to
handle unexpected situations and rapidly regulate themselves to adjust to some unfriendly
working circumstance.
4.3.2.4 Consciousness of Self-reflection

In addition to the three professional abilities mentioned above, museum educators also valued the ability to engage in self-reflection during working practice. For example, Bei depicted her habit of documenting daily working performance. As she claimed,

I think…documenting daily work is very important. If we write down what we have done every day, like thinking about the strength and weakness of our practice, we can read such material at the end of every month. It is a way of reflection and making summaries.

Different from Bei who wrote reflections, Juan did self-reflection in terms of observing visitors’ behavior patterns, which also brought her inspiration for practice. As she stated,

At the beginning of Challenging Interpreter program, we sent a gift to visitors who interacted with an interpreter. Many visitors were engaged in that activity. I thought there might be some relationship between their willingness to involve in the activity and the opportunity to get a gift. Next time, I did not tell visitors we had gifts… Very few people attended that activity.

In terms of reflecting on her teaching practice, Juan noted that material incentives may influence visitors’ engagement in museum education programs. Accordingly, she examined her idea in terms of changing the teaching environment and comparing the effects between two different contexts. Juan’s self-reflection led her to generate a preliminarily research idea, which helped her better understand museum visitors.
In addition to reflecting on teaching practice, a few participants also indicated that a good museum educator should have a clear sense of what they want to be and where they want to go in the future. For example, as Jing described, “I am always thinking of the way to improve myself. From a professional scope, I want to be an expert in museum education”. Overall, the ability to self-reflect was perceived, by museum educators, as the ability to observe, analyze, and document their working performance, and the ability to think of and clarify their career goals in relation to museum education work.

4.3.3 Skills

In order to design and deliver good educational programs, participants thought a museum educator needs to master several skills in particular communication skills, teaching strategies, and writing skills.

4.3.3.1 Communication Skill

About half of museum educators underlined the importance of communication skills for museum education work. According to their understanding, communication skills were not an independent quality; rather, they were embedded in negotiation, cooperation, and interaction with different individuals and institutions. For example, Shang indicated the irreplaceable role that communication played during her working experience. As she described,

Another important competency for a museum educator is communication and negotiation. In addition to communication with other departments within my institution, I also cooperated with external institutions. Sometimes, when I did workshops, I talked to
students. After a workshop, parents consulted workshop curriculums or discuss with me about their kids.

In addition, MengMeng shared her strategies to communicate with young children. Her strategy was to understand children’s language and communicate with them in their language, which she regarded as an effective way to attract young visitors’ attention and keep their enthusiasm for inquiry-based activities in an “open environment”.

Moreover, from the museum educators’ perspective, communication skill did not solely rely on verbal communication. Moreover, Minyan noted that museum educators should not underestimate nonverbal gestures. Museum educators’ expressions, body language, and even their style of dress have an impact on visitors. For example, Minyan was always wearing children-friendly clothes, like T-shirts and sneakers. She found that children do not like a business suit. Similarly, C2 worried that the formal suit might frighten children. Unfortunately, most museums in China require their staff, especially frontline staff, to wear very formal business uniforms. According to the research outcomes of this study, this formal stance may create distances that further prevent a visitor-centered working approach in museums.

4.3.3.2 Teaching Strategies

Since implementing educational activities was a predominant task for museum educators, they strongly highlighted the importance of teaching strategies, in particular the strategy to work with children. In this study, museum educators claimed that they recognized the overlaps between school education and museum education, knew the unique teaching strategies required for science museum contexts, and appreciated science museums as an open learning environment.
In order to prepare appropriate program packages for visitors with different backgrounds, such as designing visitor-centered curricula, slides, and handouts, museum educators regarded it was necessary to ensure such teaching resources were within visitors’ “Zone of Proximal Development” (Vygotsky, 1987). As MengMeng interpreted,

We are always looking for a transition. Science education in museum should not be the same as science classes at school. However, we cannot absolutely follow the way advocated by theories to implement activities. Students who had cooperated with us for several years can get used to our way of teaching. However, for those who we are not familiar with, our teaching is more prone to be classroom style, then gradually transiting to [a less structured interaction mode].

MengMeng’s idea of “transition” is particularly applicable in Chinese science museums due to the fact that the contemporary reality of Chinese education is very different from the philosophy advocated by museum education field. Although the Ministry of Education in China has already issued a policy entitled the Guidelines for Curriculum Reform of Basic Education, which calls for the avoidance of transmitting knowledge and repetitive rote-learning, contemporary Chinese science education is still engaged in de-contextualized learning that emphasizes textbooks, lectures, and exams (Tao, Oliver & Venville, 2012). However, museum education supports a “dialogic, active, democratic and inclusive approach” (Reid, 2013, p. 227). There are epistemological and practical differences between schools and informal learning contexts in China (Kang, Anderson & Wu, 2010). It can be inferred from MengMeng’s argument that, rather than forcing visitors to accept a different way of learning immediately, it would be
more meaningful to encourage current Chinese science museum educators to find the connection between two educational contexts and scaffold visitors’ learning process step by step.

Museum educators also shared useful techniques to work with children. For example, similar to classroom management, they thought it is important to be skillful in managing school groups, keeping students’ interests in exhibition, knowing their needs and characters, and be patient with their unfriendly behaviors and different requests. Minyan described her strategy to attract students’ attention, “It is easy. I was thinking of what kind of teachers I liked when I was a student. Then I become that kind of teacher and use that way to implement activities”. Minyan understood children by situating herself in a child’s world. This is an example of showing empathy, a useful method to understand visitors in terms of standing in their positions. In addition, museum educators raised several other techniques they believed a museum educator should master, such as starting an educational activity with an attractive introduction, raising good questions, paying attention to their pronunciation and tone, and showing a sense of humor.

4.3.3.3 Writing Skill

Since writing was reported to be an important part of the job responsibilities for museum educators, five museum educators in this study mentioned writing skills as an important working competency. Museum educators argued that writing is a significant way to document, externalize, and clarify their mental and cognitive activity. It is inferred that writing skills cannot be isolated from museum educators’ academic background, creativity, consciousness of self-reflection, personal interest, and knowledge of visitors. Without adequate writing skill, museum educators felt they may not be able to conduct work reflexively. For example, Juan confessed her weakness in writing. As she commented,
Every time when I was asked to report cases that I had conducted, I had to think for a long time, but nothing jumped out of my mind. I think I should write down my thoughts and practices spontaneously… Actually, a lot of interesting cases happened during our work. But I did not make any documentation. Then, it is gone.

Some participants, in particular some of the museum education directors, emphasized the necessity of skills in writing research reports or administrative reports, and they expected such writing should be guided by a certain theoretical framework. As Hong argued,

I think the fourth competency a museum educator should embody is writing skill. A museum educator should not only be expert in communication and facilitating museum education practice, but also in writing down how to enhance the practical work to a theoretical height.

It seems that, for some museum educators, the documentation of educational practices is very important. These written documents were perceived by museum educators as a cultural tool to support, mentor, and guide other peers and/or novice museum educators’ working practice. As some museum educators indicated, the written resource is a concrete artefact, which was filled with their practical insights, that was worth sharing within the museum education community.

4.3.4 Attitudes

Most museum educators agreed that they should maintain positive attitudes towards museum education work, and, as such, positive attitudes were the force to keep them dedicated to
museum education practice. Overall, in this study, conscientiousness and commitment were perceived as two important attitudes that museum educators should obtain.

4.3.4.1 Conscientiousness

From museum educators’ perspectives, to be conscientious is a self-monitoring process that requires museum educators take responsibility to conduct work. In particular, they commented that working performance should be examined by themselves rather than relying on institution leaders’ assessments. For example, as MengMeng commented,

When a group leader assigned you some tasks, you need to carry out all the orders faithfully rather than cheating him you have done without doing it at all. We are in the exhibition hall, and leaders do not check our onsite working performance regularly.

Several other museum educators interpreted their understanding of conscientiousness in the same way as MengMeng. They always discussed this issue with a connection to “leaders”. They thought, ideally, a museum educator should think ahead, be positively engaged with visitors, and work beyond the tasks assigned by their leaders. It is inferred that institution leaders’ judgements were valued more than visitors’ feedback by many science museum educators in China. Therefore, their working practice fell into formalism rather than offering educational programs that meet visitors’ needs. However, some museum educators recognized that the problem underneath working practice is working culture. They strongly reinforced the importance of conscientiousness in this study.
Museum educators also suggested that conscientiousness should be demonstrated, not only in the process of conducting museum education programs, but also in the process of preparation and follow-up reflections to a museum education program. As MengMeng recalled,

We had a worksheet learning program. [Ideally,] we should organize an informal meeting to share our reflection and feedback after an activity completed. [Actually], we may ignore the process of negotiation and follow-up reflection. The effect would be very different. That is why I say a museum educator should be faithful to the work.

It seems that MengMeng clearly knew how different it would be if museum educators carefully prepared educational programs for students. However, the reality is that sometimes they ignored the pre-class and after-class activities due to many constraints. Therefore, she perceived of conscientiousness as an indispensable attribute that a museum educator should have.

4.3.4.2 Commitment

In this study, many museum educators suggested that, to be committed to museum education represented their intrinsic passion, love, and enthusiasm for this profession. It is “high level of dedication and passion” for museum education practice (Grenier, 2011, p. 342). Commitment was a competency recognized, agreed upon, and desired by most of the museum educators in this study. From their perspectives, committing to museum education work can help museum educators generate a positive feeling and help them construct/reconstruct a museum educator identity. In other words, museum educators thought that commitment would help them internalize the value of this work into their personal beliefs. For example, as Ting described,
“When you work [in museum] every day, you should really do some meaningful things. It is really bad to cheat others that you have put heart into work while doing nothing”. Ting further explained that, “the meaningful” feeling would arise when she found students engaged in activities and those students revisited museum. It seems that commitment is a fundamental motivator that keeps museum educators’ enthusiasm, passion, interests, and persistence towards science museum education work.

4.4 Current Professional Development Pathways

This section explains current professional development pathways perceived by museum educators in this study, which describes a part of museum educators’ current self-concept as museum education professionals. They regarded such professional development opportunities as an important way to improve their working performance. In this study, museum educators reported five ways to pursue professional growth.

4.4.1 External Communication with other Museum Communities

Fifteen museum educators in this study valued the opportunity for external communication with peers from different museums. In particular, they preferred internships at higher-level science museums, secondment to upper administrative organizations, official visits to different informal education settings, and attending professional conferences and forums. Museum educators deeply appreciated external communication that helped them shape/reshape their understanding of museum education and enhancing their working competency. According to their illustration, external communication offered them with different perspectives to think
about museum education and brought them various informal learning experiences. For example, as Yan described,

When I was out [referring to attending conferences and museum educator forums], I had many opportunities to communicate with other museum professionals. I learnt new things, and I brought new ideas back. Meanwhile, I met a lot of museum educators who shared similar perspectives on museum education. We communicated and we gained insights for professional growth together.

It seems that the external communication opportunities preferred by Yan are informative, interactive, and dialogic. Inferred from Yan, in terms of attending such activities, museum educators could observe other peers’ educational practices, gain new insights, broaden their thoughts on museum education, and finally, they develop museum education expertise in a collective and implicit way.

4.4.2 Routine Training Offered by Museums

Museum educators perceived of routine training within the work institution as a format of formal training in this study. A total of ten museum educators from three levels of science museums found routine training as a very common training format. As they reflected, the content covered by routine training was usually about educational theories, scientific knowledge, visitor services, and performing skills. They acknowledged that the routine training was institutionalized, general, and knowledge-based. Museum educators with different backgrounds had incongruent opinions on the general introductions covered by routine training. For example,
Chong, with a doctoral degree in the field of agricultural engineering, thought a general introduction to education offered him a framework to reflect on his educational practice. As he interpreted,

We had continuously conducted educational programs. However, we did not know why we did it. We even did not know how to do reflections. [Such training] gives us theoretical guidance.

Although Chong found the theoretical introduction to education was beneficial to his daily practice, in the same institution, Zhou, with a Master’s degree in early childhood education held different ideas. He did not perceive many benefits from such training. He thought,

Currently, museum education does not have a very sound foundation. The invited lecturers who did not work in science museums only talked about how to communicate with students and how to interact with students.

It seems that Zhou questioned the invited educational experts’ qualification in delivering lectures to museum educators. Inferred from Zhou’s statement, most of invited evaluation experts were from a formal education system, without authentic teaching experience in the museum context or other similar informal education context. Museum educators, like Zhou, expected the invited educational experts should understand both museum education pedagogy and museum exhibitions. Frontline museum educators like Zhou seems to know well what they need to improve in future and they have a clear expectation on the institutionalized training programs.
However, the training offered by the museums in this study may not meet their needs. This gap needs to be noticed and filled if museums really want to improve museum educators’ professional expertise with a purpose to offer high quality museum education programs.

### 4.4.3 Self-regulated Learning

Museum educators reported that self-regulated learning was an autonomous way for them to obtain professional growth. From their perspectives, self-regulated learning for their professional development was very experiential and longitudinal. Therefore, they may usually read books, search online resources, interact on social media, and write working reflections. They may also conduct self-regulated learning along with teaching practices. Many of them perceived that self-regulated learning helped them expand teaching resources, know about scientific knowledge in relation to an exhibition, identify hotspot social events, summarize working experiences, and generate ideas for designing and conducting educational activities. From museum educators’ perspectives, self-regulated learning was not an independent learning activity but rather a process embedded in working practice. For example, Jing was frequently reflecting on her school teaching experience, which brought her new ideas to engage visitors in educational activities. In addition, MengMeng’ comment succinctly demonstrated a mutual influence between professional learning and working practice. As she stated,

> Now I am learning the theory of education, psychology and science education…

> Applying what I have learnt from theory to my current job, I gradually understand, aha, it is like this! You know, some ideas [from books] may be different from working practices.
The “aha” moment encountered by MengMeng reflected that the process that museum educators learn education related theories should not be static and decontextualized. The practical working experience helped MengMeng make contextual meaning of educational theories, and the understanding of theories generated from self-regulated learning reversely facilitated museum educators’ working practice.

4.4.4 Formal Training

Eight museum educators reported formal training as an important professional development pathway during working practice. As they indicated, formal training referred to training opportunities offered by universities or upper administrative institutions. For example, MengMeng attended online university courses in the major of school education. From her perspective, these courses were useful for her to understand school education, know students’ psychological development, and expand her understanding of discipline knowledge. As she illustrated,

I lack of knowledge about students’ psychological development at different age groups, which impeded my ability to identify appropriate teaching goals and objectives for different visiting groups. I also had little knowledge about Chinese literacy or Maths [when I was an undergraduate student]. But you know… elementary students were usually led by Chinese literacy teacher and Math teachers to visit science museums. After learning these [online] courses, I know more about teachers’ expectations on museum activities.
Although attending university courses was perceived as a systematic way to learn a certain field in relation to museum education, it was not a common way reported by museum educators in this study. Many museum educators have received formal training from short-term workshops organized by CAST. CAST invited museum educator experts from outside of mainland China, including speakers from North America, Europe, and Taiwan, to share their educational beliefs and museum education experiences with Chinese science museum educators. Such international scope was acknowledged to have a positive influence on current Chinese museum educators’ working practice. Educators from lower level science museums particularly noted their appreciation of these events. For example, as MengMeng stated,

> Usually, we did not consider educational theory in our practice. These training workshops made us recognize the distance between the work in our museum and other science museums or even with international science museums… The invited experts showed examples to us, engaged us in activities, in which we experienced very interesting educational activities and we also experienced the meaning of “openness”.

Similar to MengMeng’s feeling, several other museum educators also demonstrated their satisfaction in gaining theoretical understanding from such short-term workshops. They thought the museum education cases shared by overseas museum educators were usually open, experiential, interesting, and visitor-centered.

**4.4.5 Peer Support**

Being supported by colleagues within a science museum was perceived, by five museum educators, as a very effective way to build working confidence, gain professional knowledge,
better understand the nature of museum education, and set up career goals. This kind of peer support was regarded as vital, especially by novice museum educators. From the museum educators’ perspective, the behavior and experiences shared by veteran museum educators had a strong impact on new comers’ working practice, and such modelling impact should be longitudinal.

The case from Museum E was a good example to demonstrate the strength of peer support. Museum E is a city level science museum. MengMeng, Juan, and Jie worked in the same educational department. MengMeng was the first one to start working at the museum, and then, Juan and Jie began to work simultaneously. Juan was a school teacher before working in Museum E, while Jie had no working experience when she started at the museum. Juan acted as a conduit for information. She learned working experience from MengMeng, and shared the ideas she learnt from MengMeng with Jie. In other words, MengMeng’s experience and working model was a guide for Juan. Meanwhile, Juan also was a facilitator and helper for Jie who went through a very tough period at the beginning. As Juan and Jie expressed,

When I came here, MengMeng had already implemented a lot of activities. Thus, I had a working model. I followed her and my work started smoothly. Of course, everybody understood educational activities in different ways, so I added in my own thoughts.

Juan had a huge impact on me. I was always following her, learning from her and observing her teaching practices. And then I made some changes. It was so tough during the first year.
It was noted that MengMeng, Juan, and Jie had built a working community in which MengMeng shared her thoughts with Juan, and Juan with Jie. Figure 8 shows how this peer support community was constructed along with the formation of sub-communities. The arrow in Figure 8 indicates the influence of the experienced museum educator on the novice museum educator. The dash arrow indicates the influence of museum educators’ personal understanding and/or their previous experience on their working practice. In Figure 8, MengMeng and Juan were both learners and teachers who shared their experience with the following newcomers.

*Figure 8. A peer support community: An example from Museum E*

As reported by museum educators in Museum E, such peer support relieved novice museum educators’ anxiety and helped them establish a sense of belonging in museum education work. It was also indicated from their reflection that the working model established by veteran museum educators was not universal or generalized. Moreover, novice museum educators assimilated education merits from the veteran museum educators, and then they constructed their personal understanding of museum education. In other words, the lessons learnt from experienced museum educators were a framework and “advanced organizer” for novice museum educators to initiate educational practice. This learning process was very personalized and
contextualized, and it indicated how museum educators improve their individual working performance.

4.5 Desires for Professional Development

In comparing the existing formats of professional development for museum educators and their expected avenues of professional development, several differences emerged. First, although museum educators frequently attended routine training organized by museums, none of them expressed their desires for similar training in future. Moreover, although the format of desired ways of professional development were the same as current ways of training, museum educators suggested more clear and specific requirements for each format. They demonstrated an expectation for building a professional community where they can share, support, and learn from each other.

4.5.1 External Communication with other Museum Communities

Most museum educators desired external communication with other museum communities, as future professional development. From their perspective, external communication could provide them with opportunities to build professional networks, expand educational resources, and evaluate working performance by means of communicating with and comparing to other science museum colleagues. For example, when asked why she desired external communication opportunities, Yan interpreted,

You know, what we are doing now is like working behind a closed door. We were so satisfied with our performance. We convinced ourselves that we are in the top class in
Chinese museum education field. And we take for granted that we can even compete with other international science museums. Is that true? Absolutely not!

It appears that Yan was not satisfied with the perceived organizational culture of working behind closed doors. She felt a sense of helplessness as she was unable to change this working culture. Therefore, she was eager for external communication opportunities as a way to search for professional support.

In respect to the formats for external communication, museum educators expected more opportunities to attend conferences, competitions, school science fairs, and official visits to other informal learning institutions. They felt such external communication could broaden their professional network and inspire them with creative ideas. They even desired to visit overseas science museums and to engage in internship opportunities in science museums with extraordinary educational programs. Jing explained why she desired for overseas museum visiting experience,

After working for certain years, I really met a bottleneck stage… I hope I could learn how museum educators in other countries design activities. In our domestic science museums, I found most activities were the same. The innovation seldom emerged.

From Jing’s perspective, science museums in mainland China were generally lacking in innovative programs. Therefore, she expected an overseas experience to inspire her educational practice. She also thought that knowing about advances in international museum education was a valuable way to improve her practice.
Museum educators expected that the experience of visiting different museums could bring them a chance to learn from other museum education experts. Here, “visiting” did not indicate an ordinary tour, as is typical of a tourist visit, or scheduling meetings with museum educators from another museum. Visiting meant the opportunity to work with museum education experts for a period of time, learn their educational programs and ways of designing, and develop and implement programs through cooperation and mentorship. As Bei stated, “I really hope to have external learning opportunities… I did not mean just visiting, but working with them, observing how they conducted activities, and how to facilitate a science class in museum”.

From museum educators’ perspective, conversational communication (like attending conferences, meetings, and salons) was not enough for museum educators to improve their teaching practice. They were of the view that they needed more experiential opportunities. They showed interest in understanding the rationale, objectives, and processes of constructing, developing, and implementing museum education programs. Thus, museum educators were of the view that situational learning in the museum context best fit their desires to improve their museum education practices.

4.5.2 Formal Training

A total of eight museum educators mentioned formal training like lectures, workshops, or graduate level courses as an important training format. However, the museum educators in this study also recognized the weakness of such training formats. Several museum educators regarded the current, formal training as ineffective. They perceived a gap between the goals of the training and their own expectations. They also found that formal training did not produce a significant longitudinal impact on practical work. As Fan stated, “[Formal training] cannot
provide you with what you really need… there is distance between what they told you and what you really wanted to know”.

Since they recognized the shortcomings of formal training, museum educators proposed possible solutions for formal training in future. They thought formal training should be rooted in theories and should encourage peers to share practical experience. They preferred short-term workshops with a systematic curriculum and specific educational focus. For example, Minyan explained her understanding of the meaning of “systematic”:

It should be a short-term training session with a concrete topic. For example, if a workshop intends to address topics around design and organize educational programs, then it should specify training contents. These contents may include: define program designing and organizing, and facilitate learners to construct different educational programs. It should be comprehensive, from concept introduction to practice.

Furthermore, museum educators expressed a dislike for formal training in passive and didactic ways. They preferred interactive and experiential practices. From their perspective, they thought they could not understand the essence of constructivist teaching if they have never been taught in that way. Thus, Chao advocated future training programs in a way of group discussion, and he also hoped more field trip opportunities followed by a discussion session could be offered. Regarding the qualification of a workshop facilitator, Chong particularly emphasized that a workshop facilitator should possess considerable practical experience as well as expansive knowledge of outdoor education, such as experience in developing and organizing extracurricular science activities.
4.5.3 Self-regulated Learning

Museum educators in this study expected that the present self-regulated learning model could still be encouraged for future professional development. As perceived by several museum educators, the awareness and willingness to engage in self-regulated learning reflected a museum educators’ positive attitude towards museum education work. In addition, self-regulated learning was also recognized as the most meaningful and easiest way to meet one’s professional needs. Apart from learning from books, online resources, social media and self-reflection, museum educators emphasized the necessity of learning from overseas museum education reports, especially those concerning international visitor studies. For example, as Zhou reported,

I think there might be numerous studies conducted in science and technology museums, for example, visitor studies. We need to read those articles and absorb research outcomes critically. You know, our social and cultural contexts are different. Like visitor studies, you cannot entirely apply their working model in the context of Chinese science museums.

“Critically absorbing” overseas museum education experience was an idea proposed by several museum educators from Museum A. From their interpretation, a critical assimilation of overseas experience again implied that Chinese science museum educators begin to reflect on museum education from a sociocultural perspective. Recognition of the contextualized nature of museum education pushed museum educators to investigate their ways of working from a situational perspective. Meanwhile, it also reminded museum educators to carefully examine the local
context in which museum education programs took place. It was a way of avoiding a “copy to China” working model.

4.5.4 Peer Support

Several museum educators expected to improve their teaching strategies with the help of peer colleagues and educational experts. For example, in order to improve teaching practices more efficiently, many museum educators expected to build sustainable apprenticeships with experienced museum educators. They felt that their educational practice would benefit from interaction with these mentors. Some museum educators also expressed their willingness to mentor other colleagues. They expected to become an educator of other museum educators and share their working experience with them. As Jing described,

I really want to be a museum education expert. When I attended some professional development programs, some lecturers were talking about their teaching experience and thoughts. Well… It is very interesting. I want to reach to that level, inspiring more people.

It seems that some museum educators were looking for mentorship opportunities and some of them were willing to share their working practice with novice educators. However, as shared by some museum educators, many museum administrator did not officially recognize this informal, but cooperative way of learning as an important professional development pathway. It was difficult to build an interactive museum educator community without official support in the Chinese context. Even so, museum educators envisioned some working models that they hoped
museum directors and museum education decision makers could take into consideration. For example, as MengMeng described,

For example, the expert conducts an activity and we participate in it. We should have a complete taste of what a good museum educational activity is. Then, let us independently design and conduct an activity. We self-evaluate if the activity we conduct reaches to certain requirements. It is a process of examination and reflection.

The working model depicted by MengMeng represented a social learning approach. Museum educators, such as MengMeng, were looking for an expert to help them improve their teaching practice in terms of an experiential, interactive, and practical learning process. Consequently, they thought they could move from peripheral to central of museum education work and would eventually be an independent and empowered professional.

### 4.5.5 Cross-departmental Training

Instead of attending training on general topics, MengMeng suggested cross-departmental communication since she had observed boundaries between different departments in her museum. Although she took responsibility of facilitating visitors’ learning, she confessed her limited knowledge about other exhibitions at the very beginning. Except for a simple interpretation script that she got from the exhibition design department, MengMeng found she had few chances to work with exhibition designers. As she suggested,
When the exhibition is renovated, I hope technical experts who are familiar with exhibitions could give us a brief introduction. Or when we buy new displays, I hope all staff relevant to education work can learn first… rather than only receiving a simple interpretation script.

Although MengMeng did not elaborate upon the very specific needs she expected from exhibition design or the technical department, she implicitly expressed her desire for contextualized and experiential training. It seems that she needed to hear the behind the scenes stories rather than knowing an exhibition through abstract and second-hand sources filled with jargon. MengMeng’s suggestion reflected her constructivist educational belief, that learning for museum educators should not be decontextualized, but in a situation within the larger context of the museum. Indeed, from the museum educators’ perspective, cross-departmental training could offer them a different perspective to make sense of the exhibition. In other words, they thought they cannot facilitate a meaningful visiting experience until they observed a scientific phenomenon, engaged in an activity, understood undermining principles of scientific concepts, and knew the connections between science and daily life through cross-departmental training and cooperation.

4.6 Summary

Chapter Four documented museum educators’ self-concept as museum education professionals from an individual perspective. This chapter answered the overarching research question from three aspects. In section 4.1, museum educators described the different motivational factors that drove them to work in science museums, which depicts their pre-work
identity in relation to museum education. In summary, every museum educator was not motivated by a singular motivation. Both intrinsic and extrinsic motivational factors impacted museum educators as they made work decisions. This part of the results demonstrated museum educators’ complicated pre-working history and considerations before working as a museum educator.

In sections 4.2, 4.3, and 4.4, museum educators described their self-concept from three aspects: their perception about job responsibilities, working competency, and current professional development pathways. Overall, museum educators in this study regarded their job responsibilities as very diverse. They also suggested that a good museum educator should have special expertise in the domain of professional knowledge, ability, skills, and attitudes. In terms of current professional development pathways, museum educators developed their expertise from external communication with peers from different museums, routine training within museums, self-regulated learning, formal training, and peer support.

In Section 4.5, museum educators depicted their imaginations of their possible-selves in relation to museum education, specifically in terms of envisioning possible professional development pathways. Their imagination of future development derived from their practical working experience. They valued some existing ways of learning, as well, there were also differences between what they currently had and what they imagined.
Chapter 5: Data Analysis and Findings (Cont.)

Chapter Five reports the analysis and findings to the last two sub-questions to the overarching research question: How does Chinese science museum educators’ self-concept as professionals manifest and transform in their work practices and professional needs within the local social and cultural Chinese science museum context?

- How is change in the manifestations of Chinese science museum educators’ self-concept of being museum education professionals influenced by local social and cultural contexts?
- What opportunities, conflicts, dilemmas, and tensions experienced by Chinese science museum educators are perceived to be indicative of their self-concept as professionals?

The analysis and reporting of findings in Chapter Five first focuses on how museum educators’ self-concept as professionals changed within the local social and cultural contexts. Then, this chapter analyzes the contradictions encountered by museum educators in such contexts. Contradictions are necessary in the process of building or maintaining a community. Therefore, according to CHAT, understanding contradictions as a cultural tool can mediate Chinese science museum educators’ learning experiences (Engeström, 2001, 2011).

5.1 Social and Cultural Influences on Self-concept as Professionals

In this study, social and cultural contexts were specifically exemplified by individual level social and cultural context and organizational level social and cultural contexts. Museum educators’ gender, age, educational level, academic major, working history, and position title
characterized the individual level social and cultural context. The organizational level social and cultural context was exemplified by three level science museums: one at the national level, three at the provincial/municipal level, and one at the city level. As indicated in Chapter Three, a total of 23 museum educators participated in this study. Although this is a small number compared to the population of museum educators in China in general, the differences in museum educators’ self-concept as museum education professionals still emerged within the different social and cultural contexts.

5.1.1 Differences at Individual Level

The distribution of museum educators’ demographic information was shown in Table 2 in Chapter Three. Science museum educators’ self-concept as museum education professionals was different on each individual variable by gender, age, educational level, academic major, working history, and position title.

Although differences by gender were not intentionally compared in this study, it is still worth noting that museum educators’ gender had distinctive impact on their perceptions of work motivation and desires for future professional development pathways. Specifically, male museum educators valued intrinsic motivations more than females. This finding was not in accordance with the general findings for school teachers; female teachers were more driven by intrinsic motivations than male teachers (Moran et al., 2011). Compared with male museum educators, more female museum educators in this study found working in museums as a fallback career choice. They were concerned more with the balance between family time and museum education work. In addition, female museum educators expected their future professional development to be more experiential, interactive, and collective. Compared to male museum
educators, more female museum educators preferred self-directed learning, learning along educational practice, external communication, formal training, and cross-departmental training.

Museum educators with different academic majors had distinctive perceptions in the domain of job responsibilities, current professional development pathways, and desires for future developments. Specifically, museum educators with education-related backgrounds reported more work on attending competitions, organizing volunteers, training teachers, program evaluation, organizing and implementing educational programs. However, museum educators with a science background conducted more basic work in exhibition halls and other behind-the-scenes work, including designing and developing programs and writing educational materials. In other words, the tasks performed by museum educators with an education-related major were more interactive and communicative, and this group of museum educators could directly embody the educational function of science museums. Comparatively, museum educators with an academic background in science performed more fundamental, backstage, and supportive educational work. In addition, although museum educators with a science background reported more experience of self-regulated learning and learning along with teaching practices, they demonstrated more expectations to formal training in future development. Comparatively, museum educators with educational backgrounds reported more peer support and external communications. As well, they expected more autonomous learning, external and cross-departmental communication. It seems that, compared with museum educators with a science background, museum educators with an educational background preferred an interactive and collective working and learning environment. Museum educators with different educational degrees have different perceptions in the domain of job responsibilities. Specifically, more museum educators with a bachelor’s degree conducted frontline education work such as training
teachers, organizing volunteers, and implementing educational programs. Museum educators with a graduate degree conducted more behind-the-scene tasks, such as general administrative work, writing, evaluation, researching, planning, and participating in exhibition designing, which indicated that they had fewer opportunities to communicate with audiences directly.

Museum educators at different age groups have different perceptions in the domain of working motivation and pathways for professional development. Specifically, museum educators under 30 years old were more concerned with the external benefits that museum education work could bring them. For example, they cared about job security and the geographic location of the museum. However, the findings did not indicate that younger museum educators were mainly motivated by extrinsic factors. Intrinsic motivations, like satisfying personal curiosity and gaining professional opportunities, were valued more by younger museum educators. These motivations were featured as motivational factors that facilitate museum educators’ professional growth. However, intrinsic motivations, like feelings of self-fulfilment, were more valued by older museum educators. This motivation was featured as a motivational factor that drove individuals to devote themselves to public society. In addition, museum educators over 50 years old did not report any engagement in self-regulated learning, routine training offered by institutions, formal training, and research. However, they had more external communication opportunities than young museum educators.

Museum educators with different ranks have different perceptions in the domain of job responsibility and current professional development pathways. Comparatively, museum education administrators conducted more external communication work such as teacher training, external communication, providing consultation service for schools, and program promotion. Frontline museum educators were in charge of in-site educational services. The external training
opportunities for frontline museum educators were relatively fewer than museum education administrators. Museum educators with different previous working experiences have different perceptions in the domain of work motivation and current professional development pathways. Compared to museum educators who had never made a career change, those who had different work experience before becoming a museum educator were more driven by intrinsic motivations to work in science museums, and they were more involved in peer support. However, those who started their career in museums did not build as much intrinsic attachment to museum education work as those who changed their job before. In addition, museum educators who had not changed careers before reported more self-regulated learning and routine training.

Overall, the research outcomes demonstrated in Section 5.1.1 reflected that museum educators’ self-concept as museum education professionals did not exist universally. Instead, such perception varied across different individual level sociocultural factors characterized by gender, age, academic background, working ranks, and previous working experience. In summary, museum educators’ self-concept in this study was diverse and dynamic.

5.1.2 Differences at Organizational Level

As the demographic information of museum educators shown in Table 2, museum educators in this study were from three organizational levels of science museums. Specifically, a total of eight museum educators were from the national level science museum, ten from three provincial/municipal level science museums, and five from a city level science museum. In mainland China, science museums in different organizational levels are situated in different social and cultural contexts. For example, political and financial support from government, visitors’ perceptions, and the connection between school system and museums vary differently
among science museums in different levels, which may result in the difference of museum educators’ self-concept of being museum education professionals.

Museum A is a national level science museum and it is the only national science and technology museum in mainland China. According to their self-reflection, most museum educators from Museum A were predominantly driven by extrinsic motivations. For example, more than 80% of the participants from Museum A confessed that working in this museum was a fallback career choice for them. They were primarily concerned with the job location and job security. However, around half of the museum educators from Museum A reported their personal interests were also a strong force driving them to work in museums.

The variety of occupational responsibilities conducted by museum educators from Museum A was fewer than those from provincial/municipal or city level science museums. In other words, the work assigned to museum educators in Museum A was more specified. They usually conducted basic tasks in exhibition halls, designed and developed educational programs, and conducted ordinary administrative work. For example, all new museum staff in Museum A had to conduct basic work in exhibition hall for at least one year. The original purpose of spending one year gaining experience in the exhibition hall was to help museum staff members understand exhibitions and visitors. However, museum educators in Museum A did not recognize this assignment as beneficial, and they regarded such basic tasks negatively. They thought that the tasks in exhibition halls required very little in the way of professional skills and were not overly taxing of their professional skills.

Compared to those from provincial/municipal or city level science museums, museum educators from Museum A had more formal training opportunities, like attending university courses, workshops, and routine training offered by the museum. These formal training
opportunities were more institution-based, systematic, and general but with less flexibility. In additional, greater desire for external communication and engagement, especially with foreign educators, were expressed by museum educators from Museum A, even though they have already had more opportunities to obtain outreach training than science museum educators from other level science museums.

Museum E is a city-level science museum. Compared to the national level and provincial level science museum, Museum E was smaller in several ways. For example, Museum E had less government financial support and fewer educational human resources. From the museum educators’ perspectives, working in a city where Museum E located was not as competitive as working in a capital city where national level and provincial level science museums are located. Therefore, in Museum E, although extrinsic motivation was still a main concern, museum educators in Museum E cared more about the connection between their previous experience and the museum education work. They also cared more about the compatibility between their academic background and the requirement of the museum education work.

Since Museum E was lacking sufficient museum educators on their staff, the current museum educators needed to assume more responsibility for the workload, which lead them to have more opportunities to experience various educational roles. This phenomenon was similar to research outcomes in Bailey’s study (2006), which suggested that working in small institutions can help museum educators have more opportunities to approach to different stakeholders. In other words, museum educators in Museum E were exposed to more diverse occupational responsibilities. Consequently, the positive aspect of this working model was that museum educators could generate a holistic view of museum education after they had experienced different aspects of museum education. However, museum educators from city level science
museums to hope for changes in their museum education work practice, since they aspired to focus on particular parts of museum education rather than working as a museum education generalist.

In terms of the professional development, museum educators from Museum E experienced professional growth by attending informal activities like self-regulated learning, learning along with teaching practices, and learning through peer support. In other words, the professional development for museum educators from Museum E was more flexible, informal, and implicit. Moreover, in order to enhance future career development, they expected more self-regulated learning, external communication, cross-departmental cooperation, and increased autonomy of their museum education work. Different from the museum educators at Museum A, who have already experienced formal training and expected for more formal training opportunities, fewer museum educators in Museum E raised the aspiration for formal training. It seems that museum educators’ previous professional development experience shaped their desires for future professional growth.

Museum B, C, and D were provincial/municipal level science museums. Science museums at this level have characteristics of both Museum A and Museum E. Therefore, the perceptions of museum educators from provincial/municipal level science museums shared similarities between museum educators from Museum A and Museum E. For example, museum educators from Museum B, C, and D reported their job responsibilities were also varied, which was in correspondence to the experience of museum educators from Museum E. However, they had more formal training and external communication, which was similar to museum educators from Museum A. Few museum educators from Museums B, C and D reported their aspiration for self-regulated learning, in comparison to Museum E.
In summary, science museums at different levels demonstrated different working environment such as different organizational culture, institutional policy to support museum education, and the number of museum education experts. These sociocultural factors have considerable influence on museum educators’ self-concept of being museum education professionals. Such perceptions were shaped differently by the working environment and organizational culture in which they have been situated.

5.2 Emergent Contradictions Encountered by Museum Educators

Museum educators’ self-concept as museum education professionals was deeply influenced by sociocultural factors in this study and such sociocultural factors made museum educators encounter contradictions during their museum education practice. According to CHAT, individuals do not act independently; rather, they are situated in activity systems in which they encounter different contradictions with different stakeholders and cultural artefacts in that context (Engeström, 2001, 2011). CHAT may account for and regard such contradictions as the driving force for the development and transformation of adult learners’ expansive learning. In the context of this study, revealing the contradictions may offer opportunities for museum educators to reflect on their education practice and further facilitate their professional development. Therefore, as a way to prompt museum educators’ professional growth, it is important to understand the current constraints they face in their professional practice (Castle, 2001; Nolan, 2009). Although Chapter Four discussed some contradictions museum educators have encountered such as an unfair allocation for professional development opportunities and difficulty in program evaluation, this section systematically analyzes museum educators’ interpretation of the conflicts, disagreements, and weaknesses during working practice.
5.2.1 Internal Contradictions

A total of nineteen science museum educators (82%) demonstrated internal conflicts and tensions, which they encountered during museum education work. For example, they encountered personal and professional dilemmas when a job’s promotion was not developed toward a professional trajectory as they anticipated. They were also worried about the insufficient knowledge and lack of external communication opportunities with which to successfully conduct their practice. In addition, they demonstrated a more negative attitude toward museum education work along with their working years increased. All of these worries and difficulties provoked a crisis that pushed the museum educators to deeply think about their working status and understand the value of being a museum educator.

5.2.1.1 To be a Museum Education Expert vs. a Museum Education Administrator

Museum education administrators in this study identified themselves as museum educators. Several museum education administrators in this study have experienced a similar promotion pathway. Before taking over administrative work, they were frontline museum educators with passion and expertise in offering educational services to visitors. However, their professional trajectory changed their working focus from education to administration and logistics, which they regarded as lack of direct connection with museum education practice. The decrease of frontline teaching opportunities made these museum educators face a conflict, as their original occupational preference was to become a museum education expert rather than a museum education administrator. For example, after being promoted, Bei was responsible for communicating with school teachers to arrange museum education activities. However, she felt a sense of anxiety in delivering museum education programs to students after she was away from
the frontline work for a long time. As she commented, “Although I told school teachers about how to teach in science museums, a real teaching practice with students is actually hard for me. I hope I could have more opportunities to do frontline education work. I need practice”.

Several other museum educators, like Bei, expressed their difficulty in integrating teaching practice as one part of their daily work. Although they suggested that such practical teaching experience may deepen their understanding of education theories and refine their teaching skills, it was difficult for them to allocate time on frontline teaching work after being promoted to an administrative position. In other words, being promoted from teaching to an administrative position put them in a predicament. They were pulled between their original desires to be a museum education expert and the reality of being a museum education administrator.

It is also worth clarifying the difference between becoming a museum education administrator and obtaining administrative skills. Several frontline museum educators found that to be a museum education professional also required many administrative strategies. They discussed the difficulty in dealing with interpersonal relationships with colleagues and in organizing teamwork. For example, as Jing reported, “Sometimes, you cannot do work alone. You need support from other colleagues. Then how to ask them to facilitate your work? You cannot order them to do something”. Jing’s words reflected the challenge of maintaining cooperation between colleagues, and her words also reminded museum education administrators to think about the leadership issue for frontline museum educators.

The skills of administration and organization were perceived as part of basic skills for museum education work. As Jing illustrated, she had difficulty in allocating tasks, cooperating with colleagues and monitoring the process of a project. Given the features of a hierarchical
working culture in Chinese science museums, it is very common for frontline staff members to be subordinate to the upper level leaders. Therefore, this vertical power distribution prohibited the frontline museum staff from formulating a cooperative, autonomous, and respectful community to help each other. In addition, these difficulties also implied an existence of boundaries between different departments that will be discussed in 5.2.2.4.

5.2.1.2 Insufficient Content and Pedagogical Knowledge

Some museum educators did not have any science and technology background. The lack of related science and technology knowledge made it difficult for them to implement educational practice. For example, as Juan reflected,

I found the biggest challenge is my poor understanding of science. There is a program that required museum educators to raise questions to students. When students answered, sometimes I cannot even tell if the answer was right. Students were encouraged to come up with questions, but I usually did not know how to answer.

Some museum educators, like Juan, perceived of science-and-technology-related content knowledge as a prerequisite for museum education work. Without sufficient content knowledge, they felt stressed and anxious when designing and delivering educational programs. Such anxieties require museum education stakeholders in China to rethink the recruitment criteria for museum educators. In addition, museum educators’ anxieties also demonstrated that their epistemological understanding of knowledge development was consistent with a transmission model rather than constructivist in nature.
In addition to expressing their need for supplemental content knowledge, a few museum educators also described their need for understanding relevant education theories to guide their practice. However, they had difficulty making sense of such educational philosophies. For example, as Zhou commented,

Difficulty… difficulty is that, in science museums, we were not concerned about educational theories. It is almost non-existent. I do not know how it has been developed abroad. There were few studies about science museum education [in China], which made us feel stressed…It is like that everything we do is in mess.

Zhou expressed his desire for enhancing his theoretical understandings of educational practices, as he recognized that building a theoretical framework can help him understand museum education holistically. His statement highlighted the role of theory in museum education practice, which is in accordance with Bedford’s (2009) argument that theory can “shape your practice intentionally, clarify goals, provide benchmarks for success, and convince others you know what you are doing” (p. 139). On the other hand, Zhou’s comment also reflected the deficiency of museum education studies in China. This phenomenon was also identified in Kang, Anderson, and Wu’s (2012) study with university faculties in China, which revealed that the Chinese education researchers’ constrained their understanding of education to formal education systems. Therefore, few university researchers explored education and learning beyond formal school contexts. Museum educators in this study complained the lack of theoretical guidance on museum education practice. Such complaints should not be neglected by educational researchers, policy makers, and practitioners in China. The awareness of museum education research and
implementing museum education from a research perspective should be reinforced in the context of Chinese science museums.

### 5.2.1.3 Lack of External Communication Opportunities

Although several professional development events occur every year, museum educators reported that the allocation of resources was very unfair in museum educator communities. Only a few frontline museum educators thought the primary way for them to update knowledge was through online resources. From some museum educators’ perception, external communication opportunities beyond the boundaries of the museum were quite rare. For example, as MengMeng stated,

> When I wanted to deepen my understanding [of museum education], I found learning opportunities were quite few. Especially for us young museum educators, we had quite few chances in approaching to experts. Usually, our leaders went out [for external communication] and shared with us vicariously what they had learnt.

From MengMeng’s description, external communication opportunities were hierarchically allocated. Museum education directors and museum directors took most professional development opportunities. Although external communication was perceived as an important opportunity to build professional networks and enhance professional competency, frontline museum educators were seldom allocated such opportunities. The information they had received was usually from second-hand resources. They were the group of staff members who directly
contacted with audiences and delivered educational service, however the supportive resources and external training opportunities they received were scarce.

5.2.1.4 Decreased Interest in Museum Education Work

After working in science museums for several years, some museum educators felt burnout and tired with this job. They began losing interest, enthusiasm, and passion for museum education. Instead, they formulated an indifferent working attitude and began to question the meaning and value of this job. They felt they did not know how to overcome this unsatisfying stage of their career. For example, as Yan described,

I used to have a very clear vision [about my career development]. Now I found it is useless to expect something [from this job] since you cannot get it only with your endeavor alone… I used to be very passionate and wholly contributed to this work. I did not care about any material rewards [from this job]. Now, after undergoing several disappointing things, I lost my passion. I kept silent.

During the interview, Yan did not explicitly articulate the meaning of “disappointing things”. According to the reflection journal about the informal conversation between the researcher and Yan, it seems that her feelings of disappointment derived from her dissatisfaction with the museum directors’ management style, which she described as being characteristic of a “typical Chinese bureaucracy”. As she reported, directors in her museum only thought about their personal promotion without consideration of the ways to sustainably develop Museum C.
Several museum educators also articulated other possible reasons that might result in negative working attitudes. For example, Fan regarded the lack of clear professional development pathways was one factor that lead frontline museum educators to formulate an indifferent attitude towards museum education work. As Fan explained,

I found a very big problem is that, we were not very clear about our future, which might influence our working enthusiasm. In my department, museum educators always asked me if this is a career that worth contributing one’s whole life? Most people would think they did this job only when they were young, then leave…People perceive this work as simple, repetitive, boring and tiring. People quit this job frequently. Therefore, this work is usually conducted by novice educators.

From Zhou’s perspective, low social reputation was another reason that made museum educators feel disappointed and discouraged about museum education work. As he described,

Visitors did not regard us as a teacher or with high science literacy. They perceived us as custodians, security guards, and servants… There was an incident of a female museum educator who had graduated from a top level University in mainland China. When delivering a program, she overheard the conversation between a parent and his/her child: “If you do not study hard, you will be like her”. That museum educator was very sad.

According to the comments made by Yan, Fan, and Zhou, it is possible to infer that museum educators’ negative and indifferent attitude towards museum education work derived
from very sophisticated sociocultural and political factors. First, museum educators’ working motivation may play an important role in influencing their working status. As indicated previously in Section 4.1, some museum educators were mostly driven by extrinsic incentives, such as for making a living, finding a stable environment, and being recommended by authoritative persons. Therefore, they did not care about formulating a passionate working attitude. Second, the organizational culture may impact on museum educators’ working status. Some museum educators who came with high occupational aspirations felt depressed if science museums did not provide them with a clear professional development pathway. Third, the low social status recognized by visitors also made museum educators feel disappointed and further reduced their interest in frontline museum education work.

5.2.2 Contradictions between Museum Educators and Science Museums

A total of sixteen science museum educators (70%) articulated their concerns and dissatisfaction with the museum institution for several reasons. Specifically, they complained that, a) museums lacked autonomy to recruit appropriate museum educators, b) the jobs allocated to museum educators were unfair, c) the working environment was filled with bureaucratic and hierarchical organizational culture, d) departmental cooperation was impeded by departmental boundaries, and e) museum educators received unsatisfying welfare and work benefits.

5.2.2.1 Museums Lack Autonomy and the Right to Recruit or Dismiss Museum Educators

Several museum educators especially those from provincial/municipal or city level science museums noticed that their institutions (departments) did not have authority to recruit a qualified museum educator to a tenured position or to dismiss someone who did not meet the
working requirements. A tenured education position in science museums can be a reciprocal tool between museums and individuals, or between museums and agencies with authorities. It might be an instrument for political power and interpersonal purposes. Accordingly, such sociocultural and political obstacles inevitably hindered the professionalization of museum education work. This sociocultural situation also led to the difficulty in constructing clear recruitment criteria for museum educators. Museum educators’ statements, as in the exemplar from Hong, provide strong evidence for these assertions. As Hong indicated,

I found the biggest challenge [in my museum] was lack of museum education human resources… The recruiting process was not satisfactory. We cared too much about the degree or 关系 [pinyin: guanxi] [relationship]… Although someone may not have a qualified degree or related major, she/he can still be recruited if she/he had strong 关系. Such a person occupied the position without doing anything… Our science museum is a public institution. Here, you have no authority to employ a person who is appropriate for this job. You also had no right to fire someone who did nothing.

Yan made a similar comment. As she disclosed,

In my department, everything is very complicated. Most museum educators in my department had a very strong background [Here, strong background refers to, for example, someone’s parents or relatives have taken an important position in government or enterprise]. Some museum staff only had a high school diploma. In other words, working in our department becomes a reciprocal tool among people with authorities.
Inferred from Yan’s statement, a museum educator position sometimes was politically used as an exchange for implicit benefits, which made Yan feel disappointed. Therefore, she was eager for a transparent and standardized recruitment mechanism. Several other museum educators from provincial/municipal level science museums made comments similar to Hong and Yan. They suggested that a museum educator position sometimes became an exchange tool for other implicit political purposes. It seems that they felt pained when they found that museums recruited inappropriate people to conduct museum education work.

5.2.2.2 Unclear Job Allocation

Museum educators reported that the museum education work they were currently conducting was unclearly defined. As they perceived, the description of objectives, job responsibilities, and requirements were obscure and not clear, which led to the unfair job assignment on duties and tasks. Some museum educators undertook overloaded job responsibilities. They found the practical working situation deviated to their original expectation. For example, as Jing described, “you have to do everything, not only in the exhibition hall but also developing programs in addition to many other trivial tasks… We really hoped to focus on developing programs, but we were lack of time. It was difficult”.

Jing was not the only person who encountered this difficulty during work practice. Ping made a similar comment, as she mentioned, “In our exhibition halls, we not only did basic work but also conducted activities and offer interpret service. We have to do everything. I hope those tasks can be separated”. In other words, unclear work assignments may blur different roles and then make museum educators experience an identity disorder. This identity disorder impeded the building of a specialized working community. Furthermore, such obscure classification of
museum education work may even create a sense of insecurity for museum educators. Therefore, it seems that museum educators like Jing and Ping called for the refinement of museum education work. They hoped that fair boundaries would be established in order to clarify job responsibilities for museum education, which was also a way to show the uniqueness and necessity of this profession.

5.2.2.3 Authority-centered Working Environment

Several museum educators were unsatisfied with an authority-centered working environment. As they reported, in a hierarchical organizational culture, museum leaders usually allocated work to them. Some museum educators conducted work with the purpose of satisfying and accomplishing museum leaders’ demands. They depicted their organizational culture as leader-driven rather than concerned with visitors’ actual needs, preferences, and expectations. Therefore, museum educators adjusted their work objectives according to the different leaders’ thoughts and preferences. For example, as Zhou commented, “leaders from every level at every stage would have different ideas. So as a frontline museum educator, when some leaders were coming or leaving, it is very difficult for us to conduct work without a definite and clear goal”. Obviously, Zhou, as a frontline museum educator, was in a dilemma since he was working to accomplish different orders from different level leaders, which made him sometimes feel confused. This authority-centered approach resulted in a lack of autonomy to regulate work for frontline museum educators in China.

Similarly, Yan expressed her feeling of helplessness when she was immersed in this very bureaucratic organizational environment. She encountered a conflict between her job scenario and some leaders’ work plan in her institution. As she commented,
I felt very happy about communicating with other science museums who conducted *Bridge Science Museums to School* programs. However, my leaders did not care about it. To them, 30,000RMB [Around $6,000] for a project does not make any difference. They did not value the professional development opportunity such projects can bring to our museum educators. Instead, they just found 30,000RMB was so little to a big museum.

From Yan’s perspective, some leaders in Yan’s museum were only concerned with material rewards and enhancing power. Those leaders only focused on making economic profit and achieving personal occupational promotion. Therefore, the work led by them was a formality with an emphasis on outward appearance. These leaders did not care about the internal and implicit benefits that such education projects can bring to science museums. They neglected frontline museum educators’ needs for professional growth. That was why Yan described individuals like her, who had educational dreams but were situated in an environment with low professional support, as “Loners”.

### 5.2.2.4 Departmental Boundaries

Informed by museum educators, another feature of working in a bureaucratic and hierarchical context was the lack of connection among different departments, even within one institution. Boundaries were more obvious in provincial/municipal or national level science museums. Some museum educators attributed the cause of departmental gaps to tangible and intangible department rules. Ting argued that science museums did not encourage cooperation between different departments. As she stated,
Actually, we were separated [between different departments]. For example, if an activity is initiated by my department, the activity can only be conducted within my department. It is impossible for us to search help from other departments. If I really need cross-departmental cooperation, I have to write reports with schedules in detail. After the upper level administrators approved, someone from another department could help you.

In order to get help from peers from other departments, Ting had to first undergo a vertical application procedure. However, this vertical communication would take a long time and may encounter unpredicted impediments, which can decrease the progress of a project. Therefore, in order to keep up with the timeline of a project, museum educators like Ting would rather rely on themselves and not seek external support. They expected a more flat and democratic working environment, in which separations between different departments could be resolved, and inter-departmental communication and cooperation could be facilitated.

### 5.2.2.5 Dissatisfaction with Remuneration and Future Career Development

Some museum educators were dissatisfied with low levels of financial remuneration and limited future career development. The low salary and unclear pathway of promotion brought them a sense of insecurity. In particular, four museum educators in contract positions demonstrated their strong dissatisfaction with occupational welfare and the benefits they have received. For example, as Juan illustrated,

> From a realistic perspective, our salary was very low… Although we were credentialed with different levels according to the promotion system designed for school teachers, my
museum did not give us a corresponding reward. Only the staff in tenure position can benefit from such promotion. For museum educators in a contract position like mine, our salary was fixed from the beginning.

It is inferred from Juan’s statement that the dissatisfying financial remuneration was perceived as a vital factor that reduced their enthusiasm, passion, and sense of belongingness towards museum education work. Therefore, several museum educator administrators worried that a contract position with low salary could be a primary reason that led to science museums losing veteran museum educators.

Furthermore, although some museum educators have already obtained a tenured position, they demonstrated confusion about future professional development. They found an appropriate promotion system has not been established for museum educators. This concern was clearly articulated by museum educators from the national level science museum. For example, as Lian stated, “we are promoted under a university faculty promotion system. However, my museum can only promote someone to associate professor level. [If we want to be promoted to the professor level], we have to compete with university faculties”. Inferred from Lian’s statement, Museum A did not have a mature promotion system specifically designed for museum educators. Therefore, this museum borrowed an evaluation model originally for university faculties, which brought on an additional level of stress for museum educators. This phenomenon reflected the fact that science museum education was at a preliminary stage in China. Museum educators felt unequal if they were evaluated under the criteria originally designed for university faculties or school teachers, but not reasonably transferable to the context of museums.
5.2.3 Contradictions between Museum Educators and Visitors

A total of fifteen museum educators (65%) in this study also perceived the contradictions between themselves and the museum visitors. Specifically, such conflicts and obstacles existed between museums and schools and between museums and general visitors.

5.2.3.1 Contradiction between Museums and Schools

Science museum educators in this study found that the connections between museums and schools were not strong or systematic. As they indicated, very few local schools or school teachers were aware of informal education, and they were unwilling to bring students to science museums. For example, Xiaohui found that, most local schools arranged field trips to museums as mandated by the local education bureau. Due to school schedule issues and financial constraints, many schools would limit the opportunities and possibilities to conduct outdoor education, in particular on weekdays. If the school was required to provide outdoor experiences for students, field trips were usually organized across a whole grade or even across a whole school. When these visitors arrived at museums, museum educators found that teachers and students came without any preparation. For example, as Xiaohui described,

Schools have to organize outdoor field trips. School heads were forced to do so. They came without any educational purposes. When students arrived at museums, teachers took for granted that their responsibility was taken over by museum educators. In my museum, 1,000 students at one time were too many.
From Xiaohui’s interpretation, it was inferred that both school teachers and students’ attitude towards visiting science museums did not match to museums’ expectation. And the large visiting population exceeded museum educators’ reception ability. Similarly, as Hong described,

School teachers and museum educators have different educational ideas. Some teachers thought our design was too open and without any time restrictions…For example, we designed a 20-minutes hands-on activity; however, there could be 70 or 80 students at one time, so it was impossible to complete [the activity] in an hour…

Museum educators encountered an unexpected, large visiting population and they lacked the effective class management skills and sufficient knowledge about school visitors. In addition, As museums cannot provide teachers with direct incentives to promote their professionalization, museum educators regarded this could be another reason that hindered school teachers to bring students to museums. For example, from Juan’s observation, since school teachers had heavy work load at schools, they would not take over extra work unless there were some benefit, like receiving a certificate that can be recognized by the local education bureau for promotion. As Juan explained,

When we held a Madame Curie science class competition last year, we cooperated with local education bureau. The certificate we issued was useful for school teachers to get promotion. Many teachers participated [in this activity] and they were very engaged…. This year, we did not cooperate with local education bureau, very few teachers signed up
[to attend this competition]… You have to give them some extrinsic rewards. In my opinion, our Chinese education is always in this way.

According to Juan’s interpretation, it seems that local school teachers were driven by external incentives to bring students to science museums. Museum educators found that the value of museum education was not internalized by local schools and school teachers, which led to the difficulty in encouraging school teachers to organize museum field trips.

In addition, several museum educators also perceived their own weakness in hosting school groups. For example, as Hong shared, “school teachers had no ideas of how to use the space. They expected we could tell them what to do. However, we also had little knowledge about the connection between museums and school curriculum”. Inferring from Hong’s statement, it can be suggested that, many Chinese science museum educators did not have enough knowledge about school education. Furthermore, school teachers also were not familiar with informal education pedagogy. Both sides have very limited or no opportunity to communicate with one another. Therefore, from the museum educators’ perspective, the lack of communication between the two groups and the lack of tolerance to different educational philosophies may be two of the biggest challenges for schools, teachers and students using the museum as an effective educational resource.

5.2.3.2 Contradictions between Museums and General Visitors

In addition to school groups, other groups like families, adults, and solitary visitors represent a large proportion of museum visiting audiences. When they worked with general visitors, museum educators also encountered many difficulties. For example, as Jing noted,
Most visitors did not regard our museum as a learning space. Rather, they found here to be an entertainment place. Sometimes I was passionate to introduce our exhibition, but they were not interested in it. Particularly, young kids, elementary and high school students prefer to play with interactive exhibitions… Visitors just come for fun.

Similarly, MengMeng also experienced conflicts with visitors. As she expressed,

> We have some conflicts with visitors. We hope children can gain knowledge. Actually, they do not think in this way. They just love playing… For kids, they do not expect you to tell them knowledge; rather, they want to be engaged. However, for us, we have limited interactive programs... We are not clear about how to resolve such conflicts.

From the above statements, it was inferred that museums and general visitors had different perceptions of the goals and ways to implement educational practice. As perceived by museum educators, visitors expected science museums to be a fun place with interactive activities, where they can play, relax, and be entertained. This result is in accordance with the research outcomes reported by Ji, Anderson, Wu and Kang (2014), who found that entertainment as one of the predominant motivations for visitors in Chinese science museums.

Another visiting motivation category, which was frequently cited by Chinese museum visitors in Ji, et al., (2014), was visiting “for education purpose(s)”. However, museum educators in this study did not regard visitors coming to science museums for education as a common motivation among the general public. Museum educators reported that visitors seldom asked them science-related questions. Inferred from the contradictory results of this study and the study
conducted by Ji, et al. (2014) regarding visitors’ educational motivation in science museums, it seems that museum educators in this study may have neglected other representations of visitors’ educational intentions, behaviours, and needs. They were overly focused on giving visitors scientific knowledge and helping them know about the advances in scientific development. Therefore, many museum educators offered visitors knowledge-based interpretation and expected visitors to raise questions regarding content knowledge. When museum educators felt a huge gap between their service and visitors’ preferences, a depressive feeling pervaded self-reports of their in gallery professional practice.

In addition to different expectations on visiting science museums, museum educators also described difficulty in building a comfortable and interactive relationship with visitors. They found that Chinese visitors preferred to interact with physical exhibitions and watch in-gallery performance, such as centre-stage science shows. They also noticed that visitors were not used to being engaged in social interactions, like talking with museum educators and/or other visitors. For example, as Fan articulated,

Most visitors did not like to talk with strangers. When we held some programs in the exhibition hall, it was very difficult to engage visitors, especially for adults… To be frank, it seems like our Chinese visitors were not willing to communicate in public…Observation is a way preferred by visitors…For example, we had an interesting Liquid Nitrogen experiment show. Many visitors watched this show again and again. However, if we want to communicate with them during the show, it was so difficult.
Dan also shared her difficulty in engaging visitors in educational activities in science museum. She attributed this difficulty to the local culture and the organization culture. As she explained,

There was a huge difference between Chinese and other cultures. Our director has visited overseas science museums for many times. He expected museum educators to create exaggerating and active ways to communicate with kids. Frankly speaking, it was impossible for both sides. When we approached kids, they ran away. Our official uniform might also be a problem, as kids found our uniform too formal, like a teacher… Communicating with strangers was not very acceptable by local people.

Similar to Fan and Dan, across the three levels of science museums in this study, several other museum educators reported difficulty in facilitating and maintaining meaningful conversation with visitors. Indeed, Ji, et al. (2014) found that Chinese visitors did not value social interaction as a dominant motivation that drove them to science museums. Museum educators speculated possible reasons that might lead to this phenomenon. For example, Fan and Dan suggested that the typical Chinese introverted personality could be an important factor. In addition, Fan also reflected that museum educators lacked the ability to designing engaging educational programs to attract visitors’ participation. Moreover, Jing observed that visitors would like to participate in an activity that had material rewards.

The reasons for the poor communication between museum educators and visitors were complicated. Indicated by several scholars who conducted research in Western museums, a communicative environment is ideal for developing dialogue, discussion, and even debates among museum educators and visitors (Bamberger & Tal, 2008; Falk & Storksdieck, 2005; Tlili,
Cribb, & Gewirtz, 2006). But why is it so difficult to create an engaging environment in Chinese science museums? This cultural difference led museum education researchers and practitioners to think about the underpinning cultural implications behind this phenomenon, which also reminded museum educators to initiate a cultural appropriate way to facilitate meaningful engagement in science museums in China.

5.2.4 Contradictions between Museum Educators and External Supports

A total of seven museum educators (30%) demonstrated difficulties in receiving external supports. One of the external supports raised by museum educators was the support from the upper level administrative institutions. For example, Yan attributed the disconnection between museums and school system to the insufficient support from museum’s upper administrative organization, like the local Association of Science and Technology. As she complained,

The local Association of Science and Technology governed my museum. However, the support and resources they provided were not enough. They devoted many efforts in building relationship with schools. There were many opportunities for school teachers to develop professionally. And, the awards teachers received from CAST, which were recognized by schools, enabled them to get promotion. That is why school teachers were intrigued in attending activities held by CAST. However, we did not have such support.

From Yan’s reflection, it was implied that the governance by the local Association of Science and Technology on local museums was very bureaucratic. The local Association of Science and Technology did not offer enough professional support to museums or share professional
resources with museums. Therefore, the lack of support from an authoritative upper organization made it difficult for science museums to attract school teachers with material incentives, which hindered science museums from building relationships with local schools. It was a typical hierarchical phenomenon in China. In a hierarchical organizational culture, local schools would only obey the rules from the upper level administrative institution, and it was the same as local science museums. Therefore, the vertical power distribution made the cooperation between local science museums and schools difficult.

Furthermore, as mentioned by the museum educators in this study, another external support was the external trainers who can facilitate professional growth. The museum educators in this study reported that their institutions had difficulty finding competent museum education experts to deliver professional development workshops. As they reported, the topics addressed by current trainers were either too content-based or theory-grounded. They found that current trainers’ understanding of museum education was short on connection with exhibitions, everyday lives, and practical teaching experience. This result was consistent with Taylor and Caldarelli’s (2004) work on non-formal environmental educators who found their trainers usually specialized in a particular research field, but without systematic teacher education or teaching training background. For example, as Dan stated,

I found it was very difficult to find an appropriate expert… I knew some experts may be specialized in certain scientific field. However, what I am looking for is an expert who understands exhibitions, displays and educational programs. She/he can offer practical training rather than purely telling us knowledge of light, sound and force.
Qiang also expressed similar concerns,

As I told you before, we seldom experienced inquiry-based learning when we were young. We began to know this learning approach only during recent years. [We know] it is very important for science museum education. However, currently, there are no training plans to address such topics.

Museum educators found the current professional training was very general, overly scientific-knowledge-based, and did not address the central issue of pedagogy in museum settings. They desired and sought contextualized and experiential learning opportunities appropriate to museum pedagogy. As Segall, Dasen, Berry, and Poortinga (1990) stated, "we are what we are because of culturally based learning" (p. 5). From this quote, it can be inferred that museum educators would provide visitors with learning experiences in the way they were taught, within in a similar cultural context. Qiang’s comment reflected a disjunction between educational formats advocated by museums and museum educators’ prior learning history. It also reminded museum administrators, university researchers, and policy makers that, when they design a professional development system for museum educators, they should deeply understand museum educators’ previous learning experience, weaknesses, and advantages from a learner-centered approach. It may be reasonable to infer that access to authentic experience of inquiry-based professional development is then possible for museum educators to teach visitors in a similar way.

As perceived by museum educators, external trainers may also come from a museum exhibition design department. From their working experience, museum educators observed that a
part of museum of interest to visitors was behind-the-scenes stories around exhibitions, like the conceptual framework and procedures of designing and implementing exhibitions. As a museum educator, the participants were lacking in educational resources, except for exhibition labels and simple interpretation texts. For example, when asked why the museum had not considered borrowing human resources from the exhibition design department, Dan shared the difficulty in bridging exhibition design department with education department. As she noted,

They gave us training only a few times. However, their teaching was not efficient. They were familiar with a display but they did not know how to teach us understand the mechanism behind each display. For example, she/he understood the scientific principle of each display, but she/he cannot make us understand such behind-the-scene stories…

From Dan’s interpretation, it is inferred that the ability to design an exhibition does not equal the ability to express the rationale in such designs. Furthermore, Dan’s interpretation implied that a boundary existed between different departments. This phenomenon resonated with Section 5.2.2.4, which described museum educators’ perceptions of cross-departmental boundary.

The third issue regarding the contradictions between museums and external supports lay in the cultural difference. For example, as indicated by Zhou, some museum educators might misuse educational models from other museum contexts and place them into the context of Chinese museums. As he argued,

After we came back from Taiwan, many colleagues suggested employing volunteers for museum education. From my perspective, it was not reasonable to establish a volunteer
mechanism only because it worked effectively in Taiwan. They ignored the context difference. The volunteering convention in Taiwan is better than ours [in mainland China].

Zhou highlighted the sociocultural influence on museum education, which resonated to Engestrom’s (2011) argument that learning is not merely acquisition or participation; instead, learning is expansion. Zhou realized that it was incorrect to directly copy the volunteer mechanism from Taiwan to mainland China. He recognized the importance of the sociocultural factors that led to a particular phenomenon. Such awareness revealed that Zhou had a deep understanding of museum education as a cultural practice. Yet, currently, not many science museum educators in China have formulated this cultural consciousness.

5.2.5 Contradictions between Museum Educators and Education Programs

A total of seven museum educators (30%) reported their confusion and dissatisfaction with the construction, development, and delivery of museum education programs. In particular, they had difficulty with program evaluation, and they also lacked the persistence in developing a program from a longitudinal scope.

5.2.5.1 Difficulty in Program Evaluation

Museum educators reported that they had difficulty with program evaluation. They found that the existing evaluation criteria were not specific and the criteria were always detached from the real educational situation. In addition, they also did not agree with the fact that the role of evaluator was often taken by school teachers or museum administrators who were lacking in
appropriate museum education knowledge or evaluation experience. For example, as MengMeng reported,

The director of my department invited two school teachers to evaluate our programs. Generally, if they were satisfied with some program, then it was regarded as a good one. If they thought a program not to be good, then, it was not good. Although sometimes we were invited to give our opinions, but the result was more depending on evaluators’ personal preferences... And the evaluator considered a program from a formal classroom-based education perspective, which was not in keeping with the broader perspectives of the museum educators. Sometimes, we thought it was a good program, school teachers would think it did not match the school curriculum.

From MengMeng’ interpretation, it was inferred that in the current field of Chinese museum education, museum educators were lacking relevant knowledge to evaluate museum education programs. That is why they sometimes depended on external evaluators. However, museum educators questioned the qualification of school teachers as museum education program evaluators, as they found that school teachers did not adopt clear or appropriate criteria to evaluate the program and they often evaluated a non-school program from a formal, classroom-based, education perspective.

In addition to the disagreements with school teachers, museum educators also did not agree with the museum administrations on their approach to evaluating educational activities. As indicated in Section 4.4, museum educators were encouraged to attend an annual competition with the purpose of enhancing their museum education expertise. However, several museum
educators did not agree with the competition evaluation criteria as established by the national museum administrative institutions. They even questioned the application of competition criteria into real museum education practice. For example, as noted by MengMeng,

When I watched the first two competition videos, I found those so-called excellent museum educators were like a good host reciting an interpretation script on a display. In other words, it lacked flexibility… The competition put too much emphasis on museum educators’ appearance and their performing skills. However, when we conducted real educational work, such things were not important. Rather, a museum educator’s educational beliefs, objectives and teaching pedagogy were more important.

MengMeng’s comment was in accordance with the researcher’s informal communication with several other museum educators. Her thoughts are an important reminder for competition organizers and museum administrators to reflect on the original intention, evaluation criteria, and mechanism for organizing this competition. The competition was perceived as a national event in guiding science museum education practice in China. Therefore, the competition criteria represented an authoritative ideology that may significantly impact museum educators’ educational practices. However, the actual competition criteria for evaluating a museum educator’s performance deviated from practical teaching beliefs that advocated visitor-centered, interactive, and inquiry-based approaches. After attending the competition, museum educators were often more confused about the prevailing museum education philosophy in Chinese science museums. They questioned themselves: Should I obey the competition rules to conduct educational practice, or should my working practice be shaped by my interaction with visitors?
5.2.5.2 Lack of Sustainability in Maintaining an Education Program

Some museum educators complained that they lacked creativity in designing more programs with attractive contents, formats, or designs. The limited number of existing programs was perceived of as a problem for expanding the influence of museum education on visitors. Another problem perceived by museum educators was the lack of sustainability in maintaining an educational program. As museum educators observed, rather than regular modification of a program according to visitors’ needs, some programs were terminated unpredictably. For example, as Juan commented,

I found we have done a lot, but our work lacked depth. For example, we have dug many holes, but every hole was very superficial. There used to be a museum supported science competition. I was so interested in that competition. After two years, this competition was stopped unpredictably. I did not understand why we stopped implementing that competition?

Inferring from Juan’s statement, “dug many holes” meant her museum has tried diverse museum education programs. However, these education programs were not developed in a sustainable way. Drawing upon the informal conversation with Juan, it was found that a new program would replace an excellent program when the museum director thought it was necessary. It seems that this phenomenon strongly reflected an authority-centered organizational culture, which contradicted to a visitor-centered working approach. However, as other museum educators indicated, alternating programs too frequently may lead museums to miss opportunities to build a
sustainable relationship with museum education experts or to build a professional museum education community. For example, as MengMeng explained,

We did not make good use of the teacher resources we have built during our previous activities. We changed our work every two years according to our leaders’ preference. Those teachers with whom we were familiar did not come anymore… At last, we did not build up an educational team that can serve our science museums longitudinally.

The loss of teachers’ longitudinal support in museum education made MengMeng feel distressed. It appears that her museum initiated a program according to the leaders’ direction rather than from a visitor-centered approach, which again demonstrated a highly authority-centered political culture in MengMeng’s museum. As well, this political cultural environment resulted in museums’ lost opportunities to sustainably develop good educational programs.

5.2.6 Contradictions between Museum Educators and their Family Life

A total of four female museum educators (17%) experienced conflicts in balancing museum education work and their family life. In order to take care of her child, MengMeng gave up the opportunity to pursue a Master’s degree in science education, even though she knew that graduate study would help her frame a systematic understanding of education after several years of teaching practice. The other three museum educators perceived of conflicts between their working time and their family time. For example, as Ting described,
We have to work on holidays. Our holidays were not fixed. Right now, the National Day is coming soon, but we could not have a break. [I guess] that is why many people left. We have to work during weekends. Our “weekend” is on Monday. If my family want to go out on Saturday or Sunday, I cannot go with them. It is a very real problem.

The issue of time conflict between family life and working period was an important issue particularly noted by female museum educators. However, in Section 4.1, a few female museum educators reported that the reason they chose museum education work was because they thought museum education work can help them balance work and their family life. The contradictory research findings in this study illustrated that museum educators’ self-concept as museum education professionals is diverse and complicated. However, as some museum educators have actually encountered difficulty in balancing job demands and family expectations, museums may need to think of some effective solutions to make museum educators’ working hours more flexible.

5.3 Summary

This chapter discusses Research Question from a sociocultural perspective. In this study, museum educators’ self-concept as museum education professionals were very diverse. Specifically, individual level sociocultural factors, such as museum educators’ gender, age, academic background, working history, and working ranks, impacted their self-concept as museum education professionals in different ways. In addition, museum educators from different organizational level science museums formulated their self-concept as museum education professionals differently.
Moreover, within the complicated local social and cultural context, museum educators encountered many contradictions represented by difficulties, conflicts, disagreements, and dilemmas they faced in museum education work. Such contradictions included museum educators’ internal and external varieties. The internal contradictions referred to the dilemmas they met when the career path was not developed on a professional trajectory that they anticipated. The museum educators in this study were also worried about insufficient knowledge and the lack of external communication opportunities. In addition, they showed more negative attitudes to museum education work as their working years increased. The external contradictions include museum educators’ disagreements, tensions, and difficulties when they interacted with science museum institutions, visitors, external supports, educational programs, and their families.

Both internal and external contradictions encountered by the Chinese science museum educators reflected the fact that science museums were not isolated entities and science museum educators did not work independently. Instead, as a cultural unit, science museum educators’ educational practices were deeply rooted in, and influenced by, the local social and cultural context in which they were situated. In summary, the hierarchical organizational cultural, vertical power distribution, Chinese way of communication, and traditional epistemological understanding of knowledge all have created difficulties for museum educators to offer meaningful educational practices for visitors in China.
Chapter 6: Discussion

This study explored 23 Chinese science museum educators’ self-concept as museum education professionals. The research outcomes of this study were framed in two ways: five areas of museum educators’ self-concept as museum education professionals, and the sociocultural influences on museum educators’ self-concept and the contradictions encountered by museum educators during the process of framing/reframing their self-concept. In the field of museum education in general, Tran (2008) argued that although the idea of professionalizing museum education has existed for several decades, relevant empirical studies are still highly deficient – a fact that remained true at the time of this study. In particular, Tran (2008) called for researchers’ attention to explore “a good definition of what the work in museums is comprised of, what particular skills and knowledge are required, and how it is organized” (p. 137). Another important, but missing issue is the absence of studies of museum education in the underrepresented and marginalized social and cultural contexts in which museums are situated (Ash & Lombana, 2013, Kisiel & Anderson, 2010). Given that this study paid particular attention to Chinese science museum educators, who are seldom empowered to voice their thoughts and concerns, this empirical study aims to realize, compliment, and expand the body of knowledge around museum educators’ self-concept in the context of China.

This study’s outcomes offer strong insights that reflect museum educators’ yearning for a professional working community and the contradictions they have encountered in building this community. As indicated in Chapter Two and Chapter Three, a Communities of Practices (CoP) perspective and Cultural Historical Activity Theory (CHAT) offered a combined analytical and theoretical lens through which the study was framed and analyzed. In particular, the research findings, with respect to museum educators’ desires and practices in building a professional
community were understood through CoP (Lave & Wenger, 1991; Wenger, 2006; Wenger & Snyder, 2000), and offered insights into building and defining professional boundaries to establish museum educators’ contribution to museum education work. Moreover, throughout the process of discussing the possibility of building a professional community, the emergent contradictions between museum educators and other museum education stakeholders hold the potential to prompt expansive workplace learning in the museum context. Such contradictions can be understood through a framework that is guided by CHAT (Engeström, 2001, 2011). In other words, in addition to building and defining professional boundaries, it is also important to identify and resolve contradictions encountered by museum educators in a social activity system such as the museum workplace. These are two important ways to facilitate museum educators’ professional development and expand museums’ social influence through the institution’s educational mission. Overall, CoP perspective and CHAT were integrally utilized to understand the museum educators in this study.

Kisiel (2012) stated that, the establishment of a community of practice requires distinct discontinuities and boundaries from relevant but different communities. In addition, Kisiel (2012) also indicated the cooperation between different communities should be based on the commonalities of two communities, which is described as continuities and peripheries as access points. The commonalities were derived from the understanding of the two contradictory sides and identifying and resolving the contradictions. This chapter applies Kisiel’s (2012) suggestions for resolving the contradictions: establishing a community of practice, and building bridges between different communities.
6.1 Establish a Professional Community

This section discusses manifestations of museum educators’ self-concept as professionals that were evident in their museum work practices and desires to build a professional community, which were discerned from their understanding of their 1) diverse work motivational factors; 2) job responsibilities in the context of Chinese culture; 3) competency-based working model; and 4) sharing and participatory learning community, all of which are contextualised within the unique Chinese sociocultural, educational, and political milieu.

6.1.1 Diverse Work Motivation Factors

The study revealed that, Chinese science museum educators’ self-concept as professionals was manifest and demonstrated in what they perceived to be extrinsic-intrinsic work motivational factors. Furthermore, these motivational factors were not singular, simple, or independent incentives that drove museum educators to work in museums. Instead, as expressed by every museum educator in this study, several interconnect and interwoven factors played the role together to influence their self-concept as professionals when they made occupational decisions. In other words, this study’s results do not demonstrate a separation or isolation of extrinsic and intrinsic motivations. The motivational factors are interrelated, contextualized, mutually influenced and diverse (Johnson, 2005; Marcus, 2006). Previous research studies’ findings show that museum educators work in museums with different pre-histories, which not only represent museums as a social inclusive work environment but also imply the complexity of cooperation in museums (Bevan & Xanthoudaki, 2008). Tran (2013) argued that, for the purpose of professional enhancement, work motivation is an important factor to influence museum educators’ professional attitudes and work performance.
Moreover, Lantolf (2000) highlights the importance of considering individuals’ motivation with a purpose to understand a specific social phenomenon. He argued that individuals with different motivations might contribute differently to an activity. This argument has been confirmed in this study. For example, as described in Chapter Four, Hong, who consistently had interest in science education and adolescent education, demonstrated a strong attachment and belonging to learning and teaching in museums. This intrinsic motivation also helped him to be actively engaged in designing, developing, and delivering educational programs with creativity and innovation. In another case, although museum educators like Ping regarded working as a museum educator as a fallback career choice, it did not stop her from later developing or displaying a positive attitude towards museum education work. She gradually found the connection between her academic background and museum education work. From Ping’s perspective, being a museum educator was a substitute to her dream of becoming a school teacher. However, as demonstrated by museum educators like Yan and MengMeng, although they demonstrated their love for museum education, the current working context, organizational culture, and the evaluation mechanism of performance assessment led them to negatively self-assess their confidence and willingness in serving audiences with enthusiasm and passion. Moreover, in the case of Jie who was persuaded by her father to work in the museum, she initially had no interest or high self-efficacy to work with children. She even wanted to turn to other careers that may better fit her personal interests. In summary, these four examples show how museum educators’ working performance and attitudes were regulated by different working motivations. Although they did similar museum work, different motivations shaped their perceptions towards this profession in different ways.
In this study, extrinsic motivational factors proved to be hugely influential in museum educators’ self-concept of professionals, a finding that is in contrast to what is reported in many studies conducted in Western museums (Allen & Crowley, 2013; Bailey, 2006; Bruyere & Rappe, 2007; Kidd, & Kidd, 1997; Marcus, 2006). For example, such studies carried in Western contexts frequently found that working as a museum educator is a “nearly visceral pleasure” (Marcus, 2006) and museum educators value the lifelong learning opportunities in museums and the opportunities to make social contribution (Allen & Crowley, 2013; Bailey, 2006). In this study, although intrinsic motivations were also mentioned, they were much less prominent compared with extrinsic motivations. As in Hildebrandt and Eom’s (2011) research, external incentives such as promotion, salary increase, and recognition from others are hugely important motivational factors. They are more important particularly at the beginning of making an occupation (museum education) a profession. In Chinese science museums, museum education is indeed a burgeoning occupation, as the educational function of science museums was only officially recognized by the national government recently (CAST, 2010). Therefore, according to Hildebrandt and Eom (2011), it is important to understand and motivate Chinese science museum educators in an appropriate and extrinsic way.

In order to actively engage museum educators in working practice, it is necessary to recognize that there is no “one-size-fits-all” motivation mechanism for all museum educators. Instead, ideally, it is important to recognize each museum educator’s working motivation, personal interests, and strength, and attempt to match such personal attributes to museum education work. In other words, encouraging museum educators to find the connection between museum education and their personal history may be a good starting point to help them initiate work at the beginning. For example, as indicated in Chapter Four, there are a large majority of
museum educators who are driven by extrinsic motivations. Since some extrinsic motivations are in active states (Ryan & Deci, 2000), it is important to help museum educators recognize the nature of museum education and offer them a positive learning and working experience in science museums. This is a way for museum educators who are not originally driven by intrinsic motivations to reduce the resistance, deepen understanding, and formulate positive attachments and belonging to work in science museums.

6.1.2 Job Responsibilities in the Context of Chinese Culture

Clarifying museum educators’ job responsibilities from a CoP perspective is an effective way to define the community domain and examine community members’ working practice (Wenger, 2011). Thus, by examining Chinese science museum educators’ job responsibilities, it was revealed that there are many commonalities between Chinese science museums and Western science museums (Anderson, 2013; Bailey, 2006; Dragotto, Minerva, & Nichols, 2006; Grenier & Sheckley, 2008; Liu, 2004; Munley & Robers, 2006). For example, designing, developing, and delivering educational programs are essential educational tasks for museum educators across different museum contexts, and hence, part of perception of their self-concept as professionals. Moreover, similar to reports in the existing literature, museum educators in this study also implemented evaluation, trained school teachers, volunteers, guide tour groups, provided interpretation services, and conducted general management work. All these job responsibilities are widely accepted and undertaken by museum educators around the world.

Compared to the previous research findings and arguments from Western science museums, museum educators in this study also reported different job responsibilities that they performed, which demonstrates the uniqueness of museum education in China. For example, as
noted in this study, the Chinese government provides strong financial and political support to the science museums, which makes museum educators to experience less pressure to look for financial support to sustain their programs. Therefore, few museum educators in this study reported the development of funding applications as a dominant museum-education-related job responsibility. This is very different from museum educators from Western science museums whose work includes securing funding and related supports for exhibition and program development (Dragotto, Minerva, & Nichols, 2006; Duff, Cherry, & Sheffield, 2010; Talboys, 2005).

Another noteworthy example of job responsibilities from this study in context of the Chinese culture is conducting routine work in exhibition halls, such as answering visitors’ questions, keeping the exhibition hall clean, and resolving conflicts between visitors. This happens particularly in higher-level science museums. As reported by museum educators from Museum A, their duties required them to stand in the exhibition hall all day during working hours. Although they are officially identified as museum educators, their educator’s role is quite vague and passive. In busy seasons, they also take roles as safeguard, custodian, information provider, or chaperone. This reflects the unique visiting model in Chinese science museums. The visiting population is very large and significantly beyond the museum’s capacity to host visitors during weekends and holidays. However, museums generally have very few visitors on weekdays. For example, as MengMeng indicated in Chapter Five, “We estimated a hands-on activity for 20 minutes; however, there could be 70 or 80 students at one time, it was impossible to complete [the activity] in an hour”. Thus, the large number of students was a big challenge for Chinese science museum educators in terms of how they work, especially given the extremes of visitor attendance in gallery.
At the same time, the blurring of museum educator’s role, with other responsibilities requiring their attention, also reflects the poorly-established boundaries for the profession of museum education in China. The blending of different roles leads museum educators to feel confused about their responsibilities and question the value of museum education work, which may result in an identity crisis for museum educators. Accordingly, it is necessary for museum education practitioners in China to think deeply about the uniqueness and necessity of museum education and set up a clear description of job responsibilities to protect museum educators’ intellectual contribution to this community.

The third example from the study regarding job responsibilities consistent with Chinese culture is the lack of awareness about opportunities to broaden the diversity of audiences in Chinese science museums. Although museum educators in this study referred to diversity of museum visitors, in actual fact their understanding of the notion of diversity is narrow. For example, they appreciated that visitors come to museums with diverse backgrounds, including different purposes, previous visiting experiences, and different group compositions. However, from a general social inclusion perspective, there are many marginalized social groups, such as individuals from rural areas, from ethnic minorities, with disabilities, or senior citizens who do not typically visit science museums that may be potential visitors to science museums (Dragotto, Minerva, & Nichols, 2006; Levent & Reich, 2013; Silverman & Bartley, 2013). Concern for marginalized people’s needs and desires is a way for science museums to demonstrate their care and make fundamental social change. This issue has been of particular concern in Western science museums (Ash & Lombana, 2013, Kisiel & Anderson, 2010; Silverman & Bartley, 2013) for more than 20 years. Yet, in this study, none of museum educators recognized the notion of broadening the diversity of visitors to be a meaningful and important job responsibility.
6.1.3 Competency-based Working Model

In this study, museum educators perceived themselves as professionals through science museums’ work competencies that were characterized by: professional knowledge, professional ability, professional skills, and professional attitudes. Apparently, attributes such as commitment, communication, creativity, self-reflection, and being knowledgeable were found both in this study and previous studies (Castle, 2006; Dragotto, Minerva, & Nichols, 2006; Grenier, 2011; Tran, 2013; Trinkley, 2014). Museum educators’ vision of what an ideal museum educator derived from their previous working experiences in museum education. Their perspectives about the competency for an ideal museum educator may create a preliminary model to recruit and cultivate qualified museum educators.

There are some connections between museum educators’ perceived competency and their perception about their job responsibilities. The competency model described by museum educators in this study is derived from their self-reflection on working experience. For example, since they were required to design and deliver meaningful and interesting educational programs, museum educators felt creativity, communication, and teaching skills are vital attributes in attracting and maintaining museum visitors’ attention. Since writing was regarded to be an important job responsibility, museum educators also emphasized writing skills as an important strategy to design museum education curriculum and prepare for educational resources.

However, in comparison with museum educators’ description of their job responsibilities and work competency, it seems that some competency for implementing certain job responsibilities has not been fully recognized by museum educators. For example, evaluation was found to be an important job responsibility in this study, however, museum educators did not clearly recognize the specific evaluation skills a museum educator should possess. It seems
that museum educators in this study had difficulty in defining evaluation goals, criteria, and methodology to evaluate a museum education project, as was indicated from their interpretations of their self-concept as professionals. This phenomenon reminds museum education practitioners to identify the connection between job responsibilities and corresponding competencies, which can also be an important self-study topic for museum educators’ professional development.

Similar to Chinese-featured job responsibilities, some working competencies in this study are also very unique and exemplify the Chinese cultural context, such as the overemphasis on discipline-based content knowledge that a museum educator “should” be deemed to hold expertise. Although researchers in Western museums found the broad understanding of scientific knowledge as an advantage for museum educators (Grenier, 2011; Jensen & Munley, 1985), they did not value this competency as much as the museum educators did in this study. This phenomenon reflects the idea that the epistemological belief about science held by museum educators in this study is different from that of Western science museums. As reported in Chapter Four, many museum educators regarded science in a traditional and authoritative knowledge paradigm. As such, they recited interpretation transcripts and they seldom made connections between science in exhibitions and science in daily life. Some museum educators in this study even developed a sense of anxiety when they felt the limits of their own science-related academic background, and this might lead to undermine their self-concept as professionals.

Although pedagogical knowledge and strategies were also mentioned in this study, the overemphasis on content knowledge leads one to question: Can an individual without science-related higher education background realistically become a science museum educator in the Chinese science museum context? And also, what science knowledge level should a museum
Chinese science museum educators have recently debated, on social media, the issue of recruiting a science museum educator with science background or arts background. They asserted that, since a well-founded museum educator promotion system has not been established in China, museum educators with science background can be promoted in a system designed for engineers, while museum educators with arts-based background do not have a clear promotion pathway. The overemphasis on scientific knowledge makes some museum educators with an Arts/Humanities/Social Science background marginalized, despite their understanding of pedagogy.

In summary, defining the working competency for museum educators is not a simple and solitary activity; rather, it relates to many issues including defining qualification criteria, job responsibilities, in-service training, and future promotion for museum educators. It is important for Chinese science museum educators, administrators, researchers, and policy makers to think about the key traits of museum educators, and then establish a clear description of the qualifications and responsibilities they should rightly possess.

### 6.1.4 A Sharing and Participatory Learning Community

Museum educators in this study recalled their current professional development pathways and envisioned possible ways for future professional development. As indicated in Chapter Four, both overlaps and differences existed between the current and envisioned professional development pathways. For example, museum educators valued the current professional development pathways such as external communication and self-regulated learning. They also expected to raise opportunities for formal training and learning along with teaching practices. In addition, as cross-departmental cooperation was scarce, museum educators expected to increase
the opportunity for horizontal learning across different departments. However, although routine training was a popular learning format across different science museums, some museum educators in this study did not find it very helpful, and correspondingly, they did not regard this way of learning as beneficial for future professional development.

When comparing museum educators’ articulation of their current and envisioned professional pathways, a perceived need for a learning community emerged. This learning community is conceived to be like an “energy supply station” where museum educators can “absorb” fresh ideas to enrich their working practice. The professional development pathways proposed by museum educators in this study are an integration of both formal ways (structured and purposeful) and informal ways (unstructured and incidental) (Bailey, 2006; Castle, 2006; Grenier, 2011; Marsick, 2009). Previous research studies examined the effects of different ways of professional learning. A formal, structured, and purposeful way of learning, such as formal training in this study, was recognized as a traditional way but with an advantage to expand museum educators’ knowledge in terms of intensive and general introduction about museum education (Greiner, 2010; 2011). However, many researchers have found that meaningful learning does not only happen in the context of formal training. Moreover, informal and incidental learning in real working contexts are crucial to enhance individuals’ professional expertise (Fuller, 2005; Grenier, 2010, 2011). Compared to traditional ways of training, informal and experiential learning is filled with interaction and peer support, and can facilitate museum educators’ professional growth (Grenier & Sheckley, 2008). Similarly, museum educators in this study also reported significant professional progress when they were mentored by peers, learning in practice, and communicating with other museum educators.
Although museum educators in this study reported various formats for professional development, these pathways can be categorised into three types that were in accordance with Castle’s (2006) research findings. Firstly, museum educators in this study raised their desires for expanding and deepening understanding of content knowledge through formal training. This way of training is especially necessary for newcomers to science museums. Secondly, museum educators in this study suggested learning with experienced museum educators through observation, cooperation, and practice. They proposed avoiding an expert-guided model, but advocated for a participatory approach (McIntosh, 2011; Silverman & Bartley, 2013). In terms of observing and imitating museum education experts, museum educators are supposed to analyze and summarize the existing working model, and create new and personalized working model for themselves. Finally, learning through practice along with self-directed learning was usually unintentional, implicit, and unconscious.

Among museum educators’ interpretation of their envisioned professional development in this study, several descriptive terms repeatedly emerged in the interpreted discourse, such as experiential, share, observation, modelling, participation, theory-in-use, and learning through conversation. The aforementioned types of learning and these aspirational descriptors indicate museum educators’ desires for an apprenticeship learning approach, and they also demonstrate a process of moving from peripheral participation to central engagement in a museum educator community. In terms of apprenticeship, learners gain professional ability while grasping the language, values, and practices of that community (Pratt, 2002). The newcomers also build their membership into this learning community as they are apprenticed through an enculturation process (Pratt, 2002; Theresa & Bubp, 2008). In this study, when the museum educators explained the meaning of “visiting other science museums”, they emphasized that it did not
merely indicate visiting in the common sense. Rather, these visits should be a way of working with other local museum educators, observing their practices, and initiating professional dialogues. In this visiting activity, museum educators can critically compare their practices with museum education experts, and the theories of pedagogy and education they have grasped are generated from practical understanding rather than through an abstract and decontextualized way of learning. In summary, museum educators in this study desired an apprenticeship model through which they can collaborate with peer colleagues and be mentored by museum education experts.

In summary, museum educators’ self-concept as museum education professionals reflected their desires for a professional working community. Informed by CoP, the establishment of a professional community requires a clear boundary to define the uniqueness and necessity of this profession. Section 6.1 discusses the boundary for museum education profession from four aspects, including work motivation, job responsibilities, work competency, and a shared and participatory learning community. The discussion on these four aspects demonstrates that museum education work in China is deeply influenced by the local sociocultural, educational, and political environment. Although current museum education work is poorly professionalized, museum educators’ interpretation about their self-concept as professionals offered a preliminary lens to depict the domain and specialization of museum education work and direct the professionalization of museum education work in China.

6.2 Build Bridges between Related Communities

In this study, during the process of exploring their self-concept of being museum education professionals, museum educators encountered different individual, sociocultural, and
political situations, which led them to perceive of museum education work in different ways. In addition, during this process, they also encountered various contradictions and conflicts. These two aspects of the research outcomes are in accordance with previous scholars’ thoughts on museum education from a cultural perspective (Ash, 2014; Ash & Kelly, 2013; Kelly, 2011; Theresa & Bubp, 2008).

First, inferred from this study, museum educators in Chinese science museums are made up of individuals with various backgrounds and perceptions towards the profession. Although museum educators performed similar practices, their perceptions and attitudes towards museum education were hugely different. For example, as indicated in Chapter Five, comparatively young museum educators and museum educators living under financial and familial pressures are concerned more with the material benefits of the job. The participants’ educational background influenced their ways of seeking for professional support. The organizational culture and styles of leadership also influenced museum educators’ belongingness and attachment to the profession.

Second, the contradictions and conflicts are unavoidable for museum educators when building a professional community, particularly at the beginning stage. Previous studies reveal that the contradictory issues and tensions usually appear when museum educators seek cooperation and collaboration with other relevant communities, such as with exhibition departments, schools, and universities (Groff, Lockhart, Ogden, & Dierking, 2005; Taylor & Caldarelli, 2004; Silverman & Bartley, 2013). Identifying the contradictions was a stressful and challenging experience for museum educators, which may lead to them feeling emotionally depressed about their work. However, it also illustrated their concern and reflective consideration about their professional work. Accordingly, this section discusses the uniqueness and
commonalities of different contradictions as perceived by museum educators and the possible ways to resolve such contradictions within their professional roles and responsibilities.

6.2.1 The Uniqueness of Different Contradictions

When analyzing the contradictions between museum educators and different stakeholders, each interface demonstrates its own uniqueness. For example, the contradictions between museum educators and their families suggest that museum education work requires personal dedication and commitment (Castle, 2006; Grenier, 2011). Therefore, museum education work requires museum educators to balance the time between work and family. On the other hand, this contradiction also reflects the lack of flexibility of museum education work in China and the lack of autonomy for museum educators to make decisions about their work and their other personal responsibilities.

The contradictions between museum educators and visitors reflect a deep inconsistency between the ideologies advocated by science museum education, the Chinese educational history, and the current Chinese educational reality. Specifically, the traditional educational philosophy in China respects knowledge and suggests that knowledge be unquestioned. This traditional education philosophy prohibits the implementation of inquiry-based, problem-situated, and authentic learning activities in Chinese science museums. In addition, the large number of students at schools makes learning competitive, which hinders students from formulating a cooperative and interactive learning environment (Tao, Oliver, & Venville, 2012). Moreover, the shortage of pedagogy that promotes a constructive learning experience and the lack of understanding of school curriculum results in museum educators failing to offer meaningful learning experience to visitors. In summary, when visitors come to museums, they often hold
different visiting goals and expectations, which urged museum educators to increase their knowledge and understanding about visitors in Chinese science museums.

The contradictions between museum educators and external supports demonstrate three unique aspects of Chinese science museum education practices. First, museum educators in China have begun to raise their cultural sensitivity to museum education work. For example, as indicated in Chapter Five, the argument on copying the volunteer system from Taiwan to mainland China clearly demonstrates that Chinese science museum educators have raised their awareness of the cultural impact of museum education. They started to perceive of museum education as a cultural practice influenced by the local culture, values, and customs where museums were situated. In other words, museum educators in this study recognized that, museum education is not a one-size-fit-for-all activity. It needs cautious to apply educational practices from other cultures into Chinese context.

Second, the contradictions between museum educators and external supports also demonstrate the deficiency of museum education experts. In this study, museum educators perceived professional development as a social learning process. Ideally, they depicted an excellent museum educator to be a museum education professional with both theoretical and practical museum education expertise. In addition, an excellent museum educator should be good at sharing personal working experience with museum education colleagues. However, in the social learning experience, current practicing museum educators did not find such an appropriate model to guide their professional growth.

Third, the contradictions between museum educators and external supports also reflect a segregation of power and resources controlled by different agencies. From the museum educators’ feedback, the professional connection between science museums and their upper administrative
institutions is very weak. The governance from the upper level administrative institution for science museums is only bureaucratic, without offering professional support or necessary resources, which makes museum educators, particularly those who work in newly built science museums, feel a sense of isolation.

The contradictions between museum educators and educational programs reflected museum educators’ deficiency of evaluation expertise. As reported by museum educators, school teachers and upper level museum administrative institutions are often invited as the experts to evaluate and offer suggestions for museum education practices in China. However, they often evaluate a museum education program from school education and administrative viewpoint. From museum educators’ perspective, school teachers and museum administrators should not be regarded as experts to guide museum education practices. Specifically, museum educators found the evaluation approach adopted by school teachers and museum administrators was inadequate and misleading and made museum educators feel confused and disempowered. In this study, Chinese science museum educators began to question the current evaluation system and to challenge teachers’ and museum administrators’ qualifications for evaluating museum education programs. This questioning process is a primary stage for museum educators to formulate a real and contextual appropriate professional evaluation mechanism.

In summary, the above four examples of contradictions between museum educators and other agencies demonstrates the existence of deep-rooted and unsupportive boundaries surrounding science museums in China. In addition, it is important to notice that the notion of boundary here is different from the notion of boundary in Section 6.1. In Section 6.1, boundary is regarded as protection to guarantee museum educators’ belongingness, benefits, and contributions. The boundary in Section 6.2 represents the impediments and obstacles that disrupt
the connection between science museums and external institutions. Thus, it is necessary for museum educators to challenge and break such boundaries.

6.2.2 The Commonalities across Different Contradictions

As discussed before, contradictions emerge when museum educators attempt to make connections with other community stakeholders. These contradictions do not exist independently. Instead, they share commonalities and overlaps, which facilitate the generation of a large ecosystem of working communities. In other words, resolving and reconciling contradictions cannot be an isolated cultural practice. It is a process of multifaceted negotiation, communication and cooperation. Following are some key examples.

The first example demonstrates the relationship between museum educators’ internal conflicts and conflicts with the working environment. Museum educators in this study reported three aspects of internal conflicts, which included their dilemma regarding job promotion trajectory, a deficiency of related knowledge, and a lack of outreach professional development opportunities. These conflicts do not exist independently. Instead, they are interwoven with the sociocultural, political, and organizational context in which they are situated. In other words, their internal conflicts represent the contradictions between museum educators and museum institutions to a certain extent.

Second, museum educators expressed their difficulty in program evaluation or sustainable maintenance of programs. This contradiction also reflects their dissatisfaction with the bureaucratic and hierarchical working mode in current Chinese science museums. In addition, it also shows the shortage of museum education experts who can offer theoretical and practical guidance on museum education work.
Third, the contradictions between museum educators and visitors are interrelated with the contradictions between museum educators and educational programs, and between museum educators and other departments. Current museum education programs cannot meet visitors’ needs or fit their visiting preferences. For example, as reported in Chapter Five, in exhibitions, visitors expressed their interest in hearing more contextualized stories that related to their real life. However, the interpretive scripts provided to museum educators are limited to the labels or abstract explanations. Therefore, the boundary between different museum departments impede museum educators search for “behind-the-scenes” resources. In addition, the contradiction between museum educators and visitors also reflects museum educators’ lack of relevant knowledge to explore and understand the characteristics of visitors as learners.

From the above three examples, it can be noted that every contradiction is not in isolation to the other. Although it appears that the contradictions exist between museum educators and another related agency, such conflicts cannot be resolved between these two agencies, which support Engeström’s (2011) argument that a social dilemma cannot be solved by individuals but instead on the basis of mutual cooperation. The original purpose of this study is to investigate museum educators’ self-concept as professionals and the sociocultural influences on such perceptions. At the beginning of this study, it seems that museum educators should be the stakeholders who need to be changed, improved, and cultivated. However, when various contradictions emerged from museum educators’ thoughts and reflections, it seems that professionalizing museum education work is not a singular activity based on the educators themselves. Instead, it requires engagement and negotiation between different communities and stakeholders. In other words, professionalizing museum education work is a process of making connections and collective reform. This recursive process does not have an ending. Iteratively, it
involves the establishment, examination, refinement, and re-examination of an ecological community of practice system (Engeström, 2011).

### 6.2.3 Resolve Contradictions

In order to resolve contradictions and make connections among different communities, boundary objects and brokers are indispensable in building such bridges (Kisiel, 2012). Kisiel (2012) argued that the cooperation between two sides “requires us to consider how the cultures of two (or more) institutions might facilitate or interfere with the desired goals” (p. 57). Inferring from Kisiel’s (2012) statement, the cooperation between two communities depends on the shared boundary objects and brokers. Specifically, the boundary objects and brokers are cultural entities with strong compatibility to both cultures and can create a harmonious environment for both cultures to interact with each other. Kisiel (2012) explained that, boundary objects can be “documents, terms, and artifacts that help organize interconnections of Communities of Practices” (p. 59), and brokers should “facilitate connections by introducing aspects of one practice to another” (p. 59). Then, particularly in the field of museum education, it is reasonable to question what (who) can be boundary objects or brokers? When and where is appropriate to use boundary objects and brokers to make connections? How can such boundary objects and brokers help build connection for museum educators?

Previous studies have revealed some effective boundary objects and brokers to build connections between museum educators and other museum education stakeholders. For example, museum educators’ working motivation, previous teaching experience, and previous learning experiences have been testified to be meaningful cultural mediators to influence museum educators’ interactions with their work and with other relevant communities (Allen & Crowley,
2013; Bailey, 2006; Johnson, 2005; Marcus, 2006). Similar to previous studies, these boundary objects have also been identified in this study. For example, from the perspective of some museum educators, their previous internship experience in both schools and museums helped them understand school curriculum and students, be familiar with museum exhibitions, and design appropriate programs for visitors. Some museum educators showed their willingness to share their working experience, thoughts, and successful programs with other museum educators in a community environment. In other words, museum educators in this study seem to raise their consciousness to excavate their personal advantages, uniqueness, and strengths, which may be a bridge to connect museum education work with broader audiences and communities. For those who did not have such awareness, it is important for museum education trainers, administrators, and researchers to facilitate this self-excavating process. This may be an effective way to fill the gap between museum educators and other relevant agencies.

It is also important to recognize that, if the boundary objects and brokers do not exist, museum educators have to purposefully find or create them. In other words, museum education practitioners need to make connections intentionally. A number of scholars have attempted several ways to link different communities. The first way is to build connections between different museum departments. For example, Groff, Lockhart, Ogden and Dierking (2005) found the effectiveness of cross-departmental cooperation. In their study, zoo educators reported that the informal learning events, such as inviting animal staff to share working experience and visiting zoo staffs’ work place are the most direct and efficient way for them to understand background knowledge, ideas, and thoughts about zoo education. Cunningham (2009) also advocated organizing cross-departmental learning, which is regarded as a good way to share
professional knowledge and information, enhance professional ability and reputation, construct common language and practices, and maximize the educational mission of museums.

The issue of cross-departmental sharing has also been raised in this study. Museum educators in this study complained frequently about the difficulty in cross-departmental cooperation from two aspects. First, the hierarchical working environment impedes most Chinese science museums to change their vertical working style. The horizontal cooperation is hindered by the authority-centered organizational culture. In addition, the museum staff from other departments that were invited to communicate with museum educators were not skilled in communication or museum pedagogy. Museum educators found that the invited museum exhibition designers, engineers, or technicians were not good at sharing their daily-life-related working experience with museum educators, and the language they used was usually decontextualized jargon. What museum educators need are human-centered stories to enrich visitors’ engagement in educational program. Such resources and opportunities should be sought in terms of the cooperation between museum educators and exhibition design departments.

The second way of making connections is to bridge museum educators with university researchers (Kang, Anderson, & Wu, 2010; Kelly, 2011; Silver & Bartley, 2013). University researchers share their research findings, offer theoretical guidance, and facilitate a systematic self-reflection process, which has been identified as a meaningful scaffolding process to facilitate museum educators’ professional growth (Kelly, 2011; Silver & Bartley, 2013). The museum educators in this study also described their cooperation with university researchers. As previously reported, some museum educators found such cooperation as meaningful, while others found that such cooperation was too general, abstract, and theoretical to be practically used.
As Winer and Ray (as cited in Silverman & Bartley, 2013) stated, true collaboration occurs when there is a “mutual beneficial relationship entered into by two or more organizations to achieve results they are more likely to achieve together than alone” (p. 161). Referring to this statement, museums and university researchers have not yet reached an agreement as to the significance, goals, and methods of museum education in China. That is a possible reason that leads to obstacles between Chinese science museums and universities. Currently, Chinese science museums and universities have cooperated in running a museum education Master’s program to co-cultivate qualified museum educators. It is an important sign to demonstrate the collaboration between two communities. However, collaboration between museums and universities should not just be confined to co-running graduate programs. As indicated in previous studies and interpretations from current museum educators, it is also important for current Chinese science museums to search for other cooperative channels to increase the interaction and mutual understandings between two sides.

The third way of building connections is to link museum educators with visitors. Previous researchers have examined the effectiveness of different labels (Atkins, Velez, Goudy, & Dunbar, 2009) and question types (Tal & Morag, 2007), identified the connection between school curriculum and exhibitions (Griffin, 2004; Mortensen & Smart, 2007), and explored ways to utilize technology to influence visitors’ learning (Klopfer, Perry, Squire, Jan, & Steinkuehler, 2005). These boundary objects/brokers are perceived as artifacts that museum educators can use to scaffold and support audiences’ visiting experience. As indicated in Chapter Five, museum educators articulated their confusion and difficulties in building a harmonious and interactive atmosphere, attracting audiences’ attention, and keeping their involvement. They explained several sociocultural reasons that may impede the communication between museum educators
and visitors in China. These sociocultural reasons included the contradiction between the expected interactive museum environment and Chinese visitors’ introverted personality, contradiction between museum educators’ reception ability and the large amount of visitors on weekends and holidays, and the contradiction between museum educators’ teaching philosophy and school teachers’ traditional way of education.

It is important to hold a belief that such contradictions cannot exist eternally if Chinese science museums endeavor to work towards a visitor-centered approach and situate themselves in the visitors’ frame of reference. Learning from Western museum educators’ experience, a visitor-centered approach is a key boundary broker to make connections between museum educators and visitors. In this circumstance, museum educators should be “participant-centered-educators” (Taylor & Caldarelli, 2004). Specifically, they should be a “comforter” to reduce visitors’ barriers to social interaction in the museum and build a supportive and psychological safe environment for communication. They should also be an assessor who evaluates visitors’ needs and appreciates individual differences. In addition, they should also be a facilitator who can construct a dialogic context, raise meaningful and life-related questions, and work with visitors to enhance their learning experience. In summary, the connection between museum educators and visitors are not fixed but are dynamic, which requires science museums’ and museum educators’ effort in changing their working mode and building a true visitor-centered working approach.

6.3 Summary

Interpreted through CoP and CHAT, the research outcomes of this study were discussed in the light of existing literature and with consideration of the current, historical, political, and
sociocultural reality in which Chinese science museums are situated. Specifically, two aspects of discussion were documented. Section 6.1 discusses the possibility of establishing boundaries and discontinuities of a professional community. This section discusses the uniqueness of Chinese science museum educators’ perception about their work motivation, job responsibilities, and work competency, and the possibilities to establish a community for Chinese science museum educators. This working community should be filled with a professional, cooperation, and participatory working atmosphere. Section 6.2 begins with discussion about the uniqueness and commonalities across the contradictions between science museum educators and different stakeholders. Moreover, this section also discusses the tangible and intangible boundary objects/brokers as the continuities that may help museum educators make connections with other museum education stakeholders.

In summary, the research findings of this study are synthesized in a way that reflects museum educators’ current perception of their practices and their future aspirations for a cooperative ecosystem of communities of practices. This future community, desired by museum educators, is a professional space where their working performance can be facilitated, their professional growth can be prompt, and their uniqueness and necessity of being museum education professionals can be valued.
Chapter 7: Conclusions and Implications

This chapter begins with a synthesis of the conclusions of this research by restating the research problems, reviewing the main methods, and summarizing the results. This chapter also discusses contributions and implications, as well as the limitations, and makes recommendations for future museum-educator-related research and practices.

7.1 Conclusion

This study explored 23 Chinese science museum educators’ self-concept as museum education professionals. Since Chinese science museums have recognized their educational function as facilitating citizens’ lifelong learning, the professionalization of museum education work has become a crucial issue in China, especially for concerned Chinese science museums and central government institutions like CAST. This research, as a preliminary interpretive study, provides descriptions of current museum educators’ thoughts, attitudes, and practices, as well as the contradictions that they have experienced. This research may help museum education administrators, human resource specialists, researchers, museum education practitioners, museum educator trainers, and curriculum designers to deeply understand the current status of practicing science museum educators. It is hoped that this research will support the construction of museum-educator-needed professional development communities in China and other developing countries.

This interpretive case study employed individual face-to-face semi-structured in-depth interviews as the main phenomenological method of data collection. In addition, informal conversations with museum educators and the researcher’s self-reflexive journals were complementary data sources. CoP perspective and CHAT, provided the framework that guided
the study’s data analysis resulting in the following key findings as responses to the research question:

How does Chinese science museum educators’ self-concept as professionals manifest and transform in their work practices and professional needs within the local social and cultural Chinese science museum context?

This study examined museum educators’ self-concept as museum education professionals in five areas, including museum educators’ perception of their working motivation, job responsibilities, working competency, current pathways for professional development, and desires for future professional development. These five areas were derived from the museum educators’ perceptions of their daily practices, roles, and needs, which in turn revealed manifestations of their self-concept as professionals and are multifaceted, interrelated, and complicated. Furthermore, the five areas can be understood and described through the notions of domain, community, practice, and imagination, all of which are interpreted from the CoP perspective (Wenger, 1998, 2010, 2011). These were evident in how the Chinese science museum educators demonstrated their sense of belonging, responsibility for, and commitment to museum education. The five areas also reflected their expectations and endeavours in building a professional community where they can share thoughts, practices, and resources.

In conclusion, these findings demonstrate museum educators’ original thoughts, knowledge, expectations, and imagination about museum education as well as themselves in Chinese science museums. Their understanding of museum education offers a vision of how current museum educators engage with museum education work and their relationship with this
profession. From a CoP perspective (Wenger, 2010), members in a community may share similar values, interests, and practices. These five areas can also constitute the objectives for a) museum education administrators, human resource agencies, and museum education practitioners to shape/reshape museum educator recruitment criteria, b) in-service incentive mechanisms, and c) professional training plans.

As museum educators come to museums with diverse backgrounds, their self-concept is unique and cannot be entirely generalized to all Chinese science museum contexts. In this study, museum educators’ self-concept as museum education professionals varied across different social and cultural contexts both at individual level and organizational levels.

More importantly, in terms of social interaction with different stakeholders, museum educators in this study reported their internal contradictions as well as contradictions with other cultural agencies such as museum institutions, visitors, external supports, their own families, and the educational programs. These contradictions did not exist independently. Instead, they reflected the complex working environment for museum educators. The complex nature of museum educators’ working context is influenced by: a) a highly hierarchical organizational culture, b) an authority-centered political structure, c) a highly competitive education reality, d) a hybridized educational philosophy that blends of constructive teaching and the traditional teacher-centered didactic teaching pedagogies, and e) the contradictions emergent from the process of building a professional community and making connections with different stakeholders relevant to museum education work.

The contradictions encountered by museum educators in this study reflected the inevitable difficulty Chinese museum educators face when they begin empowering themselves to develop a shared professional system. Moreover, such contradictions also brought museum
educators opportunities to see the nature and current situation of museum education in China. Revealing such contradictions is a way to help them build connections, fill gaps, resolve misunderstandings, and facilitate cooperation between museum educators and the external world, eventually transforming institutions and helping science museums fulfill their educational mission to the general public.

7.2 Implications

This section discusses the implications and limitations of the findings from the reported study. Discussion of implications will include a) implications for future research, b) implications for curriculum and practice and c) implications for theory.

7.2.1 Implications for Future Research

The outcome of this preliminary study provides insights that are useful towards understanding and further promoting museum educators’ professional development in China. Furthermore, the research findings offer interesting and important possibilities for future research in the museum education field. Overall, this section articulates the implications for future studies in four domains: a) documenting museum educators’ working and learning process, b) involving different types of science museums in museum education studies, c) exploring different stakeholders’ perspectives on museum education and museum educators, and d) cultivating museum educators as museum education researchers.
7.2.1.1 Document Museum Educators’ Working and Learning Process

As an interpretive case study largely informed by phenomenological methods, this research documented museum educators’ perception of their work-related lived experience in terms of reflecting on their past behaviours, thoughts, and attitudes about museum education. This study represents an important, but initial step towards the exploration of the professionalization of museum education work in China. However, the professionalization of museum education work is far more than just documenting museum educators’ perception of their occupational identities. Inferred from Lave and Wenger’s (1991) standpoint, in addition to reflection on their perception, knowing about museum education work is also intertwined with documenting museum educators’ authentic working practice. Similarly, as indicated by the cycle of expansive learning (Engeström, 2001), after questioning and analyzing existing practices, learners should attempt to set up, implement, and modify a new learning model. That is, after identifying museum educators’ perception of their previous working status, it is important to explore possible ways for museum educators to make changes. Therefore, on the basis of documenting their perceptions of working experience, it is furthermore important to observe museum educators’ work performance in the field and examine how they change themselves in their professional activities (Kisiel, 2012). Such future investigation lends itself to action research approach (e.g., Kelly, 2009) where by museum educators together examine their own practice, identify issues or problems in their own practice, formulate solutions and later implement and evaluate those solutions. Such future investigations of this fashion might include the exploration of the teaching pedagogy and strategies museum educators have previously employed, the difficulties they have encountered in practice, and the interactive process between museum educators and visitors. Other examples might include the documentation of the process
of building a professional community. This has the potential to be a point of reference for other museum institutions and museum educators to compare and reflect upon their own practice and the working context, and also develop innovative solutions to improve the strength and utility of their own professional communities.

Also, it might be reasonably conjectured that, on the basis of this study, it is important for future researchers investigating museum education practices to be involved in the field of museum education, taking an outsider-within stance, to observe museum educators’ practice. This way of exploration can be a powerful approach to understand museum educators’ interpretation in an authentic working context, and to evaluate museum educators’ professional development in a summative manner.

7.2.1.2 Involve Different Types of Science Museums in Museum Studies

The notion of “natural generalization” (Stake, 1995; Stake & Trumbull, 1982) acknowledges that each research case reflects a broad social and cultural context in which the study has been situated. This notion has penetrated and legitimized the whole research process of this study. Due to the time and financial constraints, as well as lack of access to other science museums, this study was conducted with 23 participants from five science museums in China. However, these five research sites to certain extent share similarities to other government supported public science museums, for example, within similar hierarchical and authority-centered organizational culture, under the administration of CAST and therefore fulfilling the educational mission of science museums as advocated by the CAST. Therefore, the research outcomes of this study have shown some commonalities and uniqueness of Chinese science museum educators’ perceptions about their working practices. Informed by the notion of natural
This research may provide us with a picture of current science museum educators in China. However, it should not be the only picture that depicts Chinese science museum educators’ thoughts about their professional roles and identities.

Given that our living world is constituted by multifaceted realities, in order to generate a relatively holistic and comprehensive understanding of Chinese science museum educators, it is necessary to broaden the types of science museum institutions in future study (Dudzinska-Przesmitzki & Grenier, 2008). This study includes four science and technology museums and one natural history museum. According to the definition of science museums, it is also necessary to explore how educators in other science-based museum contexts such as botanical gardens, zoos, aquariums and other specialized museums, like planetariums, perceive their roles, identities, and professional needs in future research.

In addition, although the research sites in this study represent three levels of science museums, all of them are located in major urban Chinese regions. In rural areas of China, where science museum institutions do not exist, science activity rooms or science caravans are commonly employed to serve as site of community-based science education and popularization. Since the social and cultural context faced by rural museum educators could be very different from that in urban museums, from an inclusive research scope, it is also necessary to understand museum educators’ thoughts, values, and ideas when they work in different regional contexts beyond urban centres.

In addition, all five science museums in this study were government supported institutions. The organizational culture of these public science museums followed a traperditional and bureaucratic Chinese working model. In comparison, although private science museums still occupy a very small proportion in Chinese museum market, more and more private science
museums have emerged in mainland China with the inclusion of Western educational philosophy. Sony ExplorScience (http://www.sony.com.cn/ses/index.html), Magic House Bean Children’s Museums (http://www.magicbeanhouse.com), and some career exploration sites are examples of private museums in mainland China. Compared to government supported science museums, private science museums face entirely different organizational, financial, and political working contexts. For example, without financial support from government, private science museums have to make profit to support their own operations. This non-governmental affiliation makes museum educators in private science museums encounter different working contexts, challenges, and professional growth demands. Accordingly, the work culture of such private museums is likely different, and hence, the perceptions of museum educators in these environments might be different and worthwhile to investigate.

7.2.1.3 Generate Different Perspectives on Museum Education and Museum Educators

Museum educators in this study reported internal and external contradictions with different stakeholders, such as with schools, casual visitors, external supports, and departments within a museum. These contradictions reflected a sophisticated relationship between museum educators and other cultural agencies (Kang, Anderson, & Wu, 2000). From a CHAT perspective, learning through different perspectives should be an important lens to understand individual’s workplace learning. It is important to make sense of different stakeholders’ arguments and practices in a museum education community, which is a good way to find out more meaningful brokers and boundary objects that may bridge the gap between museums and other stakeholders (Grenier, 2005; Kisiel, 2012; Levent & Reich, 2013; Silverman & Bartley, 2013). This study investigated only Chinese science museum educators as one grouping in the broader community.
of stakeholders. For further study, it is important to generate multiple perspectives to describe, compliment, and support museum educators’ arguments. For example, museum educators in this study complained about the lack of qualified educators to provide professional support and training of museum educators. Accordingly, it is of interest to explore and understand what such trainers think? Do they agree with museum educators’ comments and dissatisfaction? What difficulties do they face for promoting the professionalization of museum educators?

In addition, museum educators in this study also complained about the difficulty of initiating a meaningful conversation with audiences, and then they attributed the communication difficulty and the audiences’ passive visitation to a typical Chinese, introverted personality. Accordingly, it is worthwhile to investigate the extent to which visitors really want or do not want to be engaged in the conversation as part of their museum experience. Are there some subtle expressions or behaviours to manifest visitors’ willingness to engage in educational activities? What if engaging audiences in a research project to explore the boundary objects that may resolve the disconnectedness between visitors and museum educators?

A further issue of interest in this study centred on the museum educators being faced with organizational boundaries when attempting to work across departments. They felt a sense of being marginalized in comparison to other museum staff, including curators and exhibition developers. Accordingly, it is of interest to examine how do curators and exhibitions developers perceive the educational function of museums. And, how do they perceive museum educators’ role in helping museums make social change?

In summary, this study is a starting point to understand the mutual relationship between museum educators and other museum education stakeholders, which indicates that science museums are not isolated cultural institutions – but rather, part of broader collective of partners
and stakeholders. In order to maintain the connection between museum educators and other cultural agencies, it is necessary for museum education researchers to understand museum education from different perspectives which constitute the broader collective.

7.2.1.4 Cultivate Museum Educators as Museum Education Researchers

In the field of museum education in Western science museums, studies that focused on museum educators have been primarily conducted by researchers who also have rich practical museum education experience (e.g., Ash & Lombana, 2013; Bailey, 2006; Kelly, 2011; Nolan, 2009). In other words, museum education researchers also sometimes take other roles, such as research participants and museum education practitioners. Transferring among different roles provides museum educators with a holistic perspective to examine museum education practice both internally and externally. However, as the Chinese science museum educators stated in this study, they seldom have the chance or awareness to reflect on, document, and share their thoughts about their working practice. As the researcher of this study, I did not have direct teaching experience in museums. Instead, I acted as a facilitator to encourage museum educators to reflexively think of their roles, identities, and professional needs in different contexts, such as in the invited conference presentations, meetings, and informal communications with museum educators. Although this study has adopted several strategies to ensure the quality of the research data, the lack of authentic daily working experience in museum education may be an obstacle when I was trying to understand the contextual meaning of museum educators’ interpretation. Therefore, for future studies with museum educators in the context of Chinese science museums, the relationship between researchers and participants is encouraged to be slightly changed, that museum educators should take a more active role in understanding themselves.
7.2.2 Implications for Museum Education Practice

The research findings of this study have practical implications for future museum education practice. Specifically, this section discusses the practical implications from three aspects: a) raising the awareness to build a professional community for museum educators, b) increasing opportunities for museum educators to interact with different museum education stakeholders, and c) working through a research-based approach.

7.2.2.1 Raise Awareness to Build a Professional Community

In this study, museum educators’ self-reflection on their working practice and the emergent contradictions has all manifest their needs for a professional community. Indeed, informed by Ash and Lombana (2013), building a professional community for museum educators is a meaningful practice that is “consistent with museums’ longstanding goal to work with the public to increase accessibility, especially for marginalized population” (p. 58). In this study, the ideal professional working community expected by museum educators was depicted as an environment filled with safety, democracy, and cooperation, which indicates an engaging and participatory working approach (Huffman & Jacobson, 2003; McIntosh, 2011; Silverman & Bartley, 2013). In accordance with the principles of CoP, the museum educators in this study described their current performance and professional practice. They also shared their desires for engagement, imagination, and alignment of museum education work (Kelly, 2011; Wenger, 1998). In this community, museum educators found they have already had, or should have, the ownership of a set of shared beliefs, professional discourses, resources, and practices, which are the foundation of a professional identity and a sense of belongingness towards this profession (Kelly, 2011; Wenger, 1998).
Museum educator’s professional identity was framed in five areas in this study, including work motivation, job responsibility, perceived professional competency, current professional development pathways, and desires for future career growth. The revelation of these identity-related areas is a meaningful way to understand museum educators’ thoughts and practices, which may further represent the discontinuities and boundaries of the museum education as a profession. Informed by Wenger’s (2010) viewpoints, clearly identifying the discontinuities and boundaries of the museum education profession is not to “exclude others but to share a history of learning [that] ends up distinguishing those who were involved from those who were not” (p. 3). Therefore, in terms of understanding museum educators’ self-concept as museum education professionals, this research revealed current Chinese science museum educators’ common knowledge, attitudes, and practices of museum education and a shared identity of being museum education professionals.

Museum educators’ self-concept as museum education professionals is a very complicated and multifaceted phenomenon. This complexity and multifacetedness result from several contextual issues, such as the influence of the social and cultural contexts in which they live and/or their previous life history. For example, museum educators in this study were driven by different motivations to work in science museums. They also went through various role changes during their working practice, including museum educators, subordinates, group leaders, teachers, collaborators, negotiators, and resources seekers. The complicated social and cultural contexts in which they were situated influenced their perceptions of museum education. And such perceptions could further direct museum educators’ working performances and practices in different ways. Therefore, in order to ensure museum educators maximize their educational role in bridging museums with visitors, in a professional community, it is of value to deeply
understand museum educators’ perspectives, thoughts, and expectations about their identity professional needs.

Valuing museum educators’ voices can be fundamental resources for museum education researchers, administrators, and practitioners to define a professional development framework that is really needed by museum educators. For example, several museum educators pointed out the difficulty of conducting a constructivist educational activity, as they had no authentic constructivist learning experiences that had previously been modelled. Thus, in future practices and curriculum designs, it is necessary to add constructivist learning as an important unit in training museum educators. Furthermore, many museum educators in this study expected to be trained through apprenticeship within a learning community. Their perspectives serve to remind museum education researchers, administrators, and course designers to take action in building a professional learning community where novice and veteran museum educators can interact with each other. Overall, hearing museum educators’ perspectives on museum education is a way to show respect to museum educators and an avenue to offer services to meet museum educators’ professional needs.

7.2.2.2 Increase Interaction with Different Museum Education Stakeholders

The museum educators in this study reported various contradictions when they interacted with other museum education stakeholders. These contradictions demonstrated the connectedness and inter-relatedness between museum educators and other sociocultural agencies. As a result, professionalizing museum education work should not be constrained to museum educators. Rather, it is a process of interrogation, conversation, and negotiation between museum educators and other relevant stakeholders. In other words, bridging museum educators and other
stakeholders is a way to facilitate mutual understanding and establish a professional community where museum educators can share thoughts, find resources, and seek social supports. Therefore, it is necessary to increase opportunities for museum educators to interact with other museum education stakeholders, as a way to build a sustainable museum-community relationship and to combat the interference from the contradictions in the work practice encountered by the museum educators in this study.

As Section 6.2.3 indicated, the positive and sustainable interaction between museum educators and other museum education stakeholders cannot be developed without effective boundary objects/brokers. Some of these boundary objects/brokers may have already existed and some may still need to be constructed. Therefore, it is necessary to excavate, construct, and/or reconstruct meaningful boundary objects/brokers to facilitate and mediate the cooperation between museum educators and other stakeholders. As a starting point to resolve contradictions between two sides, implied by the research findings of this study, the enactment of policies may be an authoritative and mandatory force to make connections at a preliminary stage. In a hierarchical and authority-centered culture, a horizontal cooperation between museum educators and other cultural institutions may be difficult without the support from some upper-level authoritative organizations. Grass-rooted boundary brokers/objects cannot work at the beginning. In summary, in order to increase the interaction between museum educators and other museum education stakeholders, the excavation and construction of boundary objects/brokers cannot ignore the cultural influences, the adaptability of boundary objects/brokers in a unique but complex Chinese cultural, educational, and political context.
7.2.2.3 Work through a Research-based Approach

Section 7.2.1.4 suggested cultivating museum educators to be researchers as a good way to ensure the quality of research data in future studies. Moreover, working through a research approach may also be an important way to empower museum educators to reflect and express thoughts on professional identities and needs, and help them monitor and improve their working performance. For example, encouraging museum educators to discuss the contradictory events is a vital point and cutting edge for their professional growth. The conversation between researchers and museum educators can be a catalyst to prompt museum educators’ self-reflection and make museum educators feel that they are cared and concerned by others (Kang, Anderson, & Wu, 2010). It is a process of empowerment, which encourages museum educators to think of their roles, rights, and obligations and holds the potential to help them fight for their own rights and enhance their social reputation (Theresa & Bubp, 2008). As some museum educators in this study shared, they are the pioneers who prompt the development of museum education in China. As the first generation of science museum educators in China, currently, they lack a well-established working model to guide their working practices. As a result, it is important to encourage current museum educators to reflect on their practices, thoughts, and beliefs about museum education and scaffold them to explore the way to establish a culturally appropriate way to work with Chinese audiences. Therefore, from an academic perspective, working through a research-based approach may have a significant impact on facilitating the professionalization of museum education work in China. However, it is necessary to notice that, as participants in this study indicated, the academic theories and studies they need are not abstract and jargon-filled philosophies; rather, it is a process of self-reflection.
As what has been documented as a reciprocal reward to participants in Section 3.2.1 of “researcher’s positionality”, the researcher helped museum educators’ working practice from an academic perspective, such as working with them to edit program reports, offering suggestions on program evaluation strategies, and recommending useful education resources. The value of this working model has already been recognized by some museum education stakeholders. For example, as a by-product of this study, the researcher cooperated with a museum educator (Yan) to publish this reciprocal experience which was invited by the chief editor in Chinese Science and Technology Education journal. In other words, the social interaction between the researcher and participants prompted the construction of a professional learning community, where both museum education researchers and museum educators gain professional growth together.

As indicated by Rasmussen and Winterrowd (2012), cultivating museum educators’ awareness and research ability is a way to enhance their leadership and help them strengthen their own intellectual contribution to the field of museum education. Therefore, inferred by the research process of this study, in future museum education practice, it is necessary to raise museum educators’ research awareness. For example, besides employing an external evaluator to assess the effectiveness of their attitudes and performances, it is also important to encourage museum educators themselves to investigate their educational beliefs and practices. It is a way of protecting museum educators’ professional contribution, gaining a feeling of belongingness, and legitimizing museum education as a profession.

7.2.3 Implications for Theory

The research findings of this study have theoretical implications for the field of museum education and museum educators, mainly from the following two aspects. First, the integral
utilization of CoP (Lave & Wenger, 1991; Wenger, 2010, 2011; Wenger & Snyder, 2000) and CHAT (Engeström, 2001, 2011) can be fruitful perspective and theoretical support and framework to investigate adult and workplace learning phenomenon in non-Western cultural context like in Chinese science museums. As a burgeoning profession, museum education in China is relatively new and immature. The awareness of and the action in establishing professional boundaries, competencies, responsibilities, and communities has not been fully, broadly, and officially recognized and agreed across China. However, looking through the perspective of CoP and CHAT, these ideas have already existed in the practising Chinese science museum educators’ mind in this study. This serves as a reminder that museum educators have the awareness and willingness to be helpers to help themselves, even though they have encountered various difficulties and conflicts in their working practices. This implication is particularly important in a hierarchical authority-centered Chinese culture with a top-down working mode, because it shows respect to the current practising museum educators who are at the very grassroots level in the bureaucratic system in museum education, and recognizes their intellectual contribution. In summary, the utilization of CoP and CHAT in Chinese science museum contexts facilitates and also challenges our understanding of the meaning of museum education and the nature of museum educators’ professional development in Chinese science museum context.

Secondly, professional development is far beyond a simple concept in Chinese science museum education field. As inferred from museum educators’ perception interpreted in this study, professional development is not just a linear process that cultivates someone from the beginning level to being a veteran expert, nor is a single and one-side participation that exclusively belongs to practicing museum educators. Furthermore, it is not an individual, short-
term, and pure technical activity. Instead, implied from museum educators’ articulation about their self-concept as museum education professionals, professional development is conceptualized in a more systematic and complicated way. It includes a constellation of collective and longitudinal activities that are situated in a community context. This process is filled with the interfaces, confrontations, contradictions, and negotiation between museum educators and other museum education stakeholders. In other words, professional development for museum educators is not a simple issue in particular in Chinese context. Rather, it requires for a) epistemological change in the understanding of museum, museum education, and museum educators in China, b) a systematic change that may embrace the organizational transformation in the museum institution where museum educators have worked, and c) the authoritative and political support from the government.

7.3 Limitations and Concluding Thoughts

Due to the time and financial constraints, this study is only limited to 23 museum educators from five science museums located in four cities in mainland China. Thus, as a qualitative study, the research findings of this study cannot be entirely generalized to the whole Chinese science museum context. This study is, however, an important starting point for researchers to focus on Chinese science museum educators, who should be the innovators and enablers of visitors’ meaningful learning experiences.

The interpretation about the experiences and thoughts of museum education work demonstrate museum educators’ expectation for a professional community, and their hope for an interactive, participatory, and safe space where they can share beliefs, values, interests, and seek social support. Establishing a democratic working environment is extremely important, but
difficult and complicated in a typical, authority-centered, and hierarchical Chinese organizational culture. However, it is believed that this goal can be achieved if more and more researchers and museum education practitioners contribute their attention and wisdom in Chinese science museum context, with a purpose to help understand and develop science museums as a lifelong learning space for the general public.
References


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Appendices

Appendix A: Demographic Information Checklist (Chinese Version)

个人信息:
联系方式：
职位：
职称：
性别：□ 男 □ 女
年龄范围：□ 30 岁及以下 □ 31 到 40 岁 □ 41 到 50 岁 □ 50 岁及以上
最高学历：□ 高中及以下 □ 专科文凭 □ 本科文凭 □ 硕士/博士学位
学科专业：
您在本单位工作时间有多长？
如果这不是您的第一份工作，请说明您的工作经历（包括职位和年份）
您参与到“科技馆活动进校园”这个项目有多长时间？
您是否有教师资格证书？
□ 有 □ 无

工作单位信息：
单位名称：
部门名称：
单位人数：
部门人数：
您部门里参与到“科技馆活动进校园”项目的人数：
Appendix B: Demographic Information Checklist (English Version)

Personal Information Part:

Your contact information: ________________________________________________________

Job Title: ________________________________

Position: ________________________________

Gender: □ Male    □ Female

Age Range: □ 30 and below   □ 31 to 40   □ 41 to 50   □ 50 and above

Educational Level:

□ High school and below   □ college and bachelor’s degree   □ Master’s degree doctoral degree

Please indicate your degree discipline: ______________________________________________

How long have you worked in this institution? ________________________________

If this is not your first job, please indicate your working experience (including the job title and year).

_____________________________________________________________________________
_____________________________________________________________________________

How long have you been engaged in the “Bridge Museums to Schools” Program? __________

Do you have a teacher certificate? □ Yes    □ No

Institution Information Part

The name of your institution: ______________________________________________________

The name of your department: ____________________________________________________

How many people are working in your institution? ________________________________

How many people are working in your department? ________________________________

How many people are engaged in the “Bridge Museums to Schools” in your department? _____
Appendix C: Interview Protocol (English Version)

1. Why did you make the decision to work in the museum?

2. Please describe your job content.

3. So far, from your working experience, please indicate three to five attributes you perceive have dominant impact on museum education work. And explain why.

4. Have you ever met some harsh moments in your work? And please describe it.

5. Do these moments still exist? If yes, please describe how they impede your work. If not, please indicate the way you overcome the difficulties.

6. How do you evaluate your current working performance? Please indicate three points that you have done well, and three points which you regard needs improvement.

7. How do you depict your working status in five years?

8. If possible, what working aspect do you expect to change? In what way?
Appendix D: Interview Protocol (Chinese Version)

1. 是什么原因促使您来科技馆工作的？
2. 请描述您的工作内容。
3. 根据您的工作经历，请总结出三到五个影响科技馆教育工作成效最显著的因素，并给出理由。
4. 您在工作中是否有过困难的时候？请给出相关描述。
5. 上面提及的困难目前是否仍然存在？如果是，请描述这些困难如何影响到您的工作；如果不是，请描述解决这些困难的方法途径。
6. 您是如何评价目前的工作效果？请描述三个您认为做得不错的地方以及三个需要进一步改进的地方。
7. 您在未来五年内对自己工作状态的愿景有哪些？
8. 如果这项工作还存在着改进的地方，您倾向于往哪个方向变化？为什么？