Effects of Curriculum Alignment, Professional Development, and Access and Resources on Teaching Strategies for Museum Education

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Abstract: Despite government efforts to promote museum awareness in education in China, little evidence exists on why there is a teaching gap in this discipline. This study explores factors contributing to this gap and classifies the levels of curriculum alignment, professional development, access, and resources among museum educators, along with their teaching strategies. The independent variables include curriculum alignment, and access and resources. Data were collected from 75 respondents in Guizhou Province, China. Data were analysed using descriptive statistics that involved estimating mean and standard deviation and also inferential statistics using two-way MANOVA and two-way ANOVA. Findings reveal high levels of curriculum alignment and access and resources but moderate levels of professional development. Teaching strategies for museum curriculum were reported at a high level overall. Significant difference was found in alignment, and access and resources based on gender, with female educators exhibiting higher alignment and access and resources but lower professional development compared to males. Significant interaction impact was found between educatos' gender and experiences towards the teaching strategies for museum curriculum ($F=25.111$; $p=0.000$; $p<0.05$). Hence, policy makers and curriculum developers are urged to propose selected attributes of teaching that enhance the promotion of museum to the students and the public at large. Policy makers should consider targeted teaching attributes to enhance museum promotion to students and the public.

Keywords: Museum education, Curriculum alignment, Access, Resources, Teaching strategies

1. Introduction

Over the past few years, the contribution and involvement of museums as significant key organisations for education has accrued growing recognition. Outside their conventional roles and functions considering cultural archives or heritage centres, museums have become evident as settings for informal discipline learning. Past studies accentuate that interactive and engaging experiences extended by museums can augment and boost learning according to modalities dissimilar from conventional educational contexts (Hui et al., 2023; Weber, 2022). Educational experts, researchers and federal agencies agree that the integral and constitutional value an informal milieu such as museum contributes to the wide-ranging realm of education (Elgammal et al., 2020; Fuste Forne, 2024; Wu et al., 2021). Museums have been ascertained to galvanise scientific inquisitiveness, sustain critical thinking, and intensify visitor comprehension of scientific philosophies and principles (Spadoni et al., 2022). Hitherto, incorporating the informal educational potentiality of museums into structured and persistent teaching strategies unveils its unique array of challenges. Although the distinct possibilities provided by museum are well-orchestrated, seamlessly integrating these experiences with formal education inventiveness demands careful deliberations and strategic planning (Downey et al., 2007; Mamur et al., 2020). This is essential in esuring that museum visits effectively enrich and enhance the educational sector.

Curriculum alignment is essential for museum educators for several reasons such as providing confirmation that museum educational contributions align with educational ethics or themes that visitors, specifically students, are gaining and learning in their academic contexts (Wang, 2023; Vallance, 2004; Ziebell & Suda, 2020). Educators' access to resources involves not merely the learning materials accessible through the museum but also assistance from the management and the capability to take part in collaboration with additional educational organisations or authorities (Deng, 2019; Merriman, 2022). The resources consist of educational technology, learning materials, and collections from the museums.

When investigating museum education within China, aspects on the subtle and delicate mosaic of culture, historic, and educational attributes that explain the country's learning atmosphere must be given utmost considerations (Abasa & Liu, 2007; Sun et al., 2019). Museums in China are not just stewards of an ancient culture possessing a deep legacy in addition to contemporary centres of learning that replicate China's vigorous educational transformations. To begin with, the national policies, for instance the Law of Mandatory Education of the People's Republic of China, has a critical role in moulding instructive prevalences and practices universally, that spans the scope of museum education (Hongbiao, n.d; Pei & Que, 2019). This national policy and law warrant that the quality and content of education, encompassing that offered by museums, conforms to the state's educational goals, theoretically guiding the progress and formulation of museum curriculum, teaching materials and the strategies utilised by museum educators (Curriculum Plan, Mandatory Educational System, 1994).

Nevertheless, academic and educational advancement through China's education system, defined by substantial transformation for instance the 12-year national basic education resourcefulness, has consequences for the strategies implemented in museum education (Abasa & Liu, 2007; Sun et al., 2019; Xu, 2020;). These transformations strive to create citizens who are not merely scholastically competent but also inventive, groundbreaking, analytical thinkers and socially cognisant individuals. Consequently, museums must possess the chance to enhance formal education through supplying multidisciplinary learning involvements and experiences which are simultaneously reflective of China's academic ambitions and aspirations (Luo, 2018). The aforementioned experiences might encompass displays that intertwine science with foundations of Chinese culture and history, workshops that boost analytical critique and use of scientific concepts, and activities designed to connect theory with real-life application in an interactive way.

In Chinese museums, the main educational activity for a long time consisted of didactic tours led by properly qualified docents or museum staff members (Fang & Li, 2021). Following the Cultural Revolution (1966-1976), art museums in mainland China saw a revival, as the country shifted its attention from politics to economic progress and democratic governance (Chang et al., 2021). There is a growing recognition among the government and the public about the significance of the educational aspects of museums, as well as the value of specialised educational initiatives in

enhancing the overall experience of visitors to museums (Monteagudo-Fernández et al., 2021). By providing educators with the requisite knowledge, access, resources, competences, affnd pedagogical functionality, museum education has the possibility to function as an important tool for enhancing the standard of educational experiences in museums. The relationship between museum education and formal education is a crucial element in debates on the pedagogical function of museums (Hansson & Ohman, 2022).

Similarly, the world emphasises museum-cultured and learned individuals, experts, professionals, and leaders (Rivero et al., 2023), and its relevance should not be compromised or overlooked. According to Hansson and Ohman (2022), the relationship between museum education and formal education has been a central focus in discussions about museums' academic role. As a result, in China, where museum education is becoming increasingly important in meeting the demands and needs of a rapidly developing educational and cultural fraternity, museum education has the potential to help learners develop social and cultural cognisance, lifelong learning skills, and critical thinking (Shi Qi, 2024). By including collaborative exhibits, immersive activities, and highly engaging encounters, museums may provide appealing opportunities for students to learn cultural heritage, imaginative expressions, and documented descriptions in real and authentic settings (Chen, 2017; Qin et al., 2021). Furthermore, museum teachers in China may collaborate with official educational groups to align their programmes with the national curriculum, ensuring that museum visits enhance classroom learning and support key educational concepts (Roberson, 2011; Wei et al., 2023). Putting a focus on teaching methodologies or pedagogical components of museum education in China can help to advance the development of culturally informed individuals, professionals, and experts who are well-equipped to engage with and contribute to society's diverse culture (Roberson, 2011; Wei et al., 2023; Sidhu et al., 2023). As a result, recognising the importance of museum education in stimulating educational enrichment and cultural awareness is critical to meeting the educational demands of students and steering them towards success with acceleration and a united world (Shi, 2024).

In investigating the effects of curriculum alignment, access to resources, and obtainability on the teaching strategies of museum educators, it is apparent that the relationship between formal and informal education contexts is essential (Abasa & Liu, 2007; Forne, 2024). Kisiel (2014) supports the harmonious gains between schools and museum education for instance the support from national agencies highlights the main role of informal science education institutions or ISEIs (museums, science centres, aquariums, and the like) in promoting museum and K-12 science education, a supporting argument for better curriculum alignment between these agencies, formal and informal education. Kisiel (2014) highlights the exclusive contributions of informal settings, for instance museums, in promoting and cultivating student interest in museums, signifying that these institutions address characteristics of museum learning that traditional classrooms may fail to notice. This viewpoint is important when considering how museum educators plan, execute and strategise teachings to nurture and sustain this interest among students. Kiseil (2014) also probes into the numerous challenges integral in founding significant museum-school partnerships. Kiseil (2014) explained that factors such as communication, capacity, authority and interactions between museums and schools are some of the challenges faced by educators. There is a need to comprehend these issues and challenges that can guide museum educators in improvising their strategies to coordinate the school curricular objectives more efficiently. One good example to foster professional development between educators and museum will be through establishing ISEI that can enhance educators' continuous professional development and ongoing learning. Kiseil (2014) divulged that the advantages of student-driven communication with science that such contexts provide, infer that museum educators can adjust and modify their strategies to integrate inquiry-based and abundant in phenomena experiences into their instructional planning. Educators must coordinate informal resources for instance from ISEI with their curriculum, accentuating the educators' role in operative pedagogical amalgamation. Museum educators' decision-making process is important in forming their teaching strategies. Museum educators can make teaching and learning more meaningful by incorporating ISEI resources aligned to curricula, and resource accessibility that could contribute to effective teaching strategies within the exceptional setting of museum education.

Museum education has an important role in offering immersive and enriching learning experiences and exposure for students. Nevertheless, one of the challenges encountered by museum

educators is in aligning and positioning their curricula with the educational objectives and standards decided by schools (Alwi & Saidin, 2019; Pei & Li, 2019). This discrepancy can provoke in a mismatch between what students are exposed to during classroom learning and what they undergo and experience during museum visits. The next problem encountered by museum educators is to access the appropriate resources and materials to augment their teaching strategies as stated by Mirghadr et al. (2018). Inadequate accessibility to resources, materials, training, and technology can delay museum educators' capability to successfully occupy students and disseminate exemplary education (Mirghadr et al., 2018). Despite museums supplying a plethora of resources for instructional purposes, namely artifacts, exhibits, and experts, the accessibility and obtainability of these resources may fluctuate. Marcus et al. (2012) noted that museum educators always encounter the problem of inadequate access to museums for field trips and additional educational chances. When educators encounter lack of access in terms of the resources, this can indirectly affect their teaching strategies, because they might need to depend on substitute resources and methods to offer all-inclusive learning experiences for their students in the classrooms. According to Ziabell and Suda (2020) and Lau and Sikorsi (2018), the curriculum congruence, restricted access to museum materials or resources, and restricted materials and resources for teaching strategies affect museum educators' capability to efficiently teach and offer comprehensive and meaningful learning experiences for students. When museum educators have limited access to museum resources and materials, museum educators might be constrained in their capacity to offer hands-on, interactive and immersive student learning experiences (Chun & Lai, 2021; Ziebell & Suda, 2020; Sulistyanto et al., 2023).

Thus, the objectives of this current study are to examine the level of curriculum alignment, professional development and access and resources among educators, to examine the level of teaching strategies for museum curriculum implemented by educators, to identify the differences of curriculum alignment, professional development and access and resources based on gender and teaching experiences and to identify the differences of teaching strategies for museum curriculum implemented by educators based on gender and teaching experiences.

The current study has been able to establish supporting variables namely curriculum alignment, professional development, access and resources based on gender, experiences and teaching strategies of museum educators regardless of education level in accordance to the literature review.

Wang (2023) explains that curriculum alignment of museum education is the process of ascertaining that the museum curriculum resources, educational programmes and experiences offered by museums are related to and favourable of formal education backgrounds. This compliance encompasses developing a unified and cohesive learning experience for students that correlates and augments their classroom understanding and learning (Vallance, 2004).

Previous research studies have investigated the function of collaboration between formal education and museums backgrounds, examining the problems and expectations encountered by museum educators. These studies had shed light on factors for instance problems related with capacity, authority, communication and difficulty that affect the accomplishment of collaborative efforts and actions between schools and museums. A study by Feinstein et al. (2013) touched on problems ingrained in programmes where museum education and schools communicate. The researchers reported that factors namely communication restrictions and contradicting expectations for teacher engagement can influence the accomplishment of these collaborations. Vallance (2004) examined the role of museum education exemplifying curriculum in formal education background. In this study, Vallance (2004) put forward four classical models of museum education curriculum and anticipated a fifth model that links museum education according to the conventional plot structure. These studies provide insight on the significance of positioning museum education with formal education and the challenges to be considered in creating a consequential and effective collaborations between schools and museums.

Given the fast-paced nature of the modern world today, the importance of precise weather forecasts cannot be emphasised enough. This is in relation to a study by Tal and Steiner (2006) who mentioned that museum educators guiding field trips had a more considerable anticipations for teacher participation juxtaposed to educators themselves. These distinctions in expectations can affect and influence the experience and possibly dampen educators who possess their individual notions of an effective field trip. These studies reported that factors namely communication, capacity, and complexity can affect the accomplishment of these collaborations.

Kisiel (2004) divulged that museum education has an important function to play in facilitating and improving student learning in formal education background. Efforts should be put forward to acknowledge the prospective of informal learning experiences in museums and other comparable organisations to enhance and complement formal education. Pavlou (2022) investigated the obstacles and opportunities of museum education for pre-service educators through the digital learning environment. Findings reported by Pavlou (2022) showed that educators appreciate museums for their inherent promise and capabilities to encourage historical grasp; however, factors for instance educators' level of knowledge, competence, skills, logistics and costs associated to museums restrict the quality and quantity of museum trips. Pavlou (2022) mentioned that educators always play the conventional role of handling students when they take students out for museum field trips, whereas museum educators prefer educators to play an active role by taking part in activities, posing and responding to questions. Amoako-Ohene et al. (2020) claim that interaction between museum staff and educators, specifically at the primary school level, in many cases is restricted and can impede accomplishment of museum education programmes.

Another important factor to consider in relation to evolving educators, teaching strategies for museum curriculum will be the educators' gender and their teaching experiences. Past studies have exposed that educators' gender and their teaching experiences can affect the way they teach, behaviours, and attitudes in the museum context (Islek, 2021; Karnezou et al., 2021). For instance, studies have reported that female educators show more inclination to infuse interactive and collaborative activities when they teach museum-based lessons, whereas male educators show more tendency towards conventional and dogmatic approaches. Furthermore, educators with increased instructional practices could hold a more profound insight of pedagogical strategies and are more competent at acclimatising their museum lessons to fulfil the varied student interests and needs (Ahsni et al., 2023). These results emphasize the need to recognise and address educators' gender and their teaching experiences during the creation of museum curriculum and supplying professional development prospects (Karnezou et al., 2021).

Nevertheless, rather than using an integrated curriculum, the majority of educators continue to follow the traditional subject-based curriculum for museum education (Cheng et al., 2022; Li, 2020; Singh et al., 2017). Resources available outside of the classroom, such libraries and museums, are undervalued and ignored. In the absence of sufficient training programmes, museum visits will cease to be educational pursuits and turn into recreational outings (Chitima, 2022). Children-centred Museum programmes did not succeed in China, despite the fact that Chinese policymakers reinforced the significance of out-of-school learning environments and required kindergartens to implement a more comprehensive curriculum by utilising various social and public resources (State of Council, 2020; Wong & Piscitelli, 2019).

Wang (2023) explains the utilisation of museum curriculum resources to nurture historical materialism knowledge in selected schools. The researcher points out the potential advantages of utilising museum curriculum resources in schools. It was also argued that infusing museum resources as part of the syllabus can boost students' comprehension of historical knowledge and enhance their learning. The findings show that educators can gain benefit from museum resources if they embed the resources into the conventional school syllabus (Pei & Que, 2019). Furthermore, there is very little research on educators' opinions about museum excursions. According to early studies, educators' desire to conduct class excursions to museums is greatly influenced by external variables such as policies and insufficient training (Wu, 2024). Nevertheless, very few studies in the literature address internal variables (like attitudes) or the interaction of internal and environmental factors that affect educators' opinions about museum excursions (Wu, 2024). Prior research has shown that inadequate curriculum reform is the root cause of undeveloped after-school activities such as student museum excursions. An effective curriculum reform programme begins with excellent teacher preparation (Fan, 2022; Li, 2020). According to Korthagen (2010), pre-service educators must be fully aware of and reflect on their perspectives as part of their teacher education.

Theoretical Framework

The theoretical framework of this current study is grounded on two theories namely the Theory of Planned Behaviour (TPB) (Ajzen, 1991) and Pragmatism Theory (Dewey, 1981). Wu

(2024) explains that the Theory of Planned Behaviour (TPB) theorises that intention is the principal predictor human behaviours and the fundamental mental mechanisms where individual's behaviour (subjective norms), mindset, and perceived behavioural control predict educators' intention. Past studies have extensively employed Theory of Planned Behaviour to predict educators' behaviour intention (Sahli Lozano et al., 2021; Malak et al., 2018). The Theory of Planned Behaviour has predictive ability for factors that affect museum educators to promote museum education to students and there are three determinants that affect museum educators' behavioural intention practices (Ajzen, 1991). In this study, the behavioural intention is operationally defined as museum educators' intention of infusing museum education for students. Curriculum alignment refers to educators aligning syllabus with museum educational ethics or themes. Access and resources refer to the availability of materials for educators to refer. Teaching strategies refer to educators' ability to infuse current pedagogical strategies at adapting their museum lessons. Other significant predictors of educators' intention to teach, they exert secondary influence, facilitated through intention on gender and professional development (Kupers et al., 2023). The Pragmatism theory is an important theoretical foundation for this study and this theory postulates that the practical application of knowledge as well as the significance of human behaviour, beliefs, and values emerges as the ultimate outcome of the interplay between various cognitive and environmental aspects parallel to proximate performances and behaviours.

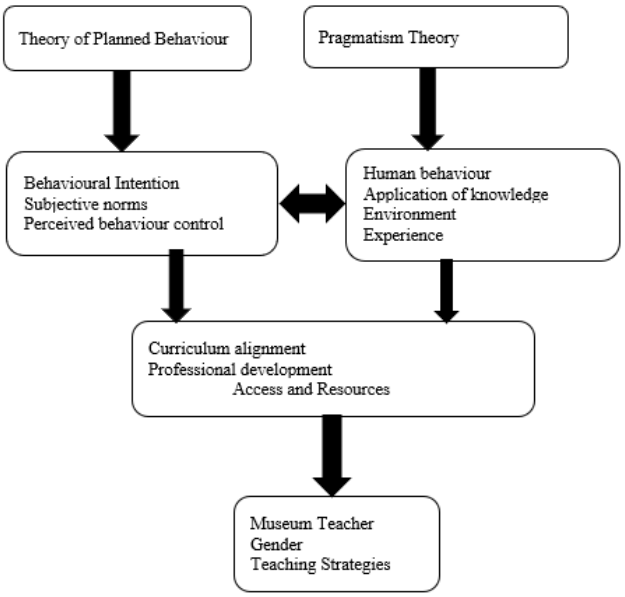

Fig 1. Proposed Theoretical Framework

Table 1. Proposed Hypotheses

Hypothesis No.	Hypothesis Statement
Ho1a	Ho1a: There are no differences of curriculum alignment, professional development and access and resources based on gender.
Ho1b	Ho1b: There are no differences of curriculum alignment, professional development and access and resources based on teaching experiences.
Ho1c	There is no interaction between gender and teaching experiences for curriculum alignment, professional development and access and resources.
Ho2a	Ho2a: There are no differences of teaching strategies for museum curriculum that implemented by educators based on gender.

Hypothesis No.	Hypothesis Statement
Ho2b	There are no differences of teaching strategies for museum curriculum that implemented by educators based on teaching experiences?
Ho2c	There is no interaction between gender and teaching experiences for teaching strategies for museum curriculum.

2. Methodology

A quantitative research design was utilised in this study and data were obtained through the survey questionnaire. Data were collected from 75 respondents in Guizhou Province, China. A convenience sampling technique was employed in this study and the data were gathered by employing pre-validated scales using a five-point Likert scale. The survey questions were modified by the researchers to better reflect the context of the recently concluded studies that they considered to be crucial. Table 2 lists the variables, the number of items, the justification for selecting the instruments, and an example of a representative item from the questionnaire.

The findings of the study were analysed using the Statistical Packages for the Social Sciences (SPSS) Version 23 that involved estimating mean and standard deviation and also inferential statistics that made use of two-way MANOVA and two-way ANOVA. Based on the sample data, conclusions about the population were drawn using inferential statistics. Inferential statistics, according to Antonius (2003), can be used to extrapolate generalisations from the sample and provide predictions about the population. The findings and discussions are shown next.

Table 2. Adapted scales for all the constructs

Variable	Source	No. of Items	Example
Curriculum alignment	Mackety et al. (2003) & the Institute of Museum and Library Services (IMLS) (1998)	8	'I make sure learning objectives of the curriculum aligns with the educational goals of museum or visit.'
Professional development	Mackety et al. (2003)	8	I get the opportunity to participate in seminars focused on teaching strategies related to museum curriculum.'
Resources and Access	Mackety et al. (2003)	8	'Students need discount rate from museums for education visits purposes.'
Teaching strategies	Mackety et al. (2003) & the Institute of Museum and Library Services (IMLS) (1998)	12	'…include the integration of hands-on activities.

3. Findings

The descriptive analysis is used to comprehensively describe the respondent profiles and address the research questions by referring to the minimum score interpretation, as outlined in the table below.

Table 3. Mean Score Interpretation

Mean Score	Interpretation
0.00 – 2.00	Low
2.01 – 3.00	Low Moderate
3.01 – 4.00	High Moderate
4.01 – 5.00	High

Profile Demography

This study involves a total of 75 respondents. The demographic profile of the study participants is presented in detail as shown in the following Table 4.

Table 4. Profile Demography

Profile	Demography	Frequency	Percentage
Gender	Male	40	53.3
	Female	35	46.7
Age	Less than 20 years old	16	21.3
	20-25 years old	45	60.0
	26-30 years old	8	10.7
	30 years old and above	6	8.0
Qualification	Diploma	27	36.0
	Bachelor Degree	34	45.3
	Masters	14	18.7
Experiences	0 – 5 years	62	82.7
	6 – 10 years	13	17.3
Visits To Museum in Year	1	53	70.7
	2	21	28.0
	3	1	1.3
Current Level of Knowledge in Museum	Novice	55	73.3
	Intermediate	20	26.7

Based on the Table 4, the demographic profile of the study respondents consists of male respondents (53.3%) and female respondents (46.7%). In terms of age, respondents were those below 20 years old (21.3%), 20 to 25 years old (60%), 26 to 30 years old (10.7%) and 30 years old and above (8%). This study also consists of students with diploma qualification (36%), bachelor degree (45.3%) and masters (18.7%). Next for experience, this study involves respondents with less than 5 years of teaching experiences (82.7%) and 6 to 10 years of teaching experiences (17.3%). In terms of their visit to museum in year, there are 53 respondents with 1 times of visit to museum in a year, 21 respondents for 2 times of visit to museum in a year and 1 respondent for 3 times of visit to museum in a year. This study also consists of respondents with novice level of knowledge in museum (73.3%) and intermediate level of knowledge in museum (26.7%).

Level of Curriculum Alignment, Professional Development, Access And Resources Among Educators

Research Questions 1: What are the levels of curriculum alignment, professional development and access and resources among educators?

Table 5 shows the results of the descriptive analysis conducted, providing frequency values, percentages, means, standard deviations, and interpretations for each of the involved aspects.

Table 5. Curriculum Allingment

Item	SD	D	U	A	SA	Mean	SD	Interpretation
I make sure learning objectives of the curriculum aligns with the educational goals of museum or visit.	0	0	0	57 (76%)	18 (24%)	4.24	0.42	High
I make sure the content in the curriculum is align with the content outlined by museums for educational purposes.	0	0	8 (10.7%)	59 (78.7%)	8 (10.7%)	4.00	0.46	High Moderate
I make sure students can develop skills provided in the curriculum for instance critical thinking through museum activities.	0	0	12 (16%)	52 (69.3%)	11 (14.7%)	3.98	0.55	High Moderate
It is important to note the conceptual framework presented by museum reflects the concept and theory in the curriculum.	0	2 (2.7%)	13 (17.3%)	58 (77.3%)	2 (2.7%)	3.80	0.51	High Moderate
The museum visit should fit the scope of curriculum.	0	0	19 (25.3%)	38 (50.7%)	18 (24%)	3.98	0.70	High Moderate
Assessment methods used during or after museum visit must match the assessment strategies stipulated in the curriculum.	0	0	1 (1.3%)	64 (85.3%)	10 (13.3%)	4.12	0.36	High
I provide opportunities for	0	0	14	41	20	4.08	0.67	High

Item	SD	D	U	A	SA	Mean	SD	Interpretation
interdisciplinary association between content given by museum and the curriculum.			(18.7%)	(54.7%)	(26.7%)			
I put emphasis on cultural and contextual significance of the museum content and the curriculum.	0	0	3 (4%)	58 (77.3%)	14 (18.7%)	4.14	0.45	High
Curriculum alignment						4.04	0.22	High

The descriptive analysis indicates that overall curriculum alignment is at a high level with amean value of 4.04 and a standard deviation of 0.22. The highest mean value item is "I make sure learning objectives of the curriculum aligns with the educational goals of museum or visit" with a mean value of 4.24 and a standard deviation of 0.42, placing it at a high level. Based on these findings, 18 individuals or 24% expressed "Strongly Agree." However, 57 individual or 76% expressed “Agree”. Meanwhile, the lowest mean value belonged to the item "It is important to note the conceptual framework presented by museum reflects the concept and theory in the curriculum" (M = 3.80, SD = 0.51, placing it at moderately high level. Based on these findings, two individuals or 2.7% disagreed. However, two individuals or 2.7% strongly agreed.

Table 6. Professional development

Item	SD	D	U	A	SA	Mean	SD	Interpretation
I get the opportunity to participate in seminars focused on teaching strategies related to museum curriculum.	11 (14.7%)	41 (54.7%)	8 (10.7%)	15 (20%)	0	2.36	0.96	Low Moderate
I attend conferences related to museum curriculum.	2 (2.7%)	57 (76%)	11 (14.7%)	3 (4%)	2 (2.7%)	2.28	0.70	Low Moderate
I get the chance to attend in-service training session for my professional development in combining curriculum and aspects of museum.	23 (30.7%)	29 (38.7%)	1 (1.3%)	22 (29.3%)	0	2.29	1.19	Low Moderate

Item	SD	D	U	A	SA	Mean	SD	Interpretation
I get the opportunity to share my knowledge with educators from other provinces on teaching aspect of museum.	8 (10.7%)	45 (60%)	2 (2.7%)	19 (25.3%)	1 (1.3%)	2.46	1.03	Low Moderate
I participate in museum program for learning purposes.	25 (33.3%)	25 (33.3%)	3 (4%)	22 (29.3%)	0	2.29	1.21	Low Moderate
I know that curriculum standards for museum programs are crucial for museum program experiences.	0	50 (66.7%)	20 (26.7%)	5 (6.7%)	0	2.40	0.61	Low Moderate
I know the importance of the resource kits (trunks containing artifacts, instructional media, curricula, etc.	13 (17.3%)	35 (46.7%)	2 (2.7%)	24 (32%)	1 (1.3%)	2.53	1.15	Low Moderate
Engagement in museum projects is important for educators.	0	21 (28%)	1 (1.3%)	36 (48%)	17 (22.7%)	3.65	1.12	High Moderate
Professional Development						2.53	0.84	Low Moderate

Table 6 displays the results of the descriptive analysis conducted for professional development, presenting frequency values, percentages, means, standard deviations, and interpretations for each item. The descriptive analysis indicates that overall professional development is at a low moderate level with a mean value of 2.53 and a standard deviation of 0.84. Item "Engagement in museum projects is important for educators" obtained the highest mean value of 3.65 and a standard deviation of 0.84, placing it at a high moderate level. Based on these findings, 17 individuals or 22.7% expressed "Strongly Agree." However, 21 individual or 28% expressed “Disagree”. Meanwhile, the item with the lowest mean value is "I attend conferences related to museum curriculum" with a mean value of 2.28 and a standard deviation of 0.70, at a moderately low level. Based on these findings, two individuals or 2.7% strongly disagreed. However, two individuals or 2.7% strongly agreed.

Table 7. Access and resources

Item	SD	D	U	A	SA	Mean	SD	Interpretation
Financial support is needed for admission fee and program costs linked with educational museum activities.	0	0	0	63 (84%)	12 (16%)	4.16	0.36	High
Students need discount rate from museums for education visits purposes.	0	1 (1.3%)	19 (25.3%)	28 (37.3%)	27 (36%)	4.08	0.81	High
Schools require transportation assistance for students to ease access to museums.	0	0	0	56 (74.7%)	19 (25.3%)	4.25	0.43	High
Educators need grants or scholarships to support education museum visits.	0	0	1 (1.3%)	72 (96%)	2 (2.7%)	4.01	0.20	High
More access to educational resources related to museum should be provided to support museum learning.	0	0	0	59 (78.7%)	16 (21.3%)	4.21	0.41	High
Museum staff plays an important role to guide educators and students during the educational visits.	0	0	13 (17.3%)	36 (48%)	26 (34.7%)	4.17	0.70	High
More museum facilities and programs should be made accessible to students with disabilities.	0	0	7 (9.3%)	46 (61.3%)	22 (29.3%)	4.20	0.59	High
More promotions on museum education should be made via social media, radio, schools and other relevant platforms.	0	0	0	47 (62.7%)	28 (37.3%)	4.37	0.48	High
Access and resources						4.18	0.33	High

Table 7 presents the results of the descriptive analysis conducted for access and resources, outlining frequency values, percentages, means, standard deviations, and interpretations for each item. The descriptive analysis indicates that overall access and resources is at a high level, with a mean value of 4.18 and a standard deviation of 0.33. The item with the highest mean value is "More promotions on museum education should be made via social media, radio, schools and other relevant platforms" (mean value of 4.37 and standard deviation of 0.48), placing it at a high level. Based on these findings, 28 individuals or 37.3% expressed "Strongly Agree." However, 47 individual or 62.7% expressed “Agree”. Meanwhile, the item with the lowest mean value is "Educators need grants or scholarships to support education museum visits" (M = 4.01, SD = 0.20), at a high level. Based on these findings, one individual or 1.3% was undecided. However, two individuals or 2.7% strongly agreed. The descriptive analysis suggests a high level of overall curriculum alignment, particularly in terms of ensuring learning objectives are in line with educational goals. However, there are minor differences in how museums portray their conceptual framework. Professional development is fairly low, with varied degrees of agreement on the significance of participating in museum projects and attending related conferences. Access and resources are generally plentiful, particularly in terms of promoting museum education through multiple platforms, while there is some debate about the necessity for grants or scholarships to fund museum visits.

Level of Teaching Strategies For Museum Curriculum

Research Questions 2: What is the level of teaching strategies for the museum curriculum implemented by educators?

Table 8 shows the results of the descriptive analysis conducted for teaching strategies for the museum curriculum, detailing frequency values, percentages, means, standard deviations, and interpretations for each item.

Table 8. Teaching Strategies for Museum Curriculum

Item	SD	D	U	A	SA	Mean	SD	Interpretation
Include the integration of hands-on activities.	0	0	1 (1.3%)	34 (45.3%)	40 (53.3%)	4.52	0.52	High
Necessitates the use of real objects in the classroom.	0	0	0	73 (97.3%)	2 (2.7%)	4.02	0.16	High
Requires the gathering of information from exhibits or displays in the classroom.	0	0	1 (1.3%)	38 (50.7%)	36 (48%)	4.46	0.52	High
Includes students’ activation of their prior knowledge.	0	0	2 (2.7%)	60 (80%)	13 (17.3%)	4.14	0.42	High
Includes activation of students’ critical thinking skills.	0	0	1 (1.3%)	49 (65.3%)	25 (33.3%)	4.32	0.49	High
Requires students to engage in discussions and present their findings.	0	0	7 (9.3%)	66 (88%)	2 (2.7%)	3.93	0.34	High Moderate

Item	SD	D	U	A	SA	Mean	SD	Interpretation
Requires heuristic teaching.	0	0	3 (4%)	51 (68%)	21 (28%)	4.24	0.51	High
Requires the utilization of digital resources.	0	0	1 (1.3%)	54 (72%)	20 (26.7%)	4.25	0.46	High
Requires the need to incorporate project-based learning.	0	2 (2.7%)	1 (1.3%)	58 (77.3%)	14 (18.7%)	4.12	0.54	High
Prioritizes students' interest.	0	0	7 (9.3%)	41 (54.7%)	27 (36%)	4.26	0.62	High
Requires real-world examples.	0	0	24 (32%)	37 (49.3%)	14 (18.7%)	3.86	0.70	High Moderate
Requires fun learning environment.	0	0	0	23 (30.7%)	52 (69.3%)	4.69	0.46	High
Teaching Strategies for Museum Curriculum						4.23	0.30	High

The descriptive analysis indicates that overall teaching strategies for museum curriculum is at a high level, with a mean value of 4.23 and a standard deviation of 0.30. The item with the highest mean value is "Requires fun learning environment" with a mean value of 4.69 and a standard deviation of 0.46, placing it at a high level. Based on these findings, 52 individuals or 69.3% expressed "Strongly Agree." However, 23 individuals or 30.7% expressed "Agree". Meanwhile, the item with the lowest mean value is "Requires real-world examples" with a mean value of 3.86 and a standard deviation of 0.70, at a moderately high level. Based on these findings, 24 individuals or 32% were undecided; however, 14 individuals or 18.7% strongly agreed.

The descriptive analysis suggests that teaching practices for museum curriculum are typically well-rated. The necessity for an enjoyable learning environment is the most desired component, with real-world examples receiving a reasonably high ranking. Respondents, on the other hand, are divided on whether real-world examples are necessary.

The Differences of Curriculum Alignment, Professional Development, and Access and Resources Based on Gender and Teaching Experience

Research Question 3: What are the differences in curriculum alignment, professional development and access and resources based on gender and teaching experiences?

Ho1a: There are no significant differences of curriculum alignment, professional development and access and resources based on gender.
Ho1b: There are no significant differences in curriculum alignment, professional development and access and resources based on teaching experiences.
Ho1c: There are no significant interactions between gender and teaching experiences for curriculum alignment, professional development, and access and resources.

To answer this research question, a Two-Way MANOVA test was employed. Before undertaking the two-way MANOVA analysis, a test for the normality of variance-covariance matrices was conducted using skewness and kurtosis values (Table 9).

Table 9. Normality Test

Aspect	Skewness		Kurtosis	
	Value	SE	Value	SE
Curriculum alignment	0	0	0	0
	.728	.277	.124	.548
Professional Development	0	0	-	0
	.619	.277	0.957	.548
Access and resources	0	0	-	0
	.071	.277	1.149	.548

Based on Table 9, all aspects are normally distributed, with skewness and kurtosis values within the range of ± 1.96 (Hair et al., 2010). Before the two-way MANOVA analysis, a test was conducted to determine the homogeneity of variance-covariance matrices using Box's M test. This test is significant for identifying whether the variance-covariance among the dependent variables is the same or the opposite across all the independent variables. This is an essential prerequisite for the Two-Way MANOVA test. Two-way MANOVA test assumes that variance-covariance among the dependent variables is the same across all the independent variables (Green et al., 1997; Hair et al., 2010). The results of Box's M test are displayed in Table 10.

Table 10. Box's M

Box's M	F-Value	Df1	Df2	Sig
40.707	6.377	6	14005.725	0.000

Based on Table 10, significant differences in variance-covariance exist among the dependent variables for all level of independent variables ($F = 6.377$, $p = 0.000$, $p < 0.05$). This indicates that the variance-covariance of the dependent variable is not homogeneous across all the independent variables. Stevens (1986) noted that although the metrics for homogeneity of variance-covariance (Box's M test) is significant, it poses no problem for the MANOVA test if the sample size is large and almost the same (biggest sample/ smallest sample < 1.5) because the impact of type I error is very small. In this study, the sample size is large and somewhat similar, hence the MANOVA test can still be applied.

In the Two-Way MANOVA analysis, several types of statistical tests such as Wilks' Lambda, Pillai's Trace, Hotelling's Trace and Roy's test can be used. Each type of statistical test is to test hypothesis multivariate where the population means are similar. The researcher used the Wilks' Lambda statistical test because it has been commonly used and reported in social sciences studies (Green et al. 1997). Table 11 shows the results of Two-Way MANOVA test.

Table 11. Wilks' Lambda

Effect	Wilks' Lambda Value	F-Value	DK between group	DK within group	Sig.
Gender	0.575	16.998	3	69	0.000*
Experiences	0.927	1.811	3	69	0.153
Interaction Gender*Experiences	0.466	26.335	3	69	0.000*

* Significant at $p < .05$

Based on Table 11, significant differences were found in curriculum alignment, professional development, and access and resources based on gender. The value of Wilks' Lambda is 0.575, with an F-value of 16.998 and $p = 0.000 < 0.001$). These results indicate a significant difference in the

curriculum alignment, professional development, and access and resources based on gender. Therefore, the null hypothesis 1a (Ho1a) is rejected.

In terms of comparing the curriculum alignment, professional development, and access and resources based on experience, Table 11 shows that the Wilks' Lambda value is 0.927, with an F-value of 1.811 and $p = 0.153$ ($p > 0.05$). The results indicate that no significant difference exists in the curriculum alignment, professional development, and access and resources based on experience. Therefore, the null hypothesis 1b (Ho1b) is accepted.

Based on Table 11, regarding the interaction effect between gender and experiences on the curriculum alignment, professional development, and access and resources, the value of Wilks' Lambda is 0.466 with an F-value of 26.335 and $p = .000$ ($p < .001$). The results indicate a significant interaction impact between educators' gender and experience on curriculum alignment, professional development, and access and resources. Therefore, the null hypothesis 1c (Ho1c) is rejected.

Next, the multiple two-way MANOVA tests were used to find the differences between the mean scores for all dependent variables in curriculum alignment, professional development, and access and resources based on gender and experiences as an extension of the MANOVA analysis. Table 12 shows the mean scores differences in aspects of curriculum alignment, professional development, and access and resources based on gender and experiences. It shows the MANOVA analysis of the difference in mean scores for curriculum alignment, professional development, and access and resources based on gender and experiences.

Table 12. Mean Scores Difference

Variable	Gender	Experiences	Mean	Std. Deviation	N
Curriculum Alignment	Male	0-5 years	4.00	0.11	39
		6-10 years	3.62	0	1
		Total	3.99	0.12	40
	Female	0-5 years	3.91	0.12	23
		6-10 years	4.47	0.04	12
		Total	4.10	0.29	35
	Total	0-5 years	3.96	0.12	62
		6-10 years	4.41	0.24	13
		Total	4.04	0.22	75
Professional Development	Male	0-5 years	2.56	0.98	39
		6-10 years	3.62	0	1
		Total	2.58	0.98	40
	Female	0-5 years	2.76	0.64	23
		6-10 years	1.91	0.16	12
		Total	2.47	0.66	35
	Total	0-5 years	2.63	0.87	62
		6-10 years	2.04	0.49	13
		Total	2.53	0.84	75
Access and Resources	Male	0-5 years	4.15	0.28	39
		6-10 years	3.62	0	1
		Total	4.14	0.29	40
	Female	0-5 years	3.98	0.20	23
		6-10 years	4.68	0.09	12
		Total	4.22	0.37	35
	Total	0-5 years	4.09	0.27	62
		6-10 years	4.60	0.30	13
		Total	4.18	0.33	75

Table 13. Two-Way MANOVA Analysis for the Difference Aspects

Variable	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	Curriculum Allignment	0.511	1	0.511	41.050	0.000
	Professional Development	1.960	1	1.960	3.024	0.086
	Access and Resources	0.694	1	0.694	11.675	0.001
Experiences	Curriculum Allignment	0.032	1	0.032	2.548	0.115
	Professional Development	0.040	1	0.040	0.062	0.805
	Access and Resources	0.024	1	0.024	0.404	0.527
Interaction Gender*Experiences	Curriculum Allignment	0.769	1	0.769	61.771	0.000
	Professional Development	3.178	1	3.178	4.903	0.030
	Access and Resources	1.314	1	1.314	22.087	0.000

Table 13 shows significant differences in the curriculum alignment ($F = 41.050$; $p = 0.000$; $p < 0.05$), professional development ($F = 3.024$; $p = 0.086$; $p > 0.05$), and access and resources ($F = 11.675$; $p = 0.001$;$p < 0.05$) based on gender. Among female educators, the levels of curriculum alignment (female = 4.10) and access and resources (female = 4.22) are significantly higher compared to male educators. However, the level of professional development (male = 2.58) among male educators is significantly higher compared to female educators (female = 2.47). Furthermore, there are no significant differences in curriculum alignment ($F = 2.548$; $p = 0.115$; $p > 0.05$), professional development ($F = 0.062$; $p = 0.805$; $p > 0.05$), and access and resources ($F = 0.404$; $p = 0.527$; $p > 0.05$) based on teaching experiences.

Additionally, the results in Table 13 show that there is significant interaction effect on the curriculum allignment ($F = 61.771$; $p = 0.000$; $p < 0.05$), professional development ($F = 4.903$; $p = 0.030$; $p < 0.05$), and access and resources ($F = 22.087$; $p = 0.000$; $p < 0.05$). The interaction between gender and experiences on the curriculum alignment is depicted in Figure 2.

Fig. 2 The interaction between gender and experiences on curriculum alignment

Figure 2 depicts the interaction between gender and experiences on curriculum alignment. It is evident from Figure 2 that the level of curriculum alignment among female educators is higher and significantly different from that of male educators, particularly for those with 6 to 10 years of experience.

Fig. 3 The interaction between gender and experiences on professional development

Figure 3 illustrates the interaction between gender and experiences on professional development. As seen in Figure 3, the level of professional development among male educators is higher and significantly different from that of female educators, especially for those with 6 to 10 years of experience.

Fig. 4 The interaction between gender and experiences on access and resources

Figure 4 displays the interaction between gender and experiences on access and resources. From Figure 4, it can be observed that the level access and resources among female educators is higher and significantly different from that of male educators, particularly for those with 6 to 10 years of experience.

The Differences in Teaching Strategies For Museum Curriculum Based on Gender

Research Question 4: What are the differences in teaching strategies for museum curriculum implemented by educators based on gender and teaching experience?

Ho2a: There are no significant differences in teaching strategies for museum curriculum implemented by educators based on gender.
Ho2b: There are no significant differences in teaching strategies for museum curriculum implemented by educators based on teaching experiences.
Ho2c: : There are no significant interactions between gender and teaching experiences for teaching strategies for museum curriculum.

To answer this research question, this research uses Two-Way ANOVA test. Before conducting the two-way ANOVA analysis, the researchers tested the normality of variance-covariance matrices using skewness and kurtosis values.

Table 14. Normality Test

Skewness		Kurtosis	
Value	SE	Value	SE
-0.196	0.277	-1.665	0.548

Based on Table 14, it is evident that all aspects are normally distributed, with skewness and kurtosis values within the range of ± 1.96. Prior to the two-way ANOVA analysis, the researchers conducted a test to determine the homogeneity of variance-covariance matrices using Levene's test. Table 15 shows the results of Levene's test.

Table 15. Levene Tests

F	Df1	Df2	Sig.
25.880	3	71	0.000

Based on Table 15, it was found that no significant differences of variance-covariance among the dependent variables for all levels of independent variables ($F = 25.880$, $p = 0.000 < 0.001$). This indicates that the variance-covariance of the dependent variable is homogeneous across all the independent variables. Next, the two-way ANOVA tests were used to find the differences between the mean scores for all dependent variables in the teaching strategies for museum curriculum based on gender and experience as an extension of the ANOVA analysis. Table 16 shows the results of ANOVA analysis for mean score difference aspects of teaching strategies for museum curriculum based on gender and experience.

Table 16. Mean Scores Difference

Gender	Experiences	Mean	Std. Deviation	N
Male	0-5 years	4.27	0.28	39
	6-10 years	3.58	0	1
	Total	4.26	0.30	40
Female	0-5 years	4.01	0.19	23
	6-10 years	4.58	0.00	12
	Total	4.21	0.31	35
Total	0-5 years	4.18	0.28	62
	6-10 years	4.50	0.27	13
	Total	4.23	0.30	75

Table 17. Two Way ANOVA Difference Aspects

Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	0.476	1	0.476	8.674	0.004
Experiences	0.014	1	0.014	0.264	0.609
Interaction Gender*Experiences	1.377	1	1.377	25.111	0.000

Based on Table 17, there is a significant difference in the teaching strategies for museum curriculum ($F = 8.674$; $p = 0.004 < 0.05$) based on gender. According to Table 17, the level of teaching strategies for museum curriculum (male = 4.26; female = 4.21) among male educators is

significantly higher compared to female educators. This means the null hypothesis 2a (Ho2a) is rejected.

Comparison of the level of teaching strategies for museum curriculum revealed no significant differences ($F = 0.264$; $p = 0.609 > 0.05$) based on teaching experience. This means the null hypothesis 2b (Ho2b) is rejected. Based on Table 17, it was found that there is a significant interaction effect between educators' gender and experiences towards the teaching strategies for museum curriculum ($F = 25.111$; $p = 0.000 < 0.001$). This means the null hypothesis 2c (Ho2c) is rejected. The graph showing the interaction between gender and experience on the teaching strategies for museum curriculum is depicted in Figure 5.

Fig. 5 The interaction between gender and experiences on the teaching strategies for museum curriculum

Based on Figure 5, it can be concluded that the level of teaching strategies for museum curriculum among female educators is higher and significantly different from male educators for educators who have 6 to 10 years of experience.

4. Discussion

The present study aimed to comprehend the level of curriculum alignment, professional development, and access and resources among educators, level of teaching strategies for museum curriculum implemented by educators, the differences in curriculum alignment, professional development, and access and resources based on gender and teaching experience, and the differences in teaching strategies for museum curriculum based on gender. The findings are consistent with previous research such as Feinstein et al. (2013) and Vallance (2014). Based on a study carried out on alignment between museum education and curriculum, Feinstein et al. (2013) and Vallance (2014) reported that factors namely communication restrictions and contradicting expectations for teacher engagement can influence the accomplishment of collaborations between museum education and schools. As mentioned earlier, the importance of integrating museum education with formal education as well as the difficulties must be taken into account in order to establish meaningful and fruitful partnerships between educational institutions and museums (Tal & Steiner, 2006).

The results on overall curriculum alignment are at a high level indicating that educators know the importance of aligning curriculum with museum education. Yet, overall professional development is at a low to moderate level. indicating that educators need more exposure to professional development. Overall access and resources are at a high level, revealing that educators have adequate acceess and resources related to musuem education. According to Pavlou (2022), educators' role is not limited to leading students on excursions, but they must play an active role by engaging actively in activities and ask more questions when they take students on museum excursions.

The results of the present study based on the Two-Way ANOVA have shown that there is a significant difference in the curriculum alignment, professional development, and access and resources based on gender. The findings suggest that the curriculum alignment may differ between

genders, differences in professional development between genders may lead to inqualities in professional advancement opportunities, and differences in access and resources between genders suggest that the availability and distribution of materials may fluctuate depending on gender. The Two-Way ANOVA revealed that no significant difference in the curriculum alignment, professional development and access and resources exists based on experience. Past studies have revealed that gender differences have an important role in curriculum alignment, professional development, and access to resources in the museum education (Weiss & Villiere, 2022). Findings reported by Kim et al (2021) showed that female educators are more prone to face difficulties in utilising professional development chances equated to their male colleagues.

Findings of the Two-Way MANOVA show the existence of a strong interaction between educators' gender and their experiences with regard to curricular alignment, professional development, and resource availability. Female and male educators may have varied experiences or consequences in these aspects, signifying that gender affects how educators interact and participate with the curriculum, opportunities for professional development, and access to resources. It was also reported that among male educators, professional development is significantly higher compared to female educators. As for the curriculum alignment, and access and resources, female educators show significantly higher levels compared to male educators. Bui et al. (2023) reported that female educators also confront difficulties in accessing resources namely mentorship, networking prospects, and funding. Tran and Nguyen (2020)'s research showed that access to resources, for example, technology, funding, and specific equipment, typically slanted towards male-centric departments, whereas female museum educators encounter resource limitations.

The present study reported on the differences in teaching strategies for museum curriculum implemented by educators based on gender and teaching experience. The Two-Way ANOVA analysis revealed a significant difference in teaching strategies for museum curriculum based on gender, and the level of teaching strategies for museum curriculum among male educators is significantly higher compared to female educators. The results of the Two-Way ANOVA analysis indicate that, for educators with six to ten years of experience, female educators have greater and substantially different levels of proficiency in teaching museum curriculum than do male educators. The educators' gender and prior teaching experience will also be crucial factors to take into account when developing their teaching strategies for museum curricula. Previous research has shown that a teacher's gender and prior teaching experiences can have an impact on their methods, attitudes, and behaviours while teaching in a museum setting (Islek, 2021; Karnezou et al., 2021).

5. Conclusion and Implications

The present study aimed at examining the level of curriculum alignment, professional development and access and resources among educators, to examine the level of teaching strategies for museum curriculum implemented by educators, to identify the differences in curriculum alignment, professional development, and access and resources based on gender and teaching experiences, and to identify the differences in teaching strategies for museum curriculum implemented by educators based on gender and teaching experiences. All the four objectives were attained as explained in the results and discussion sections of this study. The level of curriculum alignment, professional development, and access and resources among educators, as well as the level of teaching strategies for museum curriculum implemented by educators, and the differences in curriculum alignment, professional development, and access and resources based on gender and teaching experiences, and the differences in teaching strategies for museum curriculum implemented by educators based on gender and teaching experience were investigated through a quantitative survey using the Statistical Packages for the Social Sciences (SPSS) Version 23 through descriptive and inferential statistics. The results of the research showed substantial meaningful implications.

The results of this study suggest that the level of curriculum alignment, professional development, and access and resources among educators are important for selected educational organisations to propose meaningful strategies to confirm unbiassed professional development prospects and access to resources for all educators. The government and policy makers should evaluate the present policies and practices so that continuous support can be extended to educators, contributing to enhanced instructional quality and student results. Curriculum alignment, professional

development, and teaching strategies are three important variables for museum educators that affect how they teach. Hence, it is important for the government and policy makers to scrutinise these factors that can assist the museum educators to ensure they have equal access to quality education and opportunities.

This present study has identified some limitations. The data were gathered from 75 respondents in Guizhou Province, China, and the results may not be representative of the entire country. Future researchers can increase the research scope by selecting more respondents from a number of provinces. Moreover, more variables and factors need to be researched to seek reasons and issues that prohibit museum educators from integrating museum education into their curricula.

6. Co-author Contribution

All the authors affirmed that there is no conflict of interest in this article. Author 1 carried out the conception and investigation. Author 2 overlook the writeup of the whole article and prepared the relevant literature. Author 3 wrote the research design and conducted the data entry. Author 4 carried out the data analysis. Author 5 prepared the interpretation of the results. Author 6 contributed to drafting and revising the article. Author 7 revised critically the article for intellectual content.

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