

## Museum visit intervention in K-12 education: a scoping review

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### ABSTRACT

This scoping review aims to provide an overview of empirical studies on worldwide museum visit intervention in K-12 education. The study employed Mendeley citation software to identify the articles in the database. A meta-analysis PRISMA statement is used for reporting the items. Out of 135 possibly rich articles, the present study reviewed 18 studies that met the inclusion criteria and were subjected to descriptive and content analyses published between 2017 and 2021. Most of the studies are experimental and from primary school contexts. It is revealed that science is the subject matter context majority of the studies, but philosophy, disaster management, language, and environmental science are also represented. The content analysis resulted in the following learning and social outcomes. It states that social outcome is explored chiefly, followed by learning outcome. The findings indicate that museum visit intervention positively impacts students learning and social outcome. The review also identifies the need for further research on museum visit intervention in the Asia Pacific region.

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## 1. INTRODUCTION

This scoping review explores the extent and nature of the empirical research on school-based museum visit intervention worldwide. Museum education gained popularity at the end of the 19th century and gradually emerged in the 21st century. A museum is a repository of artifacts in a particular place. Artifacts in museums play a significant role in peoples' lives as it is one of the essential heritage attractions [1]. Through museum visits, students can develop cognitive knowledge about the natural environment of their country [2]. Through longitudinal survey data, it is found that students who visit museums frequently to learn science and mathematics subjects have shown higher achievements than those who did not use museums as a means to learn [3]. It is revealed that museum visits become more interesting with the use of different modes of interaction by museum educators to deepen student engagement [4]. It is found that activities based on games and the activities included in the curriculum are effective in increasing student achievement and the attitude towards the Art classes [5]. It is found that students can understand the school subject history easily if they perceive museum visits as within the scope of the learning agency [6].

In addition to the cognitive dimension, museum visits positively impact students' emotions, attitudes, and observations [7]. Students can get an opportunity to explore the artifacts exhibited. They could interact during a museum visit, which helps them foster positive cognitive, affective, and social outcomes [8]. Museum-based art intervention also improves the quality of life in people with dementia [9]. Therefore effective collaboration between museums, health care, and university sectors is required to promote the public health program [10].

Communication and sharing of ideas between the school and the local museum could make the museum education practice effective. Cordial relationships between schools, museums, and teachers' motivation are other factors that can make museum visits meaningful [11]. One recent study revealed that museum visits benefit prospective teachers and students from various dimensions [12]. One of the dimensions to foster meaningful museum teaching is through museum pedagogy [13]. A visit to a museum during a teacher-training program can create awareness of museum visits as a pedagogy among trainee teachers [14]. Equally, teacher candidates will have a positive learning experience through museum field trips [15]. The activities related to museums and science centers are also helping the pre-service teachers show a positive attitude towards science center's [16]. Moreover, one earlier study found that pre-service elementary teachers can use museum resources in teaching [17]. It is also found that museum visits positively impact the knowledge, thought, feelings, and attitude of student teachers [18]. Therefore creating awareness of museum-related pedagogical research and out-of-school learning sites will help the pre-service teachers [19].

During the COVID-19 pandemic, technology played a vital role in successfully delivering virtual museum visits [20]. It is found that virtual museums lead to the users' positive attitude toward cultural heritage [21]. Virtual museums can also be used in teaching material in museum education [22]. Therefore, there is a possibility to integrate remote museum learning courses in prospective teacher training programs [23]. In addition to it, it is possible to properly use virtual museum applications in secondary elementary courses [24]. The introduction of immersive learning experiences utilizing virtual reality cameras enhanced the virtual museum visits within the pedagogical practices [25].

To summarize, studies across the world have included in the previous review. Hence, the previous studies revealed that Western countries are advantageous in researching museum visit intervention in K-12 education. Asia Pacific region has a large number of museums. However, it is surprising that very few studies have been conducted to facilitate museum visit intervention in the Asia Pacific region school education. However, the body of literature has not been reviewed thoroughly, and there is a need to investigate the nature, extent, and range of research to find out knowledge gaps within the field-based learning domain [26]–[29].

Therefore, this scoping review focuses on the nature and extent of empirical studies on worldwide museum visit intervention. Hence, the research questions are addressed in the present scoping review: What is the extent and nature of the empirical research on museum visit intervention in K-12 education worldwide? The study focused on empirical research on worldwide school-based museum visit programs from 2017-2021. The study aims to explore and identify the relevant studies related to museum visit intervention in school education and then review them. The study also identified different outcomes of museum visit intervention worldwide and report the detailed methodology. The result in this scoping review and the recommendations can assist the Asia Pacific educationists in implementing a museum visit program in K-12 education.

## **2. RESEARCH METHOD**

This scoping review aimed to explore the extent and nature of empirical studies on museum visit intervention. We applied scoping review strategies for the search, selection, analysis of studies, and reporting the result [27], [30]. Researchers have ensured comprehensive coverage of literature based on the scoping review methodological framework.

### **2.1. Search strategy**

The search strategy for collecting the articles consists of consecutive stages. Relevant studies were identified, and based on inclusion and exclusion criteria, articles were selected, and those selected articles were analyzed. As recommended for scoping review a team work was followed by the authors to search the articles [27]. There are two stages of the search strategy. A detailed description is provided.

#### **2.1.1. Stage 1-identification of the relevant articles**

The identification stage involves database searches and manual searches. For the database searches, we developed only one search string that is in English. The English string included: i) learning in the museum and all its related terms; ii) school and curriculum; and iii) the publication period was given for five years, 2017-2021. Authors have performed individual searches in English in PubMed, Science.Gov, Semantic Scholar, Core, Science Direct, and ProQuest. The first database searches were undertaken in April 2022 and then updated in June 2022. Manual searches were performed regularly until November 2022 by checking reference lists of articles identified in the database search. The search stage resulted in 1960 articles. The articles were subsequently narrowed down with the help of Mendeley citation software. After screening the titles, abstracts, and keywords, the authors removed the duplicates and excluded the irrelevant articles. 135 potentially relevant studies are identified after the screening. A meta-analysis PRISMA statement was used to report items, as shown in Figure 1, to select the articles [31].

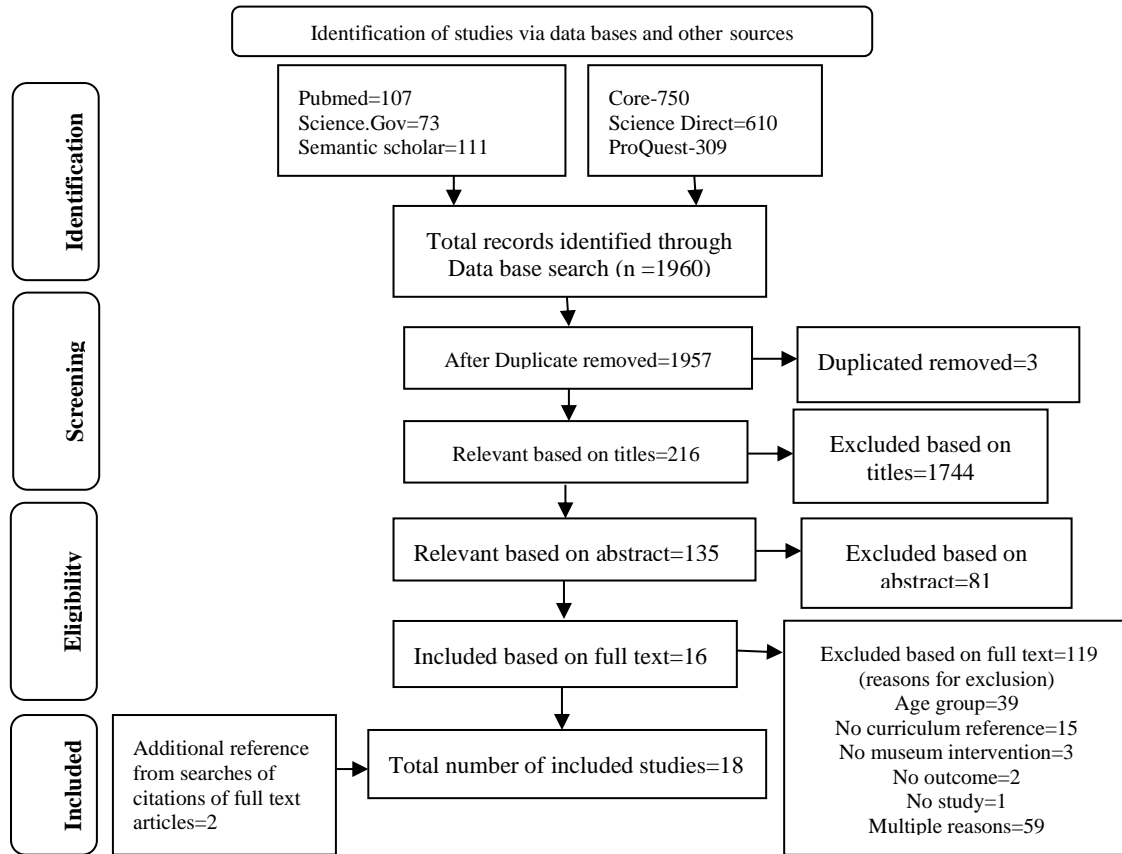


Figure 1. PRISMA flow diagram of article selection

**2.1.2. Stage 2-inclusion and exclusion criteria**

We reviewed 135 articles that align with the review's aim and the research question. Each author did this process individually before comparing our lists of criteria and included studies. Articles were reread and discussed in case of disagreement until a consensus was reached [27]. Inclusion and exclusion criteria are mentioned in Table 1. The main focus is to investigate: i) learning in museums and all its related terms; ii) formal school and curriculum based visits to museum programs involving K-12 education; iii) to investigate at least one reported outcome from students' level; iv) to examine all type of study designs, e.g., experimental, quasi-experimental design, qualitative, quantitative and case studies; and v) to explore the research articles for recent five years (2017-2021). The purpose of the study, research questions, and results are based on these criteria. Consequently, articles in which the focus of the museum visit intervention was not clarified are excluded. This repetitive process resulted in 16 articles to include in further analysis, and through manual searches, two articles were identified. Therefore, 18 articles were included for relevant studies. Table 1 shows the inclusion and exclusion criteria of the present study.

Table 1. Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Any (e.g., experimental, quasi-experimental design, qualitative, quantitative, and case studies) formal school- and a curriculum-based visit to a museum program involving K-12 education	Without any curriculum reference, an age limit crossing 18 years was eliminated
Articles contain a study report of students' outcomes	Articles with no study and student's outcome
Museum visit intervention	Articles that present no museum intervention
Peer-reviewed journal articles	Reports, conference, book chapters, grey literature

**2.2. Analysis of included article**

The descriptive analysis and content analysis were conducted on the 18 selected studies to answer the research questions and to indicate the empirical research on museum visit intervention recommended for scoping reviews [30]. The descriptive analysis included the country where the research was conducted, the

theme or subject matter of the museum visits intervention, the participants (teachers and the students), the school levels, and the methodological approach. The content analysis was employed to identify the prevailing perspectives revealed in the aims and research questions offered in the selected articles. The categorizations of the articles are qualitative, experimental, quasi-experimental, quantitative, and case studies which may have a broader understanding of the content.

### 3. RESULTS

The findings are summarized in this section. Through the database, 1960 articles were identified, which was narrowed down with Mendeley citation software's help. Out of these, 18 articles were selected based on inclusion criteria. These 18 types of research were sourced from PubMed (n=1), Core (n=1), ProQuest (n=3), Science Direct (n=3), Science.Gov (n=8), Additional references (n=2). The study observed little difference in the number of relevant studies across the various countries. Thus, the distribution of the studies is USA (N=3), Turkey (N=3), Israel (N=3), Cyprus (N=2), New Zealand (N=2), Poland (N=1), Philippines (N=1), Denmark (N=1), Italy (N=1), China(N=1), in Table 2, an overview of the 18 studies, along with findings from the descriptive and content analysis is provided. Further details from the descriptive analysis as well as the findings from the content analysis are presented in Table 2 [32]–[49].

#### 3.1. Results from the descriptive analysis

From Table 2, it appears that science is the subject matter context in four studies. Comparing the performance of students who visited the museum to the control groups shows that intervention groups have outperformed the control groups [32], [46], [48], [49]. A study observed the interaction of the students from a lower secondary school on a learning material developed for a science center [32]. Another study from Italy aims to show and make sense of the connection between TLA and socio-materiality [33]. Two studies from New Zealand aim to determine the effect of museum exhibits on child's artistic capacities and the increasing knowledge about disaster management [34], [41]. Three studies were conducted in America. A study aims to improve instructional practices for teachers [35]. Two other American studies mapped the influence of Museum visit intervention on visual literacy and the Spanish language study in middle school students [36], [40]. Two Cyprus studies mapped the influence of museum visits on possibility thinking features and philosophical discussion in primary school context [38], [39]. Similarly, one study from the Philippines focuses on the impact of natural history museums on students' interest in environmental issues. One study from China focuses on children's creativity in informal settings like museums [37].

Study from Poland attempts to discover the effect of museum ceremonies on student experiences [43]. Two qualitative studies and one case study were conducted in Israel, which focused on the student's learning behavior, engagement, and improvement of science identities in the museum settings [44]–[46]. Three Turkish study aims to determine the effect of museum visit on the students' multiple intelligence, attitude, and motivation [47]. There were 10 studies encoded as 'not specified' about the subject context, which means the subject matter context is unclear, or the subject matter is irrelevant from the context of the study. For example, the subject matter context may need to be more relevant in studying collaborative learning skills at the upper and higher secondary level through museum visits [33]. In four studies, participants or data sources were both the teachers and the students [33], [35], [38], [47]. In seven studies intervention period is not mentioned.

Experimental studies dominated (N=6), and the empirical data were collected mainly from teachers and students. The methods used for data collection for experimental studies are pre- and post-questionnaire and scale. Qualitative studies (N=5), the methods used for data collection of qualitative studies (N=5), case studies(N=4), quasi-experimental studies (N=2), and mixed methods (N=1) are primarily interviews or observation. In studies of museum visit intervention, school management did not participate.

#### 3.2. Results of the content analysis

The content analysis results are categorized into learning outcomes and social outcomes. However, each article is assigned one category based on its aim and research questions. Investigating students' achievement through museum visits was categorized as learning outcomes. Impact of museum visits on students' behavior, attitude, and creativity are categorized as social outcomes.

##### 3.2.1. Learning outcomes

The learning outcome was applied to studies investigating students' achievement through museum visit intervention in particular subjects. Seven studies come under this category. Three studies are experimental designs comprising intervention and comparison groups, and data were collected through a questionnaire. Two studies followed the case study methodology. The other two studies employed qualitative research design, including semi-structured interviews and observations.

Table 2. Studies included in scoping review and summary of descriptive and content analysis

Reference, Location	Subject	Participants data source	School level	Methodological	Intervention period	Category in content analysis: learning outcome/social outcome
[32], Denmark	Science	22 students	Secondary school	Case study	Not specified	The result shows a positive learning outcome can be established between science curriculum at school and science centers visits.
[33], Italy	Not specified	200 students, 20 teachers	Primary and higher secondary	Case study	2017-till active	The result shows that students can develop a positive social outcome by collaborating and creative knowledge skills through museum visits.
[34], New Zealand	Not specified	1 pre-school student	Pre school	Case study	6 weeks	The result shows a positive social outcome, that child's artistic and imaginative capacities were highlighted before, during and after visiting the museum exhibitions.
[35], USA	Not specified	31 teacher and number of students not specified	Primary school	Quasi experimental	2016, 2017, 2018. Three years project	The study shows a positive social outcome that treatment group performed better than the control group in creativity, critical thinking, communication, and collaboration through museum visit.
[36], USA	Not specified	279 students	Pre school	Experimental	Not specified	Very high degree of certainty in learning outcome for experimental group for both pilot and expanded study.
[37], China	Not specified	218 students from family, 202 students from pre-school	Pre school	Experimental	Sept 2017- July 2018, 1 year intervention	The result shows a positive difference on children's creativity as compared to control group. The study focusses on social outcome.
[38], Cyprus	Not specified	8 teachers and, number of students not specified	Primary school	Quasi experimental	Not specified	Children's thinking skills were also fostered through alternative learning resources such as museum visits. The study focusses on social outcome.
[39], Cyprus	Philosophy	12 students	Primary	Experimental	End of April to the end of May of 2017	The result shows positive learning outcome differences with pre and post-test through museum visits intervention.
[40], USA	Language		Middle school	Qualitative	Not specified	Result shows that museums can be integral to student learning within the community and for a school district.
[41], New Zealand	Disaster management	432 students	Primary schools	Experimental	Not specified	Result shows that there is a significant difference in students' learning in experimental group as compared to control group the study of disaster management.
[42], Philippines	Environmental science	20 students	Higher secondary school	Qualitative	2019	The study found some effect of natural history museum on the learning of STEM students in environment issues
[43], Poland	Not specified	116 students	Secondary school	Mixed method	Not specified	The result revealed a positive social outcome that museum ceremonies have a positive impact on students' experiences.
[44], Israel	Not specified	1800 students	Primary and secondary	Qualitative	Sept-June 2015, 1 school year	The study showed a positive social outcome with a change in students' behaviors when they engaged with interactive exhibits held in museums
[45], Israel	Not specified	12 students	Primary and secondary	Qualitative study	3 years	The study revealed a social outcome, that students' engagement can be improved in museum exhibits through proper design of the elements of the exhibit.
[46], Israel	Science	3 students	Primary; secondary	Case study	3 years	The study revealed a challenging view of such field trips for pedagogical design.
[47], Turkey	Not specified	120 1st grade students, 5 teachers	Primary school	Qualitative	Not specified	Study shows a positive social outcome that museum tour has a significant effect on multiple intelligences.
[48], Turkey	Science	60 students	Secondary school	Experimental	18 weeks	Students' attitudes toward science after the museum visit have improved significantly.
[49], Turkey	Science	56 students	Secondary school	Experimental	20 weeks	Students' motivation towards science after museum visit has improved significantly.

Positive differences exist with pre and post-test of 12 primary-school students' museum visits intervention [39]. Another study analyzed a significant difference in students' knowledge in the experimental group in the disaster management program organized by the museum compared to the control group. It positively impacted parents' and teachers' knowledge and behavior [41]. Another experimental study was conducted with 279 preschool students to investigate visual literacy intervention through museum visits. The result shows a high degree of certainty for both pilot and expanded study [36].

The qualitative study also investigates student learning. For instance, it investigated how museums can be integral to student learning within the community and for a school district and how the inclusive model of bilingual co-teaching allows facilitators and students to co-construct the experience [40]. A qualitative study was conducted with 20 higher secondary school students on the impact of the natural history museum on the learning of environmental issues of the STEM students. The study has found some effects of natural history museums on the learning of STEM students in environmental issues [42].

A case study was conducted with 22 secondary school students on how flipped learning framework links with the science curriculum at school and science center visits. The result shows a positive link between the science curriculum at school and science center visits [32]. How science identities in school get their support from informal environments was analyzed through a case study. The result revealed a challenging and critical view of such field trips regarding their pedagogical and physical design [46].

### 3.2.2. Social outcome

The studies that examined museum visits' impact on students' behavior, attitude, and creativity are categorized as social outcomes (N=11). A case study was conducted with 200 primary and higher secondary school students and 20 teachers. The study concluded that students could develop collaborative and creative knowledge skills through museum visits [33].

Similarly, another case study reported that child's artistic and imaginative capacities were highlighted before, during, and after visiting the museum exhibitions [34]. The social outcome generated the view that museum ceremonies positively impact 116 secondary school students' experiences [43]. Museum visits have a positive effect on the behavior of the students. For example, there is a positive change in students' behaviors when they engage with interactive museum exhibits [44]. An experimental study was conducted on the effect of children's creativity in new informal settings in museums.

The result shows a positive difference in children's creativity compared to the control group [37]. Children's thinking skills are fostered through alternative learning resources such as museum visits [38]. It is mentioned in an experimental study that the treatment group performed better than the control group in creativity, critical thinking, communication, and collaboration through museum visits [35]. Two studies from Turkey found a significant improvement in students' attitudes and motivation toward science through out-of-school learning [48], [49]. Interviews and observation with 120 primary school students indicate a significant effect of museum tours in multiple intelligences for first graders at the primary school level [47]. Analyzing the pedagogical strategies in three specific areas revealed that students' engagement can be improved in museum exhibits through the proper design of the exhibit elements [45].

## 4. DISCUSSION

This scoping review aims to gain an overview of the body of empirical research on worldwide museum visit intervention. Considering the research question regarding the extent and nature of empirical research on museum visit intervention involving K-12 education worldwide, the inclusion and analysis of 18 studies show that museum visit intervention is a large field of educational research worldwide. Despite Asia being rich in many museums to explore, only one country found in the Asia Pacific region is China. Ten studies were encoded as 'not specified' about the subject context. In seven studies intervention period is not mentioned. These prevailing features suggest opportunities for further research to develop a systematic knowledge of utilizing museum visit intervention as a pedagogical approach.

As summarized in Table 2, it is evident that most of the studies are related to science as the primary subject [32], [46], [48], [49]. However, Asia and other parts of the world have historical museums which are to be explored by other school subjects such as history, social science, geography, and others. For example, investigating whether and how museum visits contribute to students' learning of history from the Asia Pacific region context could be another research area. Another feature to mention is that of all the 18 studies, seven studies were assigned to the category of learning outcome, and 11 studies were assigned to the category of social outcome as the main content of the study. Learning outcomes involve three experimental studies, two based on case study methodology and two on qualitative research design. The majority of the studies have focused on the outcome from the student's level, and only four studies have mentioned the outcome both from the students' and teachers' levels [33], [35], [38], [47]. Therefore, more research on learning outcomes with the subject specification is possible. Moreover, studies investigating learning outcomes, including classroom preparation, museum visit intervention, and classroom follow-up work, are universally needed.

The learning outcome of the present scoping review revealed a significant difference in students' achievement in various school subjects such as science and environmental science, philosophy, and disaster management through museum visits. The findings concur with a similar study stating that students who visit museums frequently to learn science and mathematics subjects have shown higher achievements than those

who did not use museums to learn. This present scoping review investigates how museums can be integral to student learning within the community and for a school district. The study gets its support from another recent study which states that museum visits positively impact the community and public health programs. People with dementia can improve their quality of life by participating in museum-based art intervention programs [9], [10]. In contrast, another study revealed a challenging and critical view of such field trips regarding their pedagogical and physical design, facilitation approach, and consideration of peers' social interaction. Collaboration between schools and museums and incorporating the museum visit pedagogy in teacher training programs could solve this problem, as mentioned in these studies [11], [14].

The findings related to social outcome reveal that students' collaborative, creative knowledge, critical thinking, communication, artistic, imaginative, and behavioral skills improve through museum visits. In line with this, alternative learning resources such as museum visits also improved children's thinking skills, attitude and motivation, and multiple intelligences level. In addition, students' engagement in museum exhibits can be improved by the proper design of exhibit elements. The findings agree with other studies which state that museum visits positively impact students' emotions, attitudes, and observations [7], [8].

Finally, this scoping review also has limitations. First, the evidence and the quality of the methods are not assessed in this present scoping review because, in scoping reviews usually, quality assessments are not included [26]. Further research may provide detail on the quality of the methods and conclusions of the study, similar to other systematic review studies [50]–[52].

Second, based on the 'exclusion' criteria in Table 1, the scoping review is limiting. The present scoping review focuses on school-based museum visit intervention worldwide, but research on museum visit intervention from the Asia Pacific region could be another area of research. There is extensive literature on museum visit intervention worldwide published in books, book chapters, and reports that are excluded by our criterion 'peer-reviewed journal articles' [52]. Besides, research on museum visit intervention for undergrad and post-grad students, including teacher education, is also excluded in this scoping review. Hence, to provide an even more complete overview of museum visit interventions implemented and executed in Asia Pacific, future review studies may include the literature that agrees with the exclusion criteria.

#### **4.1. Scope of intervention**

Researchers have reviewed all types of study related to formal school and a curriculum-based visit to a museum program involving K-12 education in recent five years. The participants included both teachers and the students. Out of 18 studies included in this scoping review, it is observed only eight studies mentioned about the subject specification. This scoping review is held to identify most of the research on museum visit intervention from Western countries and the abstinence of much research on museum visit intervention from the Asia Pacific region. This gap helps the researchers to plan for future studies.

#### **4.2. Implications of the findings**

The significance of this study is that it reviewed all types of study designs, e.g., experimental, quasi-experimental design, qualitative, quantitative, and case studies related to museum visits in K-12 education in recent five years. The present scoping review thoroughly describes how museum visit interventions are practiced worldwide through data charts, collated and summarized literature. Despite Asia being rich in innumerable museums, the review found only one study from the Asia Pacific region. It is evident from the review that students learning, and social outcome is better through museum visit intervention. Therefore, the study provides strong recommendations to educationists from the Asia Pacific region to implement museum visit intervention as a pedagogy. Meaningful museum visits are possible through collaboration between schools and museum authorities in the Asia Pacific region.

### **5. CONCLUSION**

It is evident from this scoping review that museum visit intervention positively impacts students' learning and social outcome in K-12 education. Through museum visits, students collaboratively participate in the learning process. Western countries are advancing to incorporate museum visit pedagogy in school settings. As Asia is rich in many museums, more museum visit intervention must be in school settings. However, some challenging issues might be faced by the educators of Asia Pacific regions related to the development of museum visit pedagogy and the facilitation of museum visit programs in school settings. Since only one research has been from the Asia Pacific region, therefore this review can support the educationist from the Asia Pacific region to implement museum visit intervention in K-12 education.

## REFERENCES




- [1] L. Jin, H. Xiao, and H. Shen, "Experiential authenticity in heritage museums," *Journal of Destination Marketing and Management*, vol. 18, 2020, doi: 10.1016/j.jdmm.2020.100493.
- [2] R. Dilli, "Conducting museum education activities within the context of developing a nature culture in primary school students: MTA natural history museum example," *International Journal of Environmental and Science Education*, vol. 11, no. 2, pp. 75–84, 2016, doi: 10.12973/ijese.2016.292a.
- [3] L. E. Suter, "Visiting science museums during middle and high school: a longitudinal analysis of student performance in science," *Science Education*, vol. 98, no. 5, pp. 815–839, 2014, doi: 10.1002/sc.21116.
- [4] R. Brown, J. M. Andersen, M. Watkins, and J. Quay, "Gallery educator talk and student engagement," *Journal of Museum Education*, vol. 46, no. 2, pp. 192–201, 2021, doi: 10.1080/10598650.2020.1867796.
- [5] S. Genç and S. Buyurgan, "The effect of museum activities based on games to the student achievement and their attitude towards art classes," *Inönü University Journal of the Faculty of Education*, vol. 19, no. 3, pp. 687–699, 2019.
- [6] S. Halamy, "History and national identity: The role of museum as non-formal educational institution for students in Malaysia," in *23rd International Conference of Historians of Asia 2014 (IAHA2014)*, 2014.
- [7] A. Evren Yapicioglu *et al.*, "Journey to natural history museum in perspective of children," *European Journal of Science and Mathematics Education*, vol. 5, no. 4, pp. 365–375, 2021, doi: 10.30935/scimath/9517.
- [8] T. Mujtaba, M. Lawrence, M. Oliver, and M. J. Reiss, "Learning and engagement through natural history museums\*," *Studies in Science Education*, vol. 54, no. 1, pp. 41–67, 2018, doi: 10.1080/03057267.2018.1442820.
- [9] A. Schall, V. A. Tesky, A. K. Adams, and J. Pantel, "Art museum-based intervention to promote emotional well-being and improve quality of life in people with dementia: The ARTEMIS project," *Dementia*, vol. 17, no. 6, pp. 728–743, 2018, doi: 10.1177/1471301217730451.
- [10] P. M. Camic and H. J. Chatterjee, "Museums and art galleries as partners for public health interventions," *Perspectives in Public Health*, vol. 133, no. 1, pp. 66–71, 2013, doi: 10.1177/1757913912468523.
- [11] A. Ateş and J. F. Lane, "Analysing school-museum relations to improve partnerships for learning: a case study," *TeĖitim VBilim*, vol. 45, no. 201, pp. 231–246, 2019, doi: 10.15390/eb.2019.8017.
- [12] M. Metin Gökso, "Museum tour in social studies education: sample of Caucasian military history museum," *International Journal of Education Technology and Scientific Researches*, vol. 6, no. 15, pp. 1082–1122, 2021, doi: 10.35826/ijetsar.328.
- [13] J. Hubbard and O. M. Odebiyi, "Examining elementary social studies preservice teachers' dispositional thinking about museum pedagogy," *Journal of Social Studies Research*, vol. 45, no. 4, pp. 227–239, 2021, doi: 10.1016/j.jssr.2021.05.001.
- [14] M. Morentin and J. Guisasaola, "The role of science museum field trips in the primary teacher preparation," *International Journal of Science and Mathematics Education*, vol. 13, no. 5, pp. 965–990, 2015, doi: 10.1007/s10763-014-9522-4.
- [15] N. Uzel, "Opinions of prospective biology teachers about 'outdoor learning environments': The case of museum visit and scientific field trip," *Participatory Educational Research*, vol. 7, no. 2, pp. 115–134, 2020, doi: 10.17275/per.20.23.7.2.
- [16] A. Tasdemir, T. Kartal, and A. M. Ozdemir, "Using science centers and museums for teacher training in Turkey," *Asia-Pacific Education Researcher*, vol. 23, no. 1, pp. 61–72, 2014, doi: 10.1007/s40299-013-0085-x.
- [17] N. Balkir-Kuru, "Learning from art museums: Three course assignments for pre-service elementary teachers," *International Journal of the Inclusive Museum*, vol. 3, no. 1, pp. 113–121, 2010, doi: 10.18848/1835-2014/cgp/v03i01/44307.
- [18] S. Ramsaroop, "The role of museums in learning to teach with a critical lens," *Journal of Education*, vol. 67, pp. 83–100, 2017, [Online]. Available: <https://journals.ukzn.ac.za/index.php/joe/article/view/478>.
- [19] P. Kreuzer and D. Dreesmann, "Exhibitions and beyond: The influence of an optional course on student teachers' perceptions and future usage of natural history museums," *Journal of Science Teacher Education*, vol. 28, no. 8, pp. 651–673, 2017, doi: 10.1080/1046560X.2017.1400803.
- [20] O. Okumuş and A. Vurgun, "Pre-service history teacher's opinions about the use of virtual museum applications in history courses," *Education Quarterly Reviews*, vol. 4, no. 2, 2021, doi: 10.31014/aior.1993.04.02.204.
- [21] F. Besoain, J. González-Ortega, and I. Gallardo, "An evaluation of the effects of a virtual museum on users' attitudes towards cultural heritage," *Applied Sciences (Switzerland)*, vol. 12, no. 3, p. 1341, 2022, doi: 10.3390/app12031341.
- [22] T. P. Kersten, F. Tschirschwitz, and S. Deggim, "Development of a virtual museum including a 4D presentation of building history in virtual reality," *International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives*, vol. 42, no. 2W3, pp. 361–367, 2017, doi: 10.5194/isprs-archives-XLII-2-W3-361-2017.
- [23] D. Islek and I. Danju, "The effect of museum education practices carried out on virtual teaching environments on prospective teachers' views," *Revista de Cercetare si Interventie Sociala*, vol. 67, pp. 114–135, 2019, doi: 10.33788/rcis.67.8.
- [24] S. Eguz, "Availability of virtual museum applications in courses based on the views of classroom teachers," *Cypriot Journal of Educational Sciences*, vol. 15, no. 2, pp. 194–207, 2020, doi: 10.18844/cjes.v15i2.4501.
- [25] N. Moorhouse, M. C. tom Dieck, and T. Jung, "An experiential view to children learning in museums with Augmented Reality," *Museum Management and Curatorship*, vol. 34, no. 4, pp. 402–418, 2019, doi: 10.1080/09647775.2019.1578991.
- [26] S. Chang, "Scoping reviews and systematic reviews: Is it an either/or question?" *Annals of Internal Medicine*, vol. 169, no. 7, pp. 502–503, 2018, doi: 10.7326/M18-2205.
- [27] D. Levac, H. Colquhoun, and K. K. O'Brien, "Scoping studies: Advancing the methodology," *Implementation Science*, vol. 5, no. 1, 2010, doi: 10.1186/1748-5908-5-69.
- [28] Z. Munn, M. D. J. Peters, C. Stern, C. Tufanaru, A. McArthur, and E. Aromataris, "Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach," *BMC Medical Research Methodology*, vol. 18, no. 1, 2018, doi: 10.1186/s12874-018-0611-x.
- [29] M. D. J. Peters, C. M. Godfrey, H. Khalil, P. McInerney, D. Parker, and C. B. Soares, "Guidance for conducting systematic scoping reviews," *International Journal of Evidence-Based Healthcare*, vol. 13, no. 3, pp. 141–146, 2015, doi: 10.1097/XEB.0000000000000050.
- [30] H. Arksey and L. O'Malley, "Scoping studies: Towards a methodological framework," *International Journal of Social Research Methodology: Theory and Practice*, vol. 8, no. 1, pp. 19–32, 2005, doi: 10.1080/1364557032000119616.
- [31] D. Moher *et al.*, "Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement," *PLoS Medicine*, vol. 6, no. 7, 2009, doi: 10.1371/journal.pmed.1000097.
- [32] M. F. Andersen, H. Levensen, H. H. Møller, and A. V. Thomsen, "Building bridges between school and a science center using a flipped learning framework," *Journal of Museum Education*, vol. 45, no. 2, 2020, doi: 10.1080/10598650.2020.1744238.
- [33] G. Barzanò *et al.*, "When the place matters: moving the classroom into a museum to re-design a public space," *Frontiers in Psychology*, vol. 11, 2020, doi: 10.3389/fpsyg.2020.00943.






- [34] J. Clarkin-Phillips, M. Carr, R. Thomas, A. Tinning, and M. Waitai, "Fostering the artistic and imaginative capacities of young children: case study report from a visit to a museum," *International Journal of Early Childhood*, vol. 50, no. 1, pp. 33–46, 2018, doi: 10.1007/s13158-018-0211-2.
- [35] L. Corbisiero-Drakos, L. K. Reeder, L. Ricciardi, J. Zacharia, and S. Harnett, "Arts integration and 21st century skills: A study of learners and teachers," *International Journal of Education and the Arts*, vol. 22, pp. 1–26, 2021, doi: 10.26209/ijea22n2.
- [36] M. Deetsch, R. Glass, R. Jankowski, E. Mylander, P. Roth, and E. Wharton, "Visual literacy and its impact on pre-literacy development," *Journal of Museum Education*, vol. 43, no. 2, pp. 148–158, 2018, doi: 10.1080/10598650.2018.1426332.
- [37] X. Gong, X. Zhang, and M. C. Tsang, "Creativity development in preschoolers: The effects of children's museum visits and other education environment factors," *Studies in Educational Evaluation*, vol. 67, 2020, doi: 10.1016/j.stueduc.2020.100932.
- [38] M. Gregoriou, "Creative thinking features and museum interactivity: examining the narrative and possibility thinking features in primary classrooms using learning resources associated with museum visits," *Thinking Skills and Creativity*, vol. 32, pp. 51–65, 2019, doi: 10.1016/j.tsc.2019.03.003.
- [39] S. Ioannou, K. Georgiou, and M. Ventista, "Teaching philosophy through paintings: a museum workshop," *Analytic Teaching and Philosophical Praxis*, vol. 38, no. 1, pp. 62–83, 2017.
- [40] M. Lehman, S. Phillips, and A. Saenz Williams, "Empowering identity through art: bilingual co-teaching at the Blanton museum of art," *Journal of Museum Education*, vol. 43, no. 4, pp. 375–384, 2018, doi: 10.1080/10598650.2018.1522222.
- [41] E. MacDonald, V. Johnson, M. Gillies, and D. Johnston, "The impact of a museum-based hazard education program on students, teachers and parents," *International Journal of Disaster Risk Reduction*, vol. 21, pp. 360–366, 2017, doi: 10.1016/j.ijdr.2017.01.010.
- [42] C. H. Punzalan and L. M. Escalante, "Museum trip to enrich environmental awareness and education," *International Electronic Journal of Environmental Education*, vol. 11, no. 1, pp. 13–23, 2021, doi: 10.18497/iejeegreen.759224.
- [43] A. Richardson, "Lighting candles in the darkness: An exploration of commemorative acts with British teenagers at the Auschwitz-Birkenau state museum," *Religions*, vol. 12, no. 1, pp. 1–15, 2021, doi: 10.3390/rel12010029.
- [44] N. Shaby, O. B. Z. Assaraf, and T. Tal, "The particular aspects of science museum exhibits that encourage students' engagement," *Journal of Science Education and Technology*, vol. 26, no. 3, p. 253, 2017, doi: 10.1007/s10956-016-9676-7.
- [45] N. Shaby, O. B. Z. Assaraf, and T. Tal, "'I know how it works!' student engagement with exhibits in a science museum," *International Journal of Science Education, Part B: Communication and Public Engagement*, vol. 9, no. 3, pp. 233–252, 2019, doi: 10.1080/21548455.2019.1624991.
- [46] N. Shaby and D. Vedder-Weiss, "Science identity trajectories throughout school visits to a science museum," *Journal of Research in Science Teaching*, vol. 57, no. 5, pp. 733–764, 2020, doi: 10.1002/tea.21608.
- [47] N. Temiz, "An instructional planning and implementation of a museum tour addressing multiple intelligences for first graders," *Participatory Educational Research*, vol. 8, no. 3, pp. 24–43, 2021, doi: 10.17275/per.21.52.8.3.
- [48] H. I. Yildirim, "The impact of out-of-school learning environments on 6th grade secondary school students attitude towards science course," *Journal of Education and Training Studies*, vol. 6, no. 12, p. 26, 2018, doi: 10.11114/jets.v6i12.3624.
- [49] H. İ. Yildirim, "The effect of using out-of-school learning environments in science teaching on motivation for learning science," *Participatory Educational Research*, vol. 7, no. 1, pp. 143–161, 2020, doi: 10.17275/per.20.9.7.1.
- [50] C. Becker, G. Lauterbach, S. Spengler, U. Dettweiler, and F. Mess, "Effects of regular classes in outdoor education settings: A systematic review on students' learning, social and health dimensions," *International Journal of Environmental Research and Public Health*, vol. 14, no. 5, 2017, doi: 10.3390/ijerph14050485.
- [51] L. Mygind, E. Kjeldsted, R. Hartmeyer, E. Mygind, M. Bølling, and P. Bentsen, "Mental, physical and social health benefits of immersive nature-experience for children and adolescents: A systematic review and quality assessment of the evidence," *Health and Place*, vol. 58, 2019, doi: 10.1016/j.healthplace.2019.05.014.
- [52] K. B. Remmen and E. Iversen, "A scoping review of research on school-based outdoor education in the Nordic countries," *Journal of Adventure Education and Outdoor Learning*, vol. 23, no. 4, p. 433, 2023, doi: 10.1080/14729679.2022.2027796.

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