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Exploring geo-literacy in museum educational programmes at the Iziko Museums in Cape Town, South Africa

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Abstract

The Iziko Museums of South Africa are a group of 11 museums located in Cape Town. This article provides an overview of possible applications of geo-literacy in a museum context. The use of geographical tools in exhibitions and educational programmes at the museum is evaluated with reference to place, spatial processes, spatial distribution patterns, and human-environment interactions. The museums' collections, research activities and exhibitions can support the school curriculum and also enhance cultural sensitivity, stimulate dialogue, and encourage problem-solving. The activities at the Iziko Museums of South Africa have the potential to enhance and support the development of personal responsibility to learn from the past and contribute to creating a better future for all. Museum educators and curators should therefore further explore and implement strategies to include geo-literacy when developing exhibitions and educational programmes in their unique context.

Keywords: Iziko Museums; Cape Town; Geography Curricula; geo-literacy; education

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Introduction

Museums have traditionally been viewed as places where cultural objects are housed and displayed next to stuffed animals and fossils (Lee, 2021). The modern museum, however, is a dynamic space where opportunities abound for learners to explore and delve into a world of past, current and future learning coupled with recreational experiences (Raaijmakers, Mc Ewen, Walan, & Christenson 2021; Yetkiner, Karadeniz, & Gökaslan 2019). It is a space where learners can move around exhibitions within a single environment, access their multiple intelligences and learn more about the world in which they live (Yoo, 2021). Museums are viewed as institutions to visit in order to sharpen one's curiosity about mainly the world, science and history (Sumartojo, 2021; Yun, 2018). This means that every museum is a space to explore geographical imaginations, interpretations and representations (Schmitt & Labour, 2021). Typically, museums deal with spatial variability and processes which are deemed an essential part of the education of all citizens, across all societies (Lee 2021; Yli-Panula, Jeronen & Lemmetty, 2020).

In this article, we evaluate how geographical information can enhance learners' experiences of museums, and how museums can increase their use of geographical tools, to authenticate memory and heritage through their exhibitions and objects. The Iziko Museums of South Africa, a group of museums located in Cape Town, create a nexus where learners can learn about their own national heritage through educational programmes. Included are the Bo-Kaap Museum, the Groot Constantia Manor House, Koopmans-de Wet House, the Maritime Centre, the Planetarium, Rust en Vreugd, the Slave Lodge, the South African Museum, the South African National Gallery and the William Fehr Collection at the Castle of Good Hope. Figure 1 shows the locational detail of some of these museums and their proximity to one another, and Figure 2 some of the facades of the museum buildings. An additional and important component of the Iziko Museums' educational value to heritage education, is its mobile museum filled with objects from its collections. The objective of the mobile museum is to travel to communities, festivals, schools, career fairs, libraries, and rural areas to give exposure to the role of museums and

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encourage people to visit all the 11 Iziko Museums. The mobile museum showcases the important work which the conservators, researchers, curators, educators and all its operational staff do, in preserving heritage and creating museum spaces conducive for people to experience.

Literature review

Geography in museums

Museums across the world have become a focus for communities, offering inter-generational dialogue and a space to connect with one's heritage (Hackett, Holmes, MacRae & Procter 2018; Lee, Lee, Jeong, Lee, Kim & Lee, 2021). In this regard, the Iziko Museums in Cape Town offer rich potential to advance visitors' comprehension of geographies, through their exhibitions and objects.

Museums offer learners an opportunity to experience various aspects of the Geography school curricula (Department of Basic

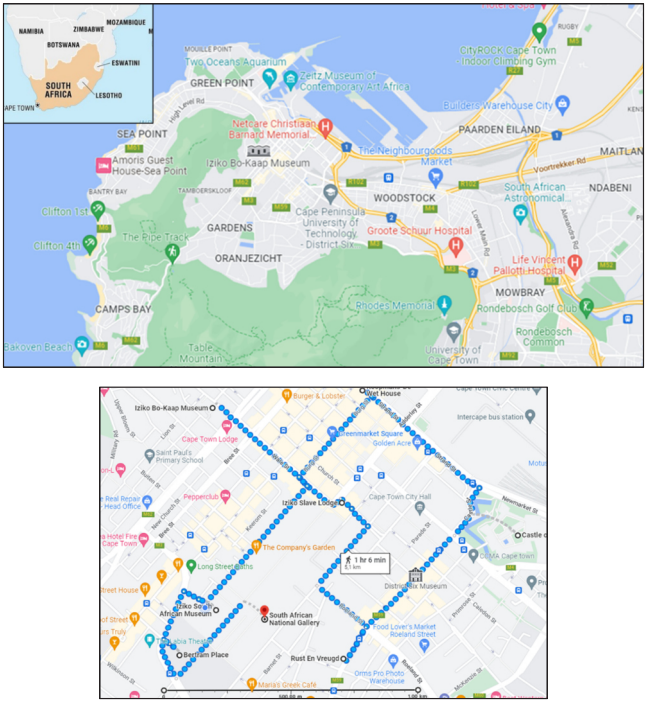

Figure 1: The location and proximity of the Iziko Museums in Cape Town (https://www.google.com/maps/dir/Iziko accessed 08 July 2022)

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Education [DBE], 2011a, b & c). Exhibitions provide learners with opportunities to reflect on best practices of energy use as well as societal ills, such as wars, gender-based violence, xenophobia, issues of urbanisation and racism stemming from slavery and colonialism. Both human and physical geographical components are included in these displays which stem out of the museum collections (Sumartojo, 2021). Collections of minerals and rocks, along with displays of climatic regions and their associated fauna and flora, are linked to natural processes and topographies, including the atmosphere, landforms and ecosystems, as well as issues related to water provision and cycles of drought – all of which form part of the Geography curricula. For that reason, geographical thinking is applicable not only to settings of formal learning, such as universities or schools, but also to those of informal learning spaces, such as museums (Shapiro, Hall & Owens, 2017).

Malanson, Scuderi, Moser, Cort, Willmott, Resler, Warner and Mearns (2014) urge museum curators to be aware of the need to create opportunities for learners to be exposed to the various sub-fields of the human–environment system (Wang, Crookes, Harding, & Johnston, 2021). The way in which an exhibition is curated, allows learners an insight into wider societal needs, aspirations, and geographical imaginations (Yoo, 2021). By stimulating geographical imaginations, the social, political, and cultural messages in an exhibition teach learners about themselves and the world in which they live now and are likely to live in the future (Wang et al., 2021). Parisi-Moreno, Llonch-Molina and Selfa (2021) indicate that for learners, a museum visit is a transformative experience, where they are presented with objects and then re-evaluate or transform their knowledge and thinking skills. The responsibility of museums is central in exhibitions where geography is a critical resource: the objects they display and the memories they awaken, tell learners about decisions that were made, the resources that were used, and people's lived experiences (Schmitt & Labour, 2021). Museums have an opportunity to utilise the Geography curriculum and emphasise the educational worth of the subject to all learners who visit their sites (Biddulph, 2009). During a single visit, but also as returnees, learners observe museum spaces being

used to describe, represent and interpret how multiple exhibits or exhibition spaces can be linked to the outside world (Lee et al., 2021). In this regard, their presence reminds museum curators to ask new questions, such as how learners use exhibitions as interpretive resources in and across exhibition spaces (Hooper-Greenhill, Phillips & Woodham, 2009; Wang et al., 2021). It is a reminder that the visual and interactive nature of exhibitions could foster different interpretations and ways of making sense of the world (Shapiro et al., 2017; Raaijmakers et al., 2021). Hooper-Greenhill et al. (2009) furthermore argue that the identity of museums has never been stable, but is constantly evolving as narratives are being contested, challenged and reshaped by society.

As primary sources, objects and artefacts open opportunities for engagement and dialogue, thereby emphasising the importance of determining what should be displayed in museums (Barzanò, Amenduni, Cutello, Lissoni, Pecorelli, Quarta, Raffio, Regazzini, Zacchilli and Ligorio, 2020). When a learner can engage with these primary sources, learning is facilitated by direct experience, knowledge is transferred via accompanying text, visualisations or by the museum educator. In this way, theoretical knowledge can be transformed into practical knowledge, thus making abstract knowledge concrete (Hackett et al., 2018). The relationship between learners and geographical information can be enhanced and developed with instruction where museum education is undertaken in its exhibitions and programmes (Parisi-Moreno et al., 2021). For example, learners are often able to interact with primary sources that they may have seen in textbooks or viewed on television (Ateş & Lane, 2020). Since they are usually motivated about going on school outings, they learn much more and have an opportunity to become more sophisticated in terms of their geographical consciousness (Balci, 2010). Learners who engage with geographical phenomena are reportedly able to improve their geographical skills in the classroom and in their home environment (Parisi-Moreno et al., 2021). It is therefore apparent that it is easier to construct an educational relationship between Geography and daily life, with the help of a visit to the museum. The ultimate purpose here is to reveal or even confirm the significance a

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museum visit has for learners' ability to enhance their geo-literacy skills. Several questions can be posed in this regard: Do Museum exhibitions have a significant impact in terms of answering and interpreting questions about Geography? How can museum visits enhance geo-literacy? Are such visits effective in helping learners to acquire geographical concepts? Do these visits enhance learners' geographical knowledge?

The South African School Geography curriculum and museums

Any topic in Geography can be explored by applying a conceptual framework that embraces the subject's four big ideas: place, spatial processes, spatial distribution patterns and human–environment interaction (DBE, 2011a, b and c). These big ideas are organising principles that are critical to geographical knowledge, ensuring that the focus is essentially geographical.

Table 1 lists the key questions which Geography learners might ask about all the geographical phenomena and processes they encounter as well as possible methods of enquiry and geographical concepts they may be exposed to.

The Geography curriculum aims to foster crucial values and attitudes in learners, namely the application of geographical knowledge and skills in their personal lives; respect for the rights of all people; and a sense of fairness, sustainability and equality (DBE, 2011a, b and c). According to Bakker, Antonelli, Clarke, Cook, Edwards and Ericson (2020), a science-literate learner has a clear perception and understanding of the dynamics and ruptures in a system, as well as its past and alternate future trajectories. Such learners understand the complexity of studied objects and phenomena, thus enabling better decision-making (Parisi-Moreno et al., 2021). Geographical education contributes to literacy, oracy, numeracy and graphicacy, and supports the development of personal and social competence interaction (Hackett et al., 2018). For instance, higher-order thinking skills such as systems-thinking can be advanced, for example, through place-based education (Yli-Panula et al., 2020).

Geographers use tools such as maps, remote sensing images, globes, graphs and drawings, to help them interpret and (re)present the world. These visual aids contribute to a kind

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Table 1: Key questions in Geography

Method of enquiry	Key questions	Concepts
Observation	What is it? What is it like? Who or what is affected?	Physical and human processes, awareness, perception, characteristics, similarities and differences
Description	Where does it occur? Why is it there?	Location, place, region, space, distribution, pattern, scale and spatial association
Analysis and explanation	What happened/is happening? Why did it happen? How is it changing?	Interdependence, causes and processes
Evaluation and prediction	What are the effects? What is likely to happen?	Environmental and social impact, interdependence, spatial interaction, spatial organisation, human–environment interaction, cause, process, time, behaviour, consequence, justice, quality of life, environmental quality, welfare, costs and benefits
Decision making	Who benefits? What decisions must be made? What are the benefits and costs of the decision? How should it be managed?	Choices, decisions, costs and benefits, planning, management, power, inequality and problem solving
Personal evaluation, judgement and response	What is my position? What action can I take?	Cultural sensitivity, diversity, ethics, opinion forming, empathy, values, action and personal responsibility

of literacy known as graphicacy or geo-literacy, which includes a range of skills associated with interpreting information that is presented in a visual manner (Adîr & Pascu, 2021). According to the Curriculum and Assessment Policy Statements (DBE 2011a, b and c) for Geography, graphicacy may be considered an essential kind of literacy, along with numeracy (mathematics), oracy (listening and speaking) and textual literacy (reading). In particular, De Jager (2014) emphasises the

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importance of visual literacy in Geography education. Maps or map objects project a powerful message about lands, history and authority, and the role of these spaces as chambers for the geographical imagination, including the entire concept of geo-literacy (Daniels 2010; Wang et al. 2021). As an example, Adîr et al. (2021) emphasise the importance of maps and pictograms as learning tools that can be used to stimulate cultural interests in museum learners. In each grade, South African school-going learners are exposed to a mix of map use and geographical skills, along with physical and human geography topics (DBE, 2011a, b and c). Thus, map use should be integrated into museum exhibitions, as it is a relevant skill across all grades taught in the schools.

Geographical engagements with museums have hitherto been focused particularly on the materiality of museums but could be extended to encompass engagement with museum activities that fall outside the core functions of digitisation, collection, preservation, research and exhibition. Admittedly, museums tend to be entangled in a variety of government agendas – particularly social policy concerns pertaining to inclusion and nation-building. Schools' use of museums can be conceptualised as a mobilisation of culture that includes both a migration inwards and outwards (Hooper-Greenhill et al., 2009; Lee, 2021). This implies that learners from urban, peri-urban and rural areas can visit the museum complex and their experiences can in turn influence their area of origin.

The emphasis on teaching with authentic objects grants museums considerable opportunity to build relationships with schools and a museum visit could, in many respects, count as schooling (Ateş & Lane, 2020; Yun, 2018). National and traditional museums are most likely to view education as essential, but also largely accord it low priority (Lee et al., 2021). Where historical analyses of museums enable an improved understanding of the museums of the past, geography of museums offers new tools and concepts for understanding the museums of the present (Yetkiner et al., 2019). As the museum landscape shifts and changes, and where new spatialisations seem to be emerging, new strategies for facilitating social cohesion and social value are needed (Hooper-Greenhill et al., 2009; Sumartojo, 2021).

Barzanò et al. (2020) explain that, in a changing world, new definitions of

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learning and teaching are constantly emerging. As is the case in South Africa, this is equally true elsewhere in the world, where innovation and depth are required of the various educational methodologies and theories (Geoghegan, 2010). Academics and experts have begun focusing their research on numerous dimensions which were previously neglected or misunderstood, such as creativity, collaboration, action and communication competency, and space–time relevance (Barzanò et al., 2020). Since traditional learning does not appear capable of targeting these dimensions, it calls for a fresh look at educational practices (Raaijmakers et al., 2021).

A phenomenon which is becoming more popular in museums is that of augmented reality (Kennedy et al. 2021). Lee et al. (2021), however, claim that museums are ignoring the effectiveness of augmented reality in educating about culture and history. These authors point out the benefits of such new technologies in education, whereby children can be taught about heritage because it can bypass time and place. Barclay (2020) notes that museums evoke multiple and complex reactions in their visitors of all ages through varying opportunities for exploration, interrogation, and dialogue as theorised by Gardner (1983).

The theory of multiple intelligences is based on the research of Howard Gardner (1983), who defines intelligence as the capacity to solve problems or fashion products that are valued in one or more cultural settings. For that reason, Schmitt and Labour (2021) appeal to diverse forms of knowledge acquisition in their visitors. The Department of Basic Education has incorporated Howard Gardner's (1983) theory as a crucial part of the school curriculum which learners can access in the classroom, with the following intelligences having been identified as valued skills: linguistic, logical-mathematical, spatial, bodily-kinaesthetic, musical, interpersonal, intrapersonal and naturalist. The school Geography curriculum incorporates multiple intelligences in seeking to explain and understand geographical skills, and in this regard offers fertile ground for museum education to tap into. Museum education can provide a broader offering of what Gardner (1983) proposes since its purpose should be to inform, entertain and educate visitors about the study of the Earth (Tormey, 2019). In the process,

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museums need to design quality exhibitions, accompanied by quality lessons, to allow geographical education to contribute to the geo-literacy of the outside world (Geoghegan, 2010; Sumartojo, 2021).

Yoo (2021) notes that museum education can potentially enhance the emotional state of individual learners; whilst aiming to support the school curriculum. It improves learning, motivates learners, and employs a variety of techniques to support conventional education (Ateş & Lane, 2020). Interpretive planning is an initial step in the process of designing museum sites, where interpretation is used to communicate messages, stories, information and experiences (Lee, 2021). It is a decision-making process that blends management needs and resource considerations with visitor needs and desires, to ascertain the most effective way of conveying a message to a target audience (Bakker et al., 2020). The goal is to relate content, in a meaningful way, to a visitor's own experience, thereby provoking emotion, thought or further inquiry into a subject (Wang et al., 2021; Yun, 2018). Schmitt and Labour (2021) note that most interpretive plans are based on defining themes that are important to communicate to a range of audiences. Interpretive planning may also guide the way in which audiences will react to, and interact with, a particular site or exhibition (Ateş & Lane, 2020; Parisi-Moreno et al., 2021). It serves to identify and analyse interpretation, education, and visitor experience goals and issues, and to recommend the most effective, efficient and practical ways of addressing those (Tormey, 2019). The efficacy of most cultural texts, including the museum, is reliant on a certain coherence of reading across a diversity of learners, with the confident expectation that the interpretations produced can speak to a wider experience (Barclay, 2020; Hackett et al., 2018). Equally, it is important for learners to deal with effective museum educators who can share background information and interesting stories about the objects and exhibits (Geoghegan, 2010; Lee, 2021). Opportunities and demands such as these need to inform strategies aimed at enhancing a greater and stronger school–museum partnership across all grades (Raaijmakers et al., 2021).

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Evaluating opportunities for developing geo-literacy at the Iziko Museums of South Africa

The architecture of the buildings included in the Iziko Museums complex as well as the exhibitions within the museums provides an interesting context for the development of geo-literacy.

Figure 2 includes photographs of some of the historic buildings included in the Iziko Museums complex. The impact of educational programmes is enhanced by the authentic context created by the architecture of the buildings and the museum exhibitions because the educator can interpret the buildings and displays as part of the educational programme.

Bo-Kaap Museum

Slave Lodge

South African Museum

South African National Gallery

Rust en Vrede

Bertram House

Figure 2: Examples of buildings included in the Iziko Museums complex (Photographs by Hylton Howard Arnolds, reproduced with permission).

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The four big ideas in Geography

Place

The concept of place helps learners to comprehend the spaces that humans use to interact with their environment. Maps displayed alongside museum exhibitions can assist learners in answering questions about where a place is located, and relevant information. In the Bo-Kaap Museum, an exhibition titled 'Islamic Art - An African Interpretation', place and cultural landscape is artistically illustrated using maps. Maps are used as geographical tools to describe both the art designed in the service of the Muslim faith and to demonstrate all artistic traditions of the Muslim culture.

Wall maps can show migrations, and supply context for the places learners read about in the exhibitions. Topographic maps are used extensively from grades 9–12 in the school curriculum and could be used to help learners develop a sense of place and direction. Stereoscopes could also be used during museum workshops, when learners visit the museum to explore the collections. Iziko Museums' Groot Constantia site is an ideal space where topographical maps can be accessed by learners, to learn the necessary competencies to read maps. Globes show landmasses and water bodies in the spherical shape of the Earth, as well as countries' proximity to one another. This helps learners understand place, geographical phenomena and their interrelationships. Globes are also invaluable for demonstrating the coordinate system, with its network of latitudinal and longitudinal lines. Some globes have raised relief, to show the mountains and other large landforms that occur on Earth. The South African Museum houses a large Gaiasphere – an interactive, digital theatre housed in a large back-projected hemisphere, which can show animations of changes happening on the Earth's surface. Using a touch screen, the learner can select different views of our changing Earth, such as the Earth at night, ozone hole evolution, climate change, the Earth's surface temperatures, its core structure or interactive atmospheric predictions.

One of the exhibitions in the South African National Art Gallery, The territories between us, consists of an aluminium fence and soil (Figure 3). Through this exhibition, the artist reflects on her trip to Angola, where

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Figure 3: One of the exhibitions in the South African National Gallery: The territories between us (photograph: Hylton Howard Arnolds)

she visited Luanda and Cunene Provinces, and explores the place of land, borders and territories.

Various paintings which form part of the William Fehr Collection (Castle of Good Hope), display the Cape from the mid-17thcentury, when Europeans first settled in South Africa. The paintings display landscape imagery and symbolism of life in the Cape, including the physical landscape. Objects in the various Iziko house museums, such as Bertrams House and Rust en Vreugd, depict the original homes and the way of life of their inhabitants in days gone by. Original objects are on display, which connects learners to a different place and space.

Spatial processes

Geographical information which depicts processes showing phenomena on Earth, can be viewed in the flow diagrams which are incorporated in museum text. Iziko Museums sites have hundreds of exhibitions depicting history, geography, science and art, as well as human–environment interactions. Flow diagrams are currently used to explain how these interactions take place.

Graphs are a common method of visually illustrating relationships in data numerically. The purpose of a graph is to present data that are too numerous or complicated to be described adequately in text, or in limited space. There are a variety of

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graphs that Geography learners need to master, as they move through the grades. Graphs in a geographical text can help to highlight processes and be used to draw conclusions (Adîr et al., 2021).

The process of 3D modelling is shown in exhibits at the South African Museum. During museum workshops, learners have an opportunity to further explore models which simplify the complex processes operating on/in the Earth. In Figure 4 below, a marine life exhibition illustrates how littering, dumping, and specifically plastic pollution on land and in the oceans, ends up destroying the very environment which humans depend on for food and oxygen.

Processes, explaining how our solar system works, are illustrated by museum educators during school holiday programmes, museum lessons and workshops. An example of this activity is found when planetarium presenters host learners at Iziko Museums' Planetarium and Digital Dome. Learners view a screening of a planetarium show and build a 3D model of a solar system. Additionally, during the human evolution workshops, which are aimed at Grade 12 learners, various skulls are compared, to show brain and skull development over the past two million years.

Spatial distribution patterns

A spatial pattern is a perceptual structure, placement or arrangement of objects on Earth, which includes the

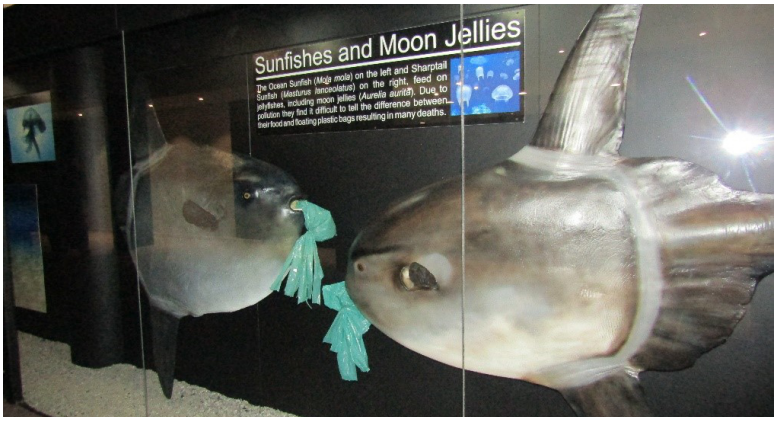

Figure 4: An exhibition in the South African Museum shows the impact of pollution by humans on sea-life (photograph: Hylton Howard Arnolds)

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space in-between those objects. Patterns may be recognised because of their arrangement; they may be in a line, or in a clustering of points. The types of spatial patterns represented on maps include absolute and relative distance and direction, clustering, dispersal and elevation. Good examples can be seen in the various maps used in museum exhibitions depicting regions where slaves were captured, and the slave routes from Southern Africa (Figure 5).

The maritime charts in the Iziko Maritime Centre show the historical routes that slave ships followed for centuries; including the trade routes around the southern tip of Africa to the East. The Slave Lodge uses various maps in its exhibitions to illustrate the spatial patterning of Dutch and Khoi-San farms in the Cape.

The South African Museum is home to the Mineral Gallery exhibition, which shows South Africa's mineral wealth using distribution dot maps. These maps are also used in the Bo-Kaap Museum exhibitions, to show the distribution of various population groups on the Cape Flats when the Group Areas Act 41 of 1950 was in force. Distribution maps are easily mastered by learners when they encounter them for the first time in the Grade 3 Geography syllabus, with choropleth maps being introduced in the Grade 3 History syllabus. These thematic maps in which areas are shaded or patterned in proportion to a statistical variable that represents an

Figure 5: A map depicting slave routes in the Slave Lodge Museum (photograph: Hylton Howard Arnolds)

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aggregate summary of a geographic characteristic within each area, such as population density or per-capita income, is a useful resource that young learners can easily interpret during a museum visit. Pie charts show percentages as a circle, divided into segments, and could indicate, for example, the various means by which learners travel to school. Since each piece of data is shown as a proportion of the 360 degrees in a circle, such a geographical tool has a mathematical component to it, and it is incumbent on museum educators to include such links in their worksheets.

Graphs such as scattergrams show relationships between two sets of data, with points located using the x- and y-axes. Sometimes these points are arranged in a pattern. The line of best fit runs through the middle of a collection of points on the graph, ideally with an equal number of points on either side of the line. These graphs can be included in museum worksheets aimed at the appropriate grade(s).

An ortho-photo/photograph or ortho-image is an aerial photograph or satellite image which has been geometrically corrected ("ortho-rectified"), such that the scale is uniform: the photo or image follows a given map projection. Unlike an uncorrected aerial photograph, an ortho-photo can be used to measure true distances, because it is an accurate representation of the Earth's surface, having been adjusted for topographic relief, lens distortion and camera tilt. Ortho-photos can be used during museum lessons to explain patterns that are evident in the landscape, and can be used extensively in conjunction with topographic maps at the Groot Constantia estate during museum workshops, to improve learners' map skills, techniques and competencies.

Human–environment interactions

The human–environment system forms the focal point of why learners study Geography. Thematic maps, which are used to visualise a human activity in a particular geographic area, portray basic features such as coastlines, boundaries and places, but are only used as a point of locational reference for the phenomenon being mapped. Figure 6 shows the Sentinels of the South exhibition in the South African Museum, depicting a snow-mobile used by early explorers in the Antarctic.

Thematic maps are used

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Figure 6: This snow-mobile is used to depict the human-environment system in the Antarctic. (Photograph: Hylton Howard Arnolds)

extensively to depict various animal habitats and fishing areas in the marine exhibitions at the South African Museum. In these exhibitions, satellite images are used to depict how humans have negatively affected the oceans and caused extensive environmental degradation to coral reefs.

Well-researched texts in the art exhibitions at the South African National Gallery explore the various geographic theories in artistic periods. Human geography and art have long been intertwined as paths in seeking answers about the world and have been implicated in transformations in the ways we represent and conceptualise our world (Yoo, 2021). Art is part of the practice of dwelling in and on the Earth. The exhibition, Materiality, unpacks how artists have used materials – directly or indirectly – to raise questions about larger societal concerns. The exhibition depicts, among many realities, climate and environmental issues, consumerism, technology, globalisation, xenophobia, migration, religion, beauty, gender, sexuality and politics. In an increasingly digitised world, honouring the materiality and physicality of work also represents a return to the tangible and the real.

Global positioning systems (GPSs) help one navigate, by providing detailed information about the position and the immediate geographical context. Learners can be encouraged to use their cellular phones to access their GPS for map-reading exercises during a museum

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visit at the Groot Constantia Estate. Cross-sections are line graphs that show a sideways view of a landscape, with features such as hills and valleys, or depths (e.g., the depth of a river). Cross-sections of hills use contour lines to determine the height of the land, while cross-sections of river depths are drawn using negative numbers (so that the line graph looks like a depth, rather than a height). These graphs are useful in palaeontological exhibitions where Karoo sedimentology is shown, to illustrate how palaeontologists go about searching for certain types of fossils.

Geographical tools and educational programmes

Geographic enquiry includes observation, description, analysis and explanation, evaluation and prediction, and decision making. These methods can be applied in a conceptual framework that embraces Geography's four big ideas, namely place, spatial processes, spatial distribution patterns and human–environment interaction. Table 2 depicts the available tools which

Table 2: Geographical tools accessible to museum education (adapted from DBE, 2011a, b and c)

	Big Ideas in Geography		
Method of enquiry	**Tools used to locate and describe place**	**Tools used to illustrate and explain spatial distribution patterns and processes**	**Tools used to explain human-environment interactions**
Observation; Description; Analysis and explanation; Evaluation and prediction; Decision-making; Personal evaluation, judgement and response	Gaiasphere; Satellite images; Cross-sections; Aerial photographs; Paintings; Objects; Topographic maps; Compass; Wall maps; Globes; Atlases; Internet	Atlases; Scattergrams; Distribution maps; Maritime charts; Synoptic charts; Satellite images; Climographs; Orthographic photographs; Pie charts; Geographic Information Systems; Choropleth maps; Dot density maps	Paintings/ artworks; Topographic maps; Thematic maps; Geographic text; Global Positioning Systems; Histograms; Atlases; Academic journals; Pie charts; Satellite Images; Topographic maps Internet; Geographic text, displays eg., showing previous methods of energy use

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Table 3: Evaluation of educational programmes presented at the Iziko Museums of South Africa (compiled by authors)

Educational Programmes	Geography Tools Applied	Implications for Geo-Literacy in Museums
Social History education	Aerial photographs; Paintings; Objects; Music; Infographics; Atlas; Political wall maps; Academic journals; Distribution maps; Maritime charts; Scattergrams; Internet; Geographic text; Thematic maps	Interpretation of relative location Map reading and route taking. Interpretation of signage Action competency, communication competency, and space–time relevance
Natural History education	Gaiasphere; Satellite images; Objects; Topographic maps; Compass; Wall maps; Stereoscope; Infographics; Geographic Information Systems; Globes; Atlas; Academic journals; Scattergram; Distribution maps; Histograms; Synoptic charts; Climographs; Orthographic photographs; Pie chart; Flow diagrams; Graphs; Modelling; Internet; Geographic text; Thematic map; Global Positioning Systems; Cross-sections	Physical and human processes, awareness, perception, characteristics, similarities and differences Location, place, region, space, distribution, pattern, scale and spatial association Interdependence, causes and processes Environmental impact, social impact, spatial interaction, spatial organisation, human-environment interaction, cause, process, time, behaviour, consequence, justice, quality of life, environmental quality, welfare, costs and benefits Choices, decisions, costs and benefits, planning, management, power, inequality and problem-solving Cultural sensitivity, diversity, ethics, opinion forming, empathy, values, action and personal responsibility
Art education	Geographical theories; Paintings; Modelling; Geographic text; Photographs	
Planetarium education	Gaiasphere; Satellite images; Sky maps; Paintings; Objects; Compass; Globes; Distribution maps; Synoptic charts; Satellite Images; Climographs; Pie chart; Modelling	

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curators and museum educators can use to improve the geo-literacy of the learners visiting the mentioned museums.

The education department at Iziko Museums is responsible for interpreting the collections and exhibitions for learners during museum lessons, outreach programmes, school holiday programmes, planetarium shows, learner workshops, and public programmes. Learners can explore the museum spaces and engage in critical thinking through programmes which focus on art, social history, natural history, and the planetarium.

Table 3 demonstrates the implications of incorporating geo-literacy as a conscious methodology in its museum education pedagogy and museum exhibitions.

Geography tools applied in each of the identified programmes are listed in Table 3. The list is not mutually exclusive as similar tools are used in various educational programmes. The implications for geo-literacy are similar for various programmes and are therefore provided in a single row linked to the four programmes. This table was created based on activities included in the current educational programmes and can also be used by educators and museum curators to inform the development of new educational programmes or events. Based on this exploration, it is evident that geo-literacy does play an important role in the educational activities in the Iziko Museums.

Conclusion

The Iziko Museums of South Africa, with their conserved buildings and displays, provide a South African historic context for learners to explore. Educational programmes and activities are linked to the outcomes of the school curriculum and support our understanding of the world in terms of social, environmental, economic and political issues, on a local and/or a global scale. Geographical tools such as maps, remote sensing images, globes, graphs and drawings, are used in educational programmes to support geo-literacy, and to interpret and (re)present the world. The environmental and social impacts of historical events, and the possibility to learn from the past to improve decision-making, are enhanced by the educational activities provided in its spaces. Museum educators and curators should therefore further explore and implement strategies to

support geo-literacy when developing exhibitions and educational programmes in their unique context. Research on the perceptions of visitors to the museum complex and the impact of educational visits could inform this strategy. The activities at the Iziko Museums of South Africa have the potential to enhance cultural sensitivity and support the development of personal responsibility to learn from the past and contribute to creating a better future for all.

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