

Visitor perspectives on engagement programmes at the National Zoological Garden, Pretoria



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Background: Zoos have evolved into centres for informal education. However, their contribution to sustainable conservation literacy remains under-researched, especially in the context of South Africa.

Aim: The study aims to examine the motives, awareness, satisfaction and recommendations of visitors regarding educational engagement programmes offered at a zoo.

Setting: The study was conducted at the National Zoological Garden (NZG) in Pretoria, South Africa.

Method: In this quantitative study, structured questionnaires were administered to a sample of 102 visitors to the NZG, using a simple random sampling technique.

Results: While leisure and entertainment remain the primary reasons for visiting, there is an increasing public interest and engagement with the educational activities offered by the NZG. The high levels of awareness, participation and satisfaction represent the zoo's potential as an impactful informal learning space. The respondents indicated their desire to engage in more guided educational tours and interactive learning experiences.

Conclusion: The study affirms that educational programming is a central element of zoo visits, not a supplementary one. Ultimately, the study recommends that zoos augment their educational role through strategic support and responsive programming.

Contribution: The study underscores the dormant educational potential of zoos and recommends that they enhance their role as educational hubs with strong support from the public and strategic opportunities. By highlighting the educational role of zoos in promoting conservation awareness and ethical visitor engagement, the research contributes to sustainable tourism practices and aligns with broader goals of responsible tourism and community well-being.

Keywords: zoo-based education; conservation education; experiential learning; visitor engagement; visitor perceptions; National Zoological Garden.

Introduction

Zoos have always been viewed as centres for tourism, particularly associated with wildlife display, leisure and entertainment activities. This narrative, however, is slowly shifting as zoos increasingly position themselves as platforms for conservation education, sustainability awareness and community engagement (Botha, Kruger & Viljoen 2021; Mearns & Botha 2018; Ojo & Yusuf 2019). The role of zoos is evolving significantly, from being just centres where animals are displayed and people visit for leisure (Ruscitti 2022). Given the growing public awareness of biodiversity loss and ecological damage, zoos are gradually expected to focus beyond entertainment and contribute to research, education and species preservation (Lewis & Williams 2025; Rahmat, Abdullah & Kashiwazaki 2020; Roe, McConney & Mansfield 2014).

In this context, the interplay of tourism, education and conservation is rapidly becoming a crucial area of academic inquiry, especially in developing countries where informal learning platforms are underutilised (Lester 2024). South Africa, prominent for its rich biodiversity and successful tourism industry, offers a valuable context for examining the educational role of zoos (Du Plessis et al. 2022). For example, the National Zoological Garden (NZG) in Pretoria is one of Africa's largest zoological institutions and attracts significant numbers of both domestic and international visitors (Mkhize 2020). Despite the existence of conservation efforts as well as animal welfare strategies, gaps in knowledge remain regarding how visitors engage with the educational

programmes of zoos and how these engagements influence knowledge and behaviour towards conservation and sustainability (Jordaan & Du Plessis 2014; Kruger & Viljoen 2023).

Research suggests that zoos have the potential to support informal learning environments (Lewis & Williams 2025; Ojo & Yusof 2019). Nonetheless, such research is largely biased to the Global North narratives, with limited empirical scholarship on this subject matter in African zoos. In addition, visitor perspectives, especially those regarding their motives to visit, awareness of educational programmes, satisfaction with the learning experiences and preferences, remain underexamined (Hermann & Du Plessis 2014; Kruger & Viljoen 2023). Such an omission limits the understanding of African zoos' potential to fulfil both conservation and educational mandates (Kruger & Viljoen 2023). These mandates align with the sustainable tourism goals, and it is crucial to recognise and support the distinct role zoos play in encouraging biodiversity, facilitating environmental awareness and aiding the broader strategic goals of sustainable development across Africa (Bueddefeld & Kerr 2024; Lester 2024). This study, therefore, sought to examine the visitor experiences of educational engagement programmes at the NZG. Specifically, it examined visitor motivations for visiting the zoo, their levels of awareness and participation in educational initiatives, their satisfaction with those experiences, and their recommendations for future improvements. The study endeavoured to gauge the extent to which NZG's educational programmes can be solidified to support conservation outcomes and sustainable tourism.

Literature review

Zoos are increasingly evolving into significant centres for conservation education and public engagement (Kleespies et al. 2022). In the face of escalating global ecological challenges, such as climate change and ecological degradation that require public awareness and behaviour change, zoos are repositioning themselves not only as centres of animal display, but as spaces for connecting science and society through informal learning (Spooner et al. 2023). Their potential to support environmental literacy, influence visitor behaviour and foster conservation ethics has become a subject of growing interest within both the education and tourism sectors (Lester 2024). Given that they are accessible public institutions that are visited by diverse groups of people, zoos are uniquely located to close the gaps between science and society by providing informal and experiential learning opportunities that facilitate environmental literacy.

Unlike formal classroom environments, zoos offer opportunities for experiential learning settings that allow visitors to encounter live animals and engage with the interpretation strategies that promote intellectual and emotional connection to nature (Lester 2024). Such settings are especially favourable to shaping environmental values and behaviour, particularly when the educational programmes are intentionally designed to promote empathy, reflection and

action (Bryan 2022). In regions with advanced zoo systems, such as in North America, Western Europe and some parts of Oceania, the educational programmes of zoos have been strategically designed and institutionalised (Valasek 2024). Zoos in these regions, which are largely in the Global North, characteristically operate devoted education departments, staffed with skilled educators who develop programmes based on pedagogical theory and conservation science (Miyake 2024). In addition, there is a strong alignment between the educational efforts of these zoos and national curricula (Valasek 2024). These institutions also collate real-time feedback from visitors and perform research-based assessment methods to measure learning outcomes (Miyake 2024).

The San Diego Zoo in the United States (US), for example, integrates digital storytelling, cooperative exhibits and conservation messaging during the entire visitor experience (Quidachay 2024). This is further supported by a strong education team and continuous programme assessment (Kisling & Barongi 2022). The Chester Zoo in England provides platforms that cater from early childhood to postgraduate levels (González-Olvera et al. 2022). In addition, the zoo provides both digital outreach programmes and on-site learning experiences (Brown & De Courcy 2022). In Australia, the Taronga Zoo incorporates ecological knowledge in its interpretation strategies, broadening the scope of conservation education to include cultural sustainability. These best practices share common features, particularly regarding their investment in visitor engagement strategies, alignment with broader sustainability goals, and integration with national and international conservation strategies (Greenwell et al. 2023). In addition, they regularly evaluate their programmes to ensure that they are educationally sound and efficient (Greenwell et al. 2023). In these contexts, zoos are recognised not only as recreational spaces but as influential contributors to ecological literacy and public advocacy (Ruscitti 2022).

Conversely, the current circumstance in many Global South zoos, particularly in Africa, reflects a significant gap regarding the recognition and execution of conservation education (Yfantidou & Goulimaris 2018). Besides the continent's unmatched biodiversity and unique cultural narratives, zoos across Africa still face problems in assuming a central role in conservation education (Bollig 2022). The problems faced include, *inter alia*, deteriorating infrastructure, limited financial resources to develop, skills and expertise gaps, and a significant prioritisation of tourism income over education outcomes (Bollig 2022). The key challenge is the limited alignment between educational departments and zoos, as in most cases, the former is either entirely absent or has limited resources to support the latter. Interpretation strategies at zoos, therefore, are largely outdated or minimal. It is observed that most of the existing educational content in African zoos, where it exists, is typically static, less interactive and text-heavy with limited digital tools to support the programmes and visitor experiences (Kruger & Viljoen 2023). As a result, visitor engagement remains largely passive, comprised of reading signs or attending unsystematic feeding demonstrations.

The limited intentional programming and real-time feedback mechanisms imply that most African zoos often have limited insights into visitors' experiences, perceptions and expectations (Ballantyne & Packer 2016). Despite this, there are some African zoos that are slowly taking steps to improve their conservation education programmes and implement some of the best practices, although to a larger extent, their efforts remain fragmented with limited systematic investments. The Johannesburg Zoo in South Africa, for example, hosts conservation-themed community events (Kruger & Viljoen 2023). However, these events are structured around entertainment more than structured learning (Kruger & Viljoen 2023). In Uganda, the Entebbe Zoo provides educational tours for school groups, although these tours are not embedded within the formal curricula or a framework for follow-up engagements with schools (Briggs & Van Zandbergen 2024). Similarly, the Addis Ababa Zoo in Ethiopia has partnered with local universities and installed basic conservation signage (Barazandeh et al. 2024). However, there are limited comprehensive strategies and inadequate infrastructure for a sustained impact in these programmes (Barazandeh et al. 2024). One of the key challenges faced by many of these zoos is that their initiatives are scantily institutionalised, and they largely rely on the enthusiasm of individual employees or temporary donor funding more than long-term plans and strategies (Bollig 2022). Above that, the experiences and expectations of zoo visitors in Africa are not fully studied, which means that the existing educational programmes are not completely grounded in the expectations, perspectives or cultural contexts of the visitors (Hermann & Du Plessis 2014; Mkhize 2020).

The limited systematic public engagement therefore limits the African zoos' potential to serve as centres of conservation learning and informal education. Besides these zoos attracting a diverse range of visitors, both domestic and international, their capacity to leverage these interactions for meaningful educational outcomes remains underdeveloped (Benatar 2023; Hermann & Du Plessis 2014; Mason 2000). Most of the programmes have limited inclusion of participatory elements, such as feedback mechanisms, reflective dialogues and co-created content (Lancaster 2013). The absence of such limits hinders the zoo's potential to develop deeper connections between visitors and the conservation pedagogies it aims to offer. In addition, there is limited effort invested in understanding the zoos' significance to people's lives, especially amongst groups who do not have any other form of environmental education outside the zoos (Mearns & Liebenberg 2018).

In other research, recommendations have been drawn that zoos can be more impactful on the condition that they adopt visitor-centred approaches that put much consideration into interaction, participation and contextual relevance (Botha et al. 2021; Frost 2011; Hermann, Du Plessis & Coetzee 2013; Jordaan & Du Plessis 2014). Such approaches can be implemented not only to transmit information but also to create experiences that resonate emotionally and intellectually with diverse groups of visitors (Mkhize 2020). Some of the suggestions given include integrating narratives that reflect local cultural and ecological realities, designing exhibits

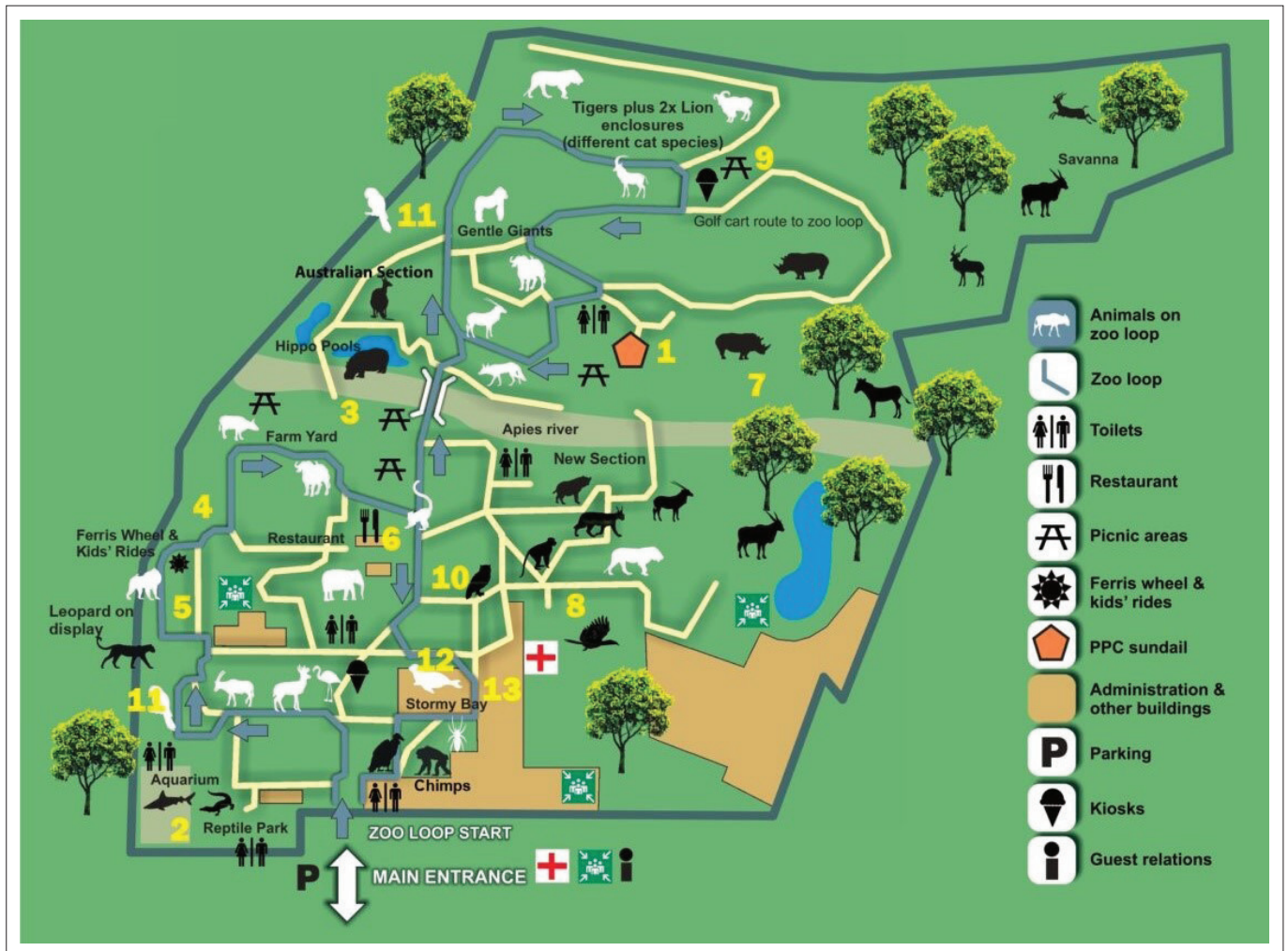
within zoos that promote more inquiry and exploration, and making use of trained experts who can interpret and facilitate real-time learning and conversations (Allenby 2014; Mkhize 2020; Valasek 2024). In addition, Lewis and Williams (2025) emphasise the significance of visitor inclusion in the assessment and planning for educational projects. This is a sustainable way to create a learning environment that is democratic and reflective of the community interests (Minteer, Collins & Raschke 2022). In multicultural and multilingual societies, such as in South Africa, these models will be relevant given that they emphasise inclusive strategies (Botha et al. 2021). While these approaches have been well documented in the Global North, their relevance to African contexts is still emerging and has yet to be widely adopted.

Besides these gaps, the significance of zoos in Africa as informal learning centres is rapidly growing, especially given the intensifying environmental challenges where the formal education sector struggles to keep abreast with the urgency of conservation issues (Awazi, Ambebe & Njamnjobo 2025; Green et al. 2022). These considerations are particularly urgent in South Africa. The NZG, one of the continent's flagship zoos, is strategically positioned to be a pioneer in this transformation.

Research design and methods

A quantitative research design was employed in this study to collect and examine visitor perspectives on educational programmes at the NZG in Pretoria. National Zoological Garden is a tourism facility that attracts visitors from all over the world. It is also globally known for its academic function, collaborating with both national and international institutions in the natural science field. Figure 1 shows the map of NZG.

National Zoological Garden was chosen for this research study as it has the potential to have a positive impact on educating people about animals and nature. The NZG houses a variety of exotic and indigenous species that are captive-bred. The facility was established in October 1899 by Dr Gunning and, since then, the indigenous and exotic animal and plant collection has grown with time. A structured questionnaire served as the survey instrument and was administered to 102 zoo visitors through a convenience sampling technique over a period of 3 weeks to promote a diverse demographic representation. The convenience sampling was conducted on-site at regular intervals during the 3 weeks between the opening and closing times. Visitors who were on the premises and available to participate in the study were asked to complete the survey. This approach was similar to previous studies that utilised a convenience sampling to obtain data from zoo visitors (Hermann & Du Plessis 2014). The purpose of the survey was to gather data regarding the visitors' experiences and, therefore, their personal information was not required. Although not based on any theory, the survey instrument design was guided by a review of similar studies and was designed to capture the experiences of zoo visitors (Ballantyne & Packer 2016; Hermann & Du Plessis 2014).



Source: South African National Biodiversity Institute (SANBI), 2023, National Zoological Garden Map, Pretoria

FIGURE 1: Map of the National Zoological Garden, Pretoria.

The instrument consisted of both multiple-choice questions and closed-ended questions, which focused on five key areas: motivations to visit the zoo, level of awareness of educational programmes of the zoo, participation in the zoo's educational programmes, level of satisfaction with those programmes and recommendations for improvement. These questions were designed based on a literature review of similar studies that examined visitor experiences and motivations to visit zoos (Hermann & Du Plessis 2014; Hermann et al. 2013; Jordaan & Du Plessis 2014; Mearns & Liebenberg 2018). The obtained data were analysed using the Statistical Package for the Social Sciences (SPSS), applying descriptive statistics to calculate percentages and frequency distributions. The structured approach adopted in this study helped to ensure a systematic examination of public perceptions and educational engagement within the zoo setting, offering a strong basis for policy and practice implications.

Ethical considerations

Ethical approval to conduct this study was obtained from the University of South Africa (UNISA) College of Agriculture and Environmental Sciences (CAES) Health Research Ethics Committee (NHREC Registration Number: REC-170616-051) with the ethical clearance number (2022/CAES_HREC/049).

The South African Biodiversity Institute National Zoological Garden Animal Research Ethics and Scientific Committee (ARESC) also provided ethical clearance to conduct the study (SANBI/RES/P2021/25).

Results

There are various reasons for visiting zoos, with leisure, entertainment and education being among some of the key motives. Table 1 presents the results regarding the respondents' motives to visit the NZG.

Following their reasons to visit, the respondents were asked to indicate their level of awareness of the NZG's educational facilities. As presented in Table 2, the results show that there was a high level of awareness displayed by the respondents.

The findings of this study show that there was a significant interest in participating in the NZG's educational activities, either as the primary or secondary activity. When the respondents were asked if they participated in the educational activities when they visited the zoo, most of them answered in the affirmative (Table 3).

TABLE 1: Reasons for visiting the National Zoological Garden ($N = 102$).

What is your main reason for visiting NZG	%
Leisure	40
Entertainment	21
Research	16
Education	11
Other	8
Business	4

NZG, National Zoological Garden.

TABLE 2: Level of awareness of National Zoological Garden's educational facilities and initiatives ($N = 102$).

Are you aware of the NZG's educational facilities and initiatives?	%
Yes	88
No	12

NZG, National Zoological Garden.

TABLE 3: Participation in the National Zoological Garden's educational activities ($N = 102$).

When you visit NZG, do you also participate in the zoo's educational activities?	%
Yes	85
Sometimes	14
No	1

NZG, National Zoological Garden.

TABLE 4: Level of satisfaction with the National Zoological Gardens educational programmes ($N = 102$).

Level of satisfaction with the NZG's educational programmes	%
Are you satisfied with the NZG's animal talks?	
Satisfied	42
Unsatisfied	8
Neutral	50
Are you satisfied with the NZG's standardised name boards?	
Satisfied	74
Unsatisfied	20
Neutral	6
Are you satisfied with the NZG's interactive display boards?	
Satisfied	80
Unsatisfied	11
Neutral	9
Are you satisfied with the NZG's information boards?	
Satisfied	76
Unsatisfied	18
Neutral	6
Are you aware of the NZG's science festivals?	
Satisfied	75
Unsatisfied	15
Are you aware of the NZG's outreach educational programmes?	
Satisfied	79
Unsatisfied	21

NZG, National Zoological Garden.

The respondents were then asked to indicate their level of satisfaction with various education programmes at NZG. These included animal talks, name boards, interactive display boards, information boards, science festivals and outreach educational programmes. The results are displayed in Table 4.

Ultimately, the respondents were asked to indicate their suggestions to improve the delivery of educational activities at NZG. Their responses were captured and are presented in Table 5.

TABLE 5: Suggested interventions to improve National Zoological Garden's educational activities ($N = 102$).

What would you suggest NZG should do to improve the zoo's current educational activities?	%
Guided educational zoo tours	25
Wildlife and conservation educational talks	12
Curriculum-based school education visits	12
Interactive conservation activity days for learners	9
Structured educational programmes on zoology and conservation	8
Supervised educational animal interaction sessions	7
Educational outreach visits to schools and communities	5
Interactive educational exhibits on wildlife and habitats	5
Live animal feeding demonstrations with educational commentary	4
Informative reading material for learners and educators	3
Educational wildlife segments on community radio shows	3
Public education and awareness campaigns on conservation	3
Digital educational resources and e-learning materials	3
Training workshops on wildlife education and conservation Awareness	1

NZG, National Zoological Garden.

Discussion

The central purpose of this research was to explore how visitors to the NZG in Pretoria perceive and engage with the zoo's educational programmes, with a specific focus on repositioning zoos as vital centres of public learning. The study found that despite leisure and entertainment being primary motivators to visit zoos, educational engagement is more integrated and appreciated than traditionally assumed. Similarly, several studies advocate for the transformation of zoos from just being recreational attractions to dynamic educational spaces. In addition, similar studies suggest that zoos are rapidly seen as centres for informal education (Lester 2024; Spooner et al. 2023). By assessing the visitors' motives to visit, their awareness levels, participation rates, satisfaction levels, as well as suggestions for improvement, this research unpacks the untapped potential of zoos to operate as centres for informal, long-term and experiential learning. This aligns with previous studies that highlight that zoos play a central role in supporting environmental literacy and conservation education (Kleespies et al. 2022).

The finding that leisure (40%) and entertainment (21%) were the indicated main reasons for visiting NZG aligns with the historical patterns of visiting zoos, in which zoos have been largely seen as recreational areas. Nevertheless, the existence of research (16%) and education (11%) as significant motivators implies that there is an evolving public perception of the role of zoos. Similarly, Bryan (2022) notes that zoos can help shape conservational values, especially when programmes are designed to promote reflection and action. Thus, the traditional view of zoos as animal parks staged for the amusement of visitors is rapidly being challenged by a new understanding of these spaces' multifunctional roles that include scientific inquiry and conservation education. The study found that, besides education not being the primary motive to visit zoos for most of the visitors, there is evidence of a substantial underlying interest in educational programmes provided by the zoos. It was observed that zoos play a dual role, which is both leisure as a pulling factor and education as a factor promoting sustainable engagement.

This implies that zoos should promote an effective integration of learning into visitor experiences and align visitor expectations with institutional goals. In addition, the indication of 'research' as a motive to visit the zoo is noteworthy. It shows the potential for scientific collaborations between zoos and academic institutions, reinforcing the zoo's identity as a legitimate site of scientific exploration.

A particular plausible result is the high level of awareness (88%) of the NZG's educational programmes and facilities. This finding is evidence of the zoo's efficient outreach of these programmes on-site. More importantly, this level of awareness was tallied with the action of the respondents, as a majority (85%) indicated that they participate in educational initiatives when visiting the zoo, and 14% indicated occasional participation. This result shows the willingness and readiness of the public to engage with educational activities offered at zoos. Conversely, previous studies note limited engagement in many African zoos because of passive interpretation strategies (Ballantyne & Packer 2016). This also changes the narrative that a regular zoo visitor is primarily motivated by leisure and entertainment. Instead, the new data obtained in this study point towards a receptive audience, open to obtaining knowledge when it is offered in an engaging, accessible and contextually pertinent way. Therefore, zoos have crucial opportunities to deepen their educational impact, especially when the learning experiences are designed and offered as core elements of the visit.

The satisfaction of visitors with various educational programmes at the NZG shows a complex but highly positive landscape. The results show the highest satisfaction with standardised name boards, interactive display boards and information boards. These elements (boards) are representative of relatively passive models of information sharing. However, given their high satisfaction ratings, these elements prove to be effective tools for basic knowledge transfer. In addition, their accessibility, visibility and clarity contribute to their impact. It was also observed that there were slightly more mixed reviews regarding the interactive or event-based programmes at the zoo, for example, the science festivals and animal talks. For instance, when asked to indicate their level of satisfaction with animal talks, 50% of the respondents remained neutral. This neutrality shows that there are inconsistencies regarding the zoos' offering of educational engagement activities. It also reflects a limited depth in the activities related to animal talks. In addition, despite most of the respondents indicating satisfaction with science festivals and outreach programmes, the notable dissatisfaction with these activities reflects key areas for improvement, particularly in augmenting the quality and relevance of these activities. It is crucial to consider that the educational initiatives in zoos should be multimodal to cater to different groups of visitors. These groups, such as families, students, tourists and scientists, have different learning needs and preferences. Therefore, a broad-brush approach would not yield high satisfaction across various population groups visiting zoos. The findings of this study point to the

need for the integration of multilayered content that promotes multiple levels of engagement.

The findings of this study raise substantial implications for zoo policy and practice. Firstly, there is a strong mandate to integrate education into the development and delivery of zoo experiences. This can be done through guided educational tours, which were the most suggested interventions (25%) by the respondents. Also, curriculum-aligned school visits are crucial, coupled with structured zoology programmes and wildlife talks. These interventions should be framed as central offerings of the zoos, not as supplementary. Secondly, institutional capacity building for educational delivery is needed. Activities in this regard should involve staff training, the development of curriculum, as well as the use of technology. In the case of technology, the growth of digital and interactive learning provides opportunities for improving the educational reach of zoos, both on-site and remotely. Given that the respondents suggested the inclusion of digital educational resources and e-learning materials, there is a need for such blended learning experiences that reach beyond the physical boundaries of the zoo. Thirdly, there is a significant need for zoos' educational activities to be extended to reach schools and communities, especially in under-resourced settings. In South Africa, for example, where access to information and formal conservation education is imbalanced, such an initiative could benefit many people, particularly those who are underprivileged in this regard. In addition, these outreach programmes need to be coupled with radio segments or public awareness campaigns, which can help boost environmental literacy and behaviour change.

From a policy perspective, there is a need for governmental agencies and bodies responsible for environmental and educational affairs to formally recognise and support as complementary educational institutions. This can be done through funding educational staff, incentives for schools to take part in zoo-based learning, as well as curricular integration. This will help align with broader national goals on conservation of biodiversity, Science, Technology, Engineering and Mathematics (STEM) education, and sustainable development. Given the scant discussions on informal learning and experiential education, this study provides a critical contribution by highlighting the value of zoo-based education in bridging formal curricula with real-world environmental challenges. Within the learning ecosystem, zoos occupy a distinct niche regarding the offering of affective, experiential and social learning prospects which often may not be found in a typical classroom environment. The high level of participation and satisfaction as found in this study highlights the effectiveness of these informal environments. Learning at zoos engages visitors cognitively and emotionally, frequently triggering a sense of wonder, curiosity and empathy. From a constructivist perspective, the zoo offers grassroots learning experiences in which knowledge is actively built through experience and interaction. In addition, the respondents' recommendations suggest a growing need for participatory, inquiry-based learning. There is a need for implementing more hands-on

experiences that align with experiential educational models, such as live feeding demonstrations, as well as participatory conservation activities. Also, it is crucial to consider differentiated pedagogical approaches to cater to different groups and learning needs. It is key for zoos to be structured beyond just observing animals to become centres for conservation literacy, social transformation and environmental stewardship. For this to happen, there is a need for reframing institutional goals, (re)allocation of resources and (re)designing of visitor experiences. Overall, the findings of this study underscore the dormant educational potential of zoos and recommend that they enhance their role as an educational hub with strong support from the public and strategic opportunities.

Conclusion

This study highlights a significant implication: zoos, traditionally perceived as leisure and entertainment spaces, have the potential and public mandate to evolve into pivotal educational institutions. The findings show that not only do the visitors to NZG engage in educational activities, but they also express the desire for more learning experiences. This shows the zoo's untapped potential to become a transformative centre for conservation education, public learning and sustainable learning experiences. The significance of this study lies in its empirical confirmation that educational engagement is not a supporting activity but a core element of visitor expectations and experiences, offering a strong case for institutional modification. It also aligns with the broader goals of sustainable tourism in Africa – promoting ethical visitor management, inclusive education, and the responsible use of natural resources – thus contributing to the achievement of the United Nations Sustainable Development Goals (SDGs), particularly those related to education (SDG 4), sustainable consumption (SDG 12) and biodiversity conservation (SDG 15). Through capturing visitors' authentic perspectives, this study makes a significant contribution to a new, evidence-based narrative to the discourse on informal learning spaces, positioning zoos as crucial nodes in the broader educational and environmental ecosystem. Through illuminating the educational potential of zoos, this study provides a basis for shaping global best practices in both policy and practice, inspiring international alignment in embedding informal learning spaces into national and conservation strategies.

Future research should build on this work by exploring various demographic perspectives, longitudinal impacts of zoo-based learning, as well as comparative discourses across different geographic and cultural contexts, given the study's focus on a single institution and a snapshot in time.

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Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

D.K.T. and K.F.M. conceived the presented idea, developed the theory and performed the computations. D.K.T., K.F.M. and L.M. verified the analytical methods. K.F.M. encouraged D.K.T. to investigate the NZG as an informal conservation learning space and supervised the findings of this work. All authors contributed to the writing and editing of the article, discussed the results and approved the final version for submission and publication.

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Data availability

The data that support the findings of this study are available from the corresponding author, L.M., upon reasonable request.

Disclaimer

The views and opinions expressed in this article are those of the authors and are the product of professional research. The article does not necessarily reflect the official policy or position of any affiliated institution, funder, agency or that of the publisher. The authors are responsible for this article's results, findings and content.

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