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Research article

Using evaluation to prove or to improve? An international, mixed method investigation into zoos' education evaluation practices

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Abstract

This study was a mixed-method investigation into zoos' education evaluation practices. The first phase of the research involved an online questionnaire in which 176 zoos across 48 countries reported their evaluation practices. The second phase comprised nine case studies, enabling direct, in-depth observation of each site within its context, including face-to-face zoo education staff interviews. Taken together, the two phases of this research offer a revealing analysis of current evaluation practice within zoos. The research indicates that zoo education staff understand evaluation and its application within formal zoo education programmes. However, zoo staff noted several barriers to regular evaluation including time, cost and know-how. The majority of case study zoos indicated that their education programmes are guided primarily by school curriculum to be attractive to teachers and link with student learning. The research also suggests that educational programme evaluations in zoos focus mostly on participant satisfaction to ensure teacher expectations are met; educational outcomes for students are rarely addressed. Rather, informal measures including observations and anecdotes are heavily utilised within zoos across all regions, and zoos noted that information gained through formal satisfaction surveys and more informal evaluation processes was used to inform current and future programmes. School return visits and participation rates were also considered important indicators of programme success. However, whilst some case study sites had conducted formal satisfaction surveys, the results had not been analysed or utilised for programme revision or development. Thus, whilst there is a general understanding of evaluation, a strong focus on visitor satisfaction and participation seems to dominate evaluation practice within zoos. There seemed to be little evaluation focused on programme success in terms of the extent to which educational goals are achieved. The implications of these findings and suggestions for future research are discussed.

Introduction

Modern zoos claim to educate their visitors, to promote conservation actions and to actively contribute to environmental education (Patrick et al. 2007). Within the literature three different forms of environmental education, applicable within a zoo setting, are discussed: formal, informal and non-formal. Formal education, the focus of this paper, is generally accepted to include an organised, systematic educational activity with an explicit curriculum that is conducted within an identifiable space, designed for learning, and both the educator and student have clearly identified roles (Coombs 1968; Rogers 2004; Edinburgh Zoo Workshop 2005; World Aquarium and Zoo Association (WAZA) 2005). Within zoos, formal education predominantly serves groups of school children visiting with their teacher, usually with a predetermined purpose (Marshdoyle et al. 1982). Informal education, also discussed within this paper, refers to experiences provided to general visitors in the form of species signs, interpretive material, keeper talks and docent or volunteer encounters.

Measuring the success of zoos' education programmes is important from both zoos' and teachers' perspectives. There is a need for classroom teachers to evaluate the effectiveness of zoo visits in relation to student learning (Marshdoyle et al. 1982). Gutierrez de White and Jacobson (1994) recommended that zoos incorporate evaluation into programme development to provide a better education product and Hunt (1995) noted the importance of satisfaction surveys and repeat visits as indicators of success.

The methods employed to evaluate zoo education programmes can be appropriately guided by the reasons for the evaluation, for example, programme justification, verification

or development (Edinburgh Zoo Workshop 2005). Additionally, previous research identifies common themes for evaluation practice including determining clear project objectives with measurable results; developing and using consistent language; defining evaluation terms; and addressing the need for contextual understanding of the social, political and cultural aspects relevant to a particular situation (Jacobson 1991; Kleiman et al. 2000; Kim 2003; Stem et al. 2004; Norland and Somers 2006). The approach to evaluation is also significant. Many authors suggest that evaluation is more effective when a coordinated or collaborative approach is taken (Jacobson 1991; Weiss 1998; Norland and Somers 2006). In particular, the evaluation of education experiences within zoos needs to be approached systematically and include all stakeholders to ensure the information gained through the evaluation is accurate, valid and reliable (Jacobson 1997).

According to the Edinburgh Zoo Workshop (2005), only one zoo (Bristol Zoo in the United Kingdom) was known to conduct evaluation of their education programmes. When the document "Building a Future for Wildlife – The World Zoo and Aquarium Conservation Strategy" (WAZA 2005) was released in that same year, it was recommended that all zoos produce a written education policy and strategic plan for education. Specifically, the European Association of Zoos and Aquaria education standards were referenced: "the zoo must demonstrate that it is carrying out its education policy, by reference to specific projects, attendance figures, evaluation procedures and research," (WAZA 2005, p. 36). WAZA (2005) also "strongly encourages all zoos and aquariums to use objective and tested methods of evaluating the effectiveness of their conservation education and training programmes" (p. 41). Perhaps understandably, WAZA does not, however, recommend specific evaluation methods or models for use within zoos.

Evaluating formal education programmes should not be beyond the capacity of zoos as they have access to teachers and students prior to, during and following an educational experience. This suggests there are other factors that may influence the use of evaluation in zoos (Hunt 1995; Dierking et al. 2002; Kohl 2004; Kruse and Card 2004; Falk et al. 2007; Vernon and Boyle 2008). Stem et al. (2004) proposed that one of the greatest issues to overcome is the apparent need for each institution to create its own evaluation process. Other factors inhibiting evaluation could include perceived lack of time, associated cost and an absence of expertise within zoos (Gutierrez de White and Jacobson 1994). Whilst many assumptions have been made, current evaluation practices within zoos have not been fully explored and require further investigation.

There is little argument about the benefits associated with the systematic evaluation of education programmes, whether the purpose is to prove a programme's worth or to improve its education quality or effectiveness. Within zoos, however, there appears to be a great deal of apprehension when it comes to evaluating formal zoo education. This empirical study seeks a deeper understanding of how zoos conceptualise and consider evaluation whilst also examining current evaluation practices on a global scale. Studying zoo education on a global scale involved an appreciation that each zoo would have different perspectives, objectives, contexts and education implementation processes. To provide the desired depth within the data, mixed methods were used. Gathering both quantitative and qualitative data can help to offset any weaknesses or limitations associated with single method approaches (Denzin 1978; Patton 1990; Tashakkori and Teddlie 1998; McConney et al. 2002).

Three research questions are posed in this study:

1. How do zoos think about or conceptualise evaluation?
2. What methods or approaches do zoos use in the evaluation of their formal education programmes?
3. What are the barriers that zoos perceive to their use of evaluation?

Method

In this study, data collection was divided into two phases. The first centred on an online questionnaire administered electronically to zoos around the world, to gather data from a large number of zoos within a relatively short period of time. The second phase involved nine in-depth zoo case studies, facilitating direct observation and documentation within each site. Case study research enabled each zoo to be examined within its own context whilst also providing the opportunity for face-to-face interviews with zoo education staff.

Phase 1: Online questionnaire

The online questionnaire consisted of 62 questions, including 20 open-ended, 29 closed response (including five with an open-ended option), 14 rating scale and four multiple choice items. The questionnaire was organised in three sections that included (1) general zoo information, activities and mission statement; (2) types of education provision and its development, implementation and evaluation; and (3) zoo visitors and their perceived educational needs and priorities. Zoos' responses to section 2 of the questionnaire were used for this paper and focused on zoos' education provision and its development, implementation and evaluation.

Recruitment to participate in the online questionnaire involved direct email contact and communication with zoo education associations around the world. The list of zoos was obtained from the International Zoo Yearbook (ZSL 2009). A total of 593 zoos open to the public, representing 72 countries, comprised the database. It was not, however, possible to confirm that all email addresses provided in the 2009 Yearbook were correct and it is possible that a number of the 593 zoos were not actually contacted. For this reason, snowball sampling was also used to contact as many zoos as possible. Nevertheless, 167 respondents (95%) to the online survey were those contacted by email using the database provided by the International Zoo Yearbook (ZSL 2009).

Zoo recruitment spanned seven months (December 2010 – June 2011). The majority of respondents were education directors or coordinators, zoo directors or education personnel. Table 1 provides a summary of respondents' positions.

Table 1. Zoo respondents' position with the zoo (*n* = 176).

Region	Education staff	Director/curator/owner	Vet/keeper/senior staff	Position not specified	Total responses
1. Asia–Pacific	12 (50%)	2 (8%)	2 (8%)	8 (34%)	24
2. Europe, Middle East and Africa	49 (46%)	27 (25%)	6 (6%)	25 (23%)	107
3. North and South America	31 (69%)	3 (7%)	1 (2%)	10 (22%)	45
Totals	92 (52%)	32 (18%)	9 (5%)	43 (25%)	176

Table 2. Summary of invitations sent, responses received and rates of participation, by geographical region.

Region	Invitations sent	Responses	Response rate	Countries with zoos in region	Countries that responded	Case studies
1. Asia–Pacific	96	24	25%	16	9 (56%)	2
2. Europe, Middle East and Africa	327	107	33%	43	32 (75%)	4
3. North and South America	170	45	26%	13	7 (54%)	3
Totals	593	176	30%	72	48 (67%)	9

Zoos within the database were placed into one of three regions, depending on their geographical location (Table 2). To provide a point of comparison it was decided that geographical regions best represented the global nature of the study. It is acknowledged that each region spans a considerable diversity of zoos and cultures.

Phase 2: Nine case studies

During the planning phase of the research three case study sites from each region were proposed. However, given the high number of zoos responding within region 2 and the relatively low number within region 1, two sites were selected from region 1, four from region 2 and three from region 3, providing a total of nine case study sites.

The selection of the case study sites was determined using the following process. All zoos that selected "Yes" or "Maybe" in the questionnaire to participating as a case study site were considered eligible (*n* = 143, or 82% of respondents). Due to visitor interviews being central to data collection for the case studies a high visitation rate was necessary to provide enough potential participants within a limited time frame. Therefore, all eligible zoos with an annual visitation of 500,000 or more were contacted by email to initiate further discussion. Although this process may have introduced some selection bias into the choice of case study sites, on balance it was more important to maximise the likelihood that sufficient visitor data would be gathered during the week spent at each site. Zoos interested in participating were short-listed as potential sites. Consideration was then given to language (if non-English speaking, was an interpreter to be provided by the zoo?) and suitability of the proposed research period for the zoo and its education department. The location of each short-listed zoo was then considered. Ultimately, the nine zoos visited as case study sites included six sites that had English as their primary language (a translator was provided at the remaining three); eight sites with visitation in excess of 1,000,000 per annum; three sites that were private and six that were government-funded; three sites that were among the 10 largest zoos in the world including both the zoo with the highest visitation and the largest zoo in the world (based on land area and the size of the animal collection).

Each case study visit was limited to seven days. The data collection process involved an extensive site analysis to place each zoo within its own context. Data collection methods included contextual observation, a photographic record, visitor interviews, education staff interviews and observation of and participation in special tours. The data used in this paper, in addition to that from the online questionnaire, are derived from zoo education staff interviews.

All sites provided a zoo staff member for each area of education within their zoo. Twenty-eight staff members were interviewed across the nine case study sites. In all cases, the head of education was interviewed and the additional interviewees included area co-ordinators (such as volunteer, school and curriculum) and general educators – typically this accounted for all education staff within each case study site. The interview protocol consisted of 18 questions requiring between 30 minutes and one hour, depending on the respondents' level of detail. Interview questions included: "Please explain, in your own words, what it means to evaluate an education programme or medium" and "Please explain the process of developing your formal education programmes – for school children".

All interviews were overtly voice recorded, which reduced the need for transcribing answers during the interviews, ensured the accuracy of data and enabled respondents to answer questions in their own words without being limited to a set writing space.

Data analysis

The qualitative data gathered through the open-ended questions were analysed by first manually coding each response according to its individual characteristics. Using the various codes, the data were then organised into main themes identified in the responses, which in turn led to identification of response patterns or trends. This iterative process was continued until all responses had been examined, coded, categorised and grouped within themes and no new concepts or themes were evident. To ensure consistency, I conducted all coding and analyses.

Results

Research question 1: How do zoos think about or conceptualise evaluation?

This question investigated how 28 zoo education personnel, from nine case study sites, responded to the prompt: *Please explain what it means to evaluate an education programme or medium,* during face-to-face interviews. Table 3 summarises their responses.

The data show that zoo education personnel have a substantial understanding of the meaning and application of evaluation. The most frequent response for the first three columns is highlighted in italics. Responses in the final column were, in general, equally represented.

Of the 28 respondents, six provided a relatively generalised or superficial response limited to discussing evaluation as a way of measuring the success of a programme, looking only at the result, for example to "observe a change in the children, they come alive inside". Twelve of the respondents described evaluation as mainly measuring the success of a programme and also described why evaluation was important, for example "to test how successful you are; to make sure they are receptive and you are providing for their (visitor) needs". The remaining ten respondents (representing six of the nine case study sites) provided a more comprehensive

Table 3. Words and phrases used by 28 zoo education personnel to describe what it means to evaluate their education programmes. All responses are represented; the most frequent response is highlighted in italics.

Words used to explain evaluation	Evaluation is used to determine if zoo visitors are…	Evaluation is used to determine if the education programme is…	Information gained through evaluation is used to…
Observe	*Having their needs met*	*Successful*	Inform programme development
Measure	Engaged	Achieving its goals	Refine the programme
Gauge	Receiving messages	Achieving its objectives	Justify education programmes
Test	Understanding the messages	Relevant	Determine if objectives have been met
Question	Being influenced by the messages		Determine if goals have been met
Determine	Having their expectations met		Give the educator a sense of satisfaction
Assess	Listening		Improve programme delivery

response by adding details of how the results would be used, for example to "make it better" and to "improve it or change a thing here and a thing there".

Regional analysis revealed that three of the five respondents within Asia–Pacific zoos (representing both case study sites within region 1) and six of the 11 respondents in North and South America (representing all three case study sites within region 3) provided a comprehensive response. This is in contrast to the response given by 12 zoo education personnel from region 2 (Europe, Middle East and Africa), where only one respondent provided a comprehensive answer and the remainder (11) were more generalised.

Research question 2: What methods or approaches do zoos use in the evaluation of their formal education programmes?

This question investigated how zoos actually evaluate their formal education programmes. The data analysed for this question are derived from the online questionnaire (176 responding zoos). The initial analysis provided data that related to both formal and informal education to gain an overall understanding of evaluation practices within responding zoos (Figures 1, 2 and 3). The analysis then focused specifically on data relating to formal education evaluation practices (Figure 4, 5, 6 and 7).

Figure 1 summarises the response to a closed, three-option (yes, sometimes or no) item within the online questionnaire. Respondents were asked "when creating educational materials (including school programmes, educational mediums or graphic interpretive signs for animal enclosures) does your zoo determine specific objectives for the educational experience?"

The data show that, on average, 95% of responding zoos determine objectives for their formal and/or informal education programmes at least sometimes and only 5%, typically, do not. When analysed regionally, 100% of zoos within region 3 (North and South America) and 98% of zoos within region 2 (Europe, Middle East and Africa) determine objectives at least sometimes. This is in contrast to zoos in region 1 (Asia, Pacific) of which 12% (3 zoos) reported that objectives are typically not determined for their educational programming.

Of the zoos that do determine objectives for their formal and /or informal educational experiences, Figure 2 summarises the response to a closed three-option (yes, sometimes or no) item asking "are there any measures used to assess whether those specific objectives have been met?"

The data show that on average, 80% of responding zoos use measures to determine the success of their educational programmes at least sometimes and 20% do not use such measures. Ninety-one percent of region 1 (Asia–Pacific) zoos reported using measures at least sometimes, a rate followed closely by region 3 zoos (North and South America, 89%). Considerably fewer region 2 (Europe, Middle East and Africa) zoos reported use of measures in determining the success of their educational offerings (73%).

Respondents to the online questionnaire were also asked to detail the types of measures they used to determine the effectiveness of their formal and /or informal education programmes in relation to specific learning objectives. Figure 3 summarises zoos' responses.

Responding zoos most frequently use questionnaires to measure the extent to which their educational objectives are achieved,

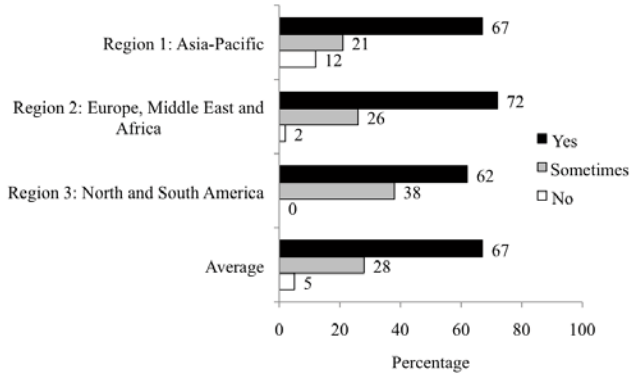

Figure 1. Percentage of zoos that determine specific objectives for their education programmes (n = 176).

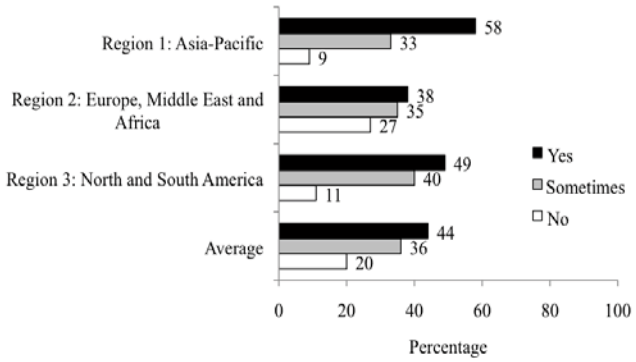

Figure 2. Percentage of zoos that use measures to determine if their specific formal and/or informal educational objectives have been met (n = 167).

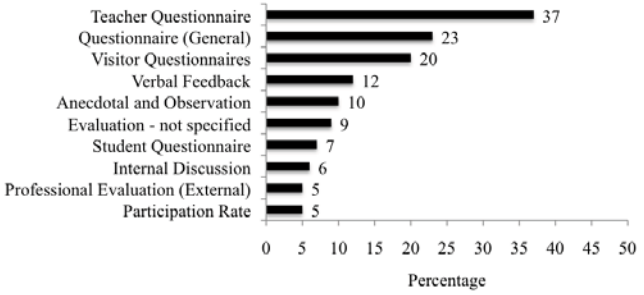

Figure 3. Types of measures used to determine if formal and /or informal educational objectives had been achieved. Note: 119 zoos gave 160 responses, so the above figures equate to more than 100.

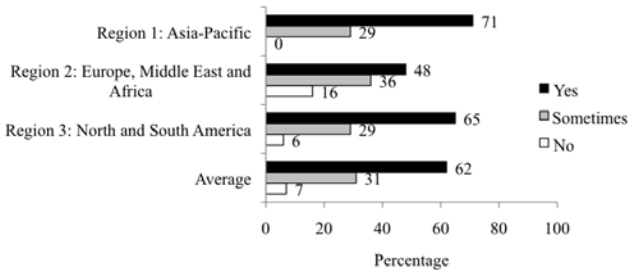

Figure 4. Percentage of zoos that collect information from teachers or students after a formal education experience at the zoo (n = 176).

accounting for the top three responses (Figure 3). Internal discussion, external evaluation and rates of participation comprise the least used types of measure with 5–6% of respondents utilising at least one of these measures. It is interesting to note that 9% of zoos noted "evaluation" as a measure but did not provide any information to enable further analysis.

Equipped with an understanding of zoos' general approach to evaluation it became important to understand how zoos evaluate their formal education programmes, programmes offered to school children. Figure 4 summarises the response to a closed, three-option (yes, sometimes and no) item within the online questionnaire, asking zoos if they collect information from teachers or students after an education programme visit.

The data show that on average 93% of zoos collect information from teachers and/or students at least some of the time. All zoos within region 1 (Asia–Pacific) reported that they collect this type of information, with more than two-thirds noting a "yes" response. Zoos within region 2 (Europe, Middle East and Africa)

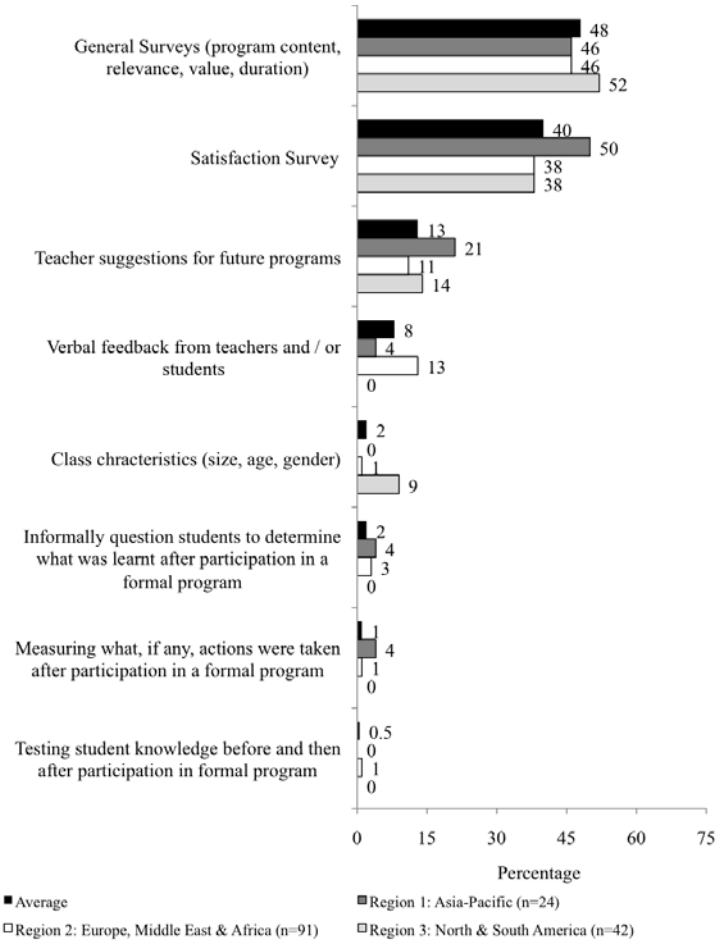

Figure 5. List of measures zoos report using to evaluate their formal school education programmes and percentage of zoos using those measures (n = 157).

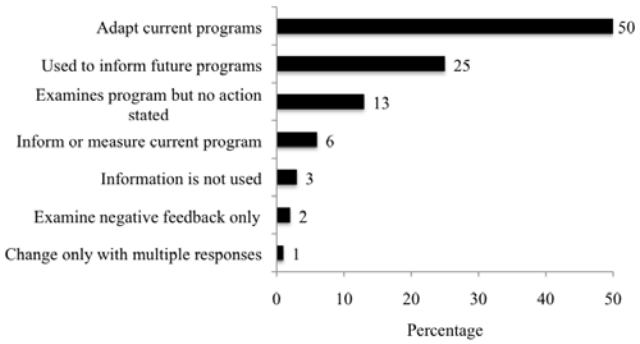

Figure 6. Summary of what zoos do with information collected relating to formal education programmes, from the various measures (*n* = 161).

fell short of the average (93%) with 84% reporting that they collected information at least some of the time. Region 2 also had the highest "no" response at 16%, more than double the average (7%). A large majority of zoos within region 3 (North and South America) reported that they collected information at least some of the time (94%).

Respondents were also asked to provide further detail about the specific measures used within zoos to measure the success of their formal education programmes. Figure 5 summarises these responses. The data show "programme content surveys" (reported by 48% of zoos, on average) and "satisfaction surveys" (40%) are the most common types of measure used by responding zoos. Further analysis revealed that only seven zoos (4%) across all regions reported using both these measures, which means that more than 80% of responding zoos use either "programme content surveys" or "satisfaction surveys" to measure the success of their formal education programmes. The data also show a very substantial drop to the next two most frequent responses, "teacher suggestions for future programmes" and "verbal feedback from teachers and/or students" (13% and 8%, respectively). The remaining measures are poorly represented with averages of 3% or less.

Regional analysis indicated only a small difference (6%) between regions that report using "programme content surveys". Region 3 zoos (North and South America) reported the highest use at 52%. For use of "satisfaction surveys", there was a 12% regional difference; slightly less than 40% of zoos in Europe, Middle East and Africa and zoos in North and South America reported using these surveys, as compared to half of the zoos in Asia–Pacific.

Of the remaining measures, regional analysis shows that zoos within region 1 report actively seeking "teacher suggestions for future programmes" at a higher rate (21%) than zoos within regions 2 (11%) and 3 (14%). Zoos within region 2 more frequently report using "verbal feedback from teachers and/or students" (13%), where as (9%) of zoos within region 3 use "class characteristics" as a measure. It is also interesting to note that only one zoo, among 157 respondents, reported testing of students prior to and following a formal education experience to measure the success of its educational programme.

Given this understanding of what types of information are collected by zoos, it became important to understand what zoo education staff do with that information. Figure 6 summarises zoos' responses to an open item asking about what zoos do with the data they have gathered to adapt or alter their formal education programmes.

The data show that more than half the responding zoos (56%) use data gained through the various measures to adapt or inform their current formal education programmes and a quarter of zoos report using the information to inform future programmes. Importantly, the analysis also showed that a relatively large percentage (16%) of zoos report that they either use the information to examine current programmes, but do not take any action, or do not use the information at all.

To further enhance our understanding of evaluation practices within zoos, 28 zoo education personnel within the nine case study zoos were asked to explain the process of developing their

Table 4. Summary of formal zoo education programme development and evaluation considerations reported by 28 zoo educators from nine case study sites.

	Education programme development		Evaluation practices		
	Context	Are goals determined?	Frequency of evaluation	Measures	Use
Site 1	Specific needs basis	None	Rarely	Informal discussion with teachers/observation/ participation rates	N/A
Site 2	Curriculum	None	Always	Teacher feedback – satisfaction survey	N/A
Site 3	Zoo site priorities	Yes	Always	Teacher feedback – satisfaction surveys/formal conversation with teachers and students/participation rates	Refinement
Site 4	Curriculum and revenue source	Yes	Periodically	Pilot of new programme/teacher feedback – satisfaction surveys/observation	Refinement
Site 5	Curriculum	Yes	Funded – always (other rarely)	Teacher feedback – satisfaction surveys and informal discussion/use of smart equipment during presentation/ observation	Justification and refinement
Site 6	Curriculum	Yes	Always	Pre and post discussions with teachers/observation/ formal student conversation	Satisfaction
Site 7	Curriculum	Yes	Always	Teacher feedback – informal discussion	Refinement
Site 8	Curriculum	Yes – visit specific	Periodically	Teacher feedback – satisfaction surveys	Not used
Site 9	Curriculum	None	Periodically	Teacher feedback – satisfaction surveys	Reporting for Zoo Board

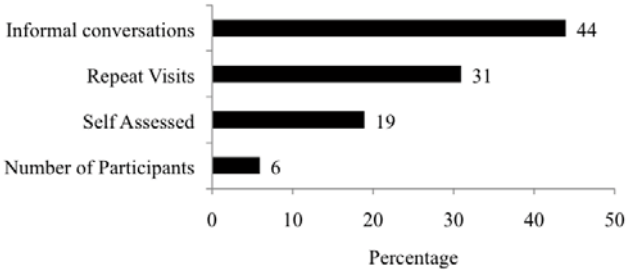

Figure 7. Summary of how zoos that do not collect information from teachers or students determine the value of their education programmes (*n* = 16).

formal education programmes, including evaluation practices. Table 4 summarises these responses, and shows that the majority of sites (78%) develop their education programmes within the context of the local school curriculum. One site reported developing programmes on the basis of visitor needs. Further analysis revealed that this zoo developed specific programmes for children with special needs including children with blindness and deafness. Another case study zoo reported that its education programmes were developed according to its own educational priorities. Further analysis of this response revealed that formal education programmes were linked to the current conservation work conducted within the zoo with the intention of giving students a "connection" to conservation efforts and the natural environment.

As indicated above, analysis of the online questionnaire showed that 67% of zoos reported that they determined specific objectives for their education experience (see Figure 1). Whilst this related to both formal and informal education, it is interesting to note that 67% of the case study sites also reported determining specific objectives or goals for their formal programmes. This consistency was also observed within the reported frequency of practising evaluation. The questionnaire data revealed that 93% of responding zoos collected data from teachers and/or students at least some of the time. This is relatively consistent with the 100% response from case study interviewees, who stated that they evaluate their programmes. It is important to note, however, that two of the case study sites reported that they "rarely" evaluate their programmes, three reported periodic evaluation and four zoos reported that they always evaluate their education programmes.

The measures reported by case study respondents, listed within Table 4, are mostly consistent with the measures reported by zoos within the online questionnaire (Figure 3). One case study site reported using a pilot study to determine the effectiveness of a new programme but this was not reported by this zoo within the online questionnaire.

The online questionnaire revealed that about half of zoos reported using the information gained through evaluation measures to adapt or refine their education programmes. This was also relatively consistent with the 44% who reported the same within the case study interview data.

Within the online questionnaire, a small number of zoos (*n* = 16) indicated that they did not collect data from teachers or students following a formal education visit. Figure 7 summarises these zoos' responses to an open question asking how they determine the value of a zoo visit from teachers' or students' perspectives.

The data show that nearly half (44%) the responding zoos measure the success of their education programmes through informal conversations and more than a third (37%) consider repeat visits and participation rates a measure of educational programme success. Three zoos reported that they self-assess their educational success but did not provide any further detail.

Research question 3: What are the barriers that zoos perceive to their use of evaluation?

This question investigated the issues and concerns raised by zoo educators in relation to evaluation and its use within their zoo. These data are taken from zoo education staff interviews at the nine case study sites (*n* = 28). Zoo educators were not directly asked to discuss the barriers or problems associated with education programme evaluation in their zoo. Rather, the following comments were made by respondents about evaluation at some point during the interview process and are listed in descending frequency.

- "Time consuming"
- "Need more staff"
- "Expensive"
- "Hard to do"
- "Haven't worked out how to do it" (relating to the evaluation of exhibit signage)
- "When formal evaluations are received I filter the information and only share the positive messages to avoid disappointment."

The data show that the primary barrier perceived by responding zoo educators is that evaluation is a time-consuming activity. When placed within the context of their interview, zoo educators emphasise how busy they are, the lack of funding and the need for more staff.

Discussion

This study aimed to provide an overview of evaluation practices within modern zoos, specifically focusing on the evaluation of formal education programmes. Through staff interviews, this research examined how zoos think about or conceptualise evaluation within the context of zoo education. With the addition of information gained through an online questionnaire, the research investigated how zoos apply evaluation processes to their formal education programmes.

One of the key factors to consider when investigating the utilisation of an evaluation approach is the reason or purpose of that evaluation. Stufflebeam (2001) identified 22 different approaches to evaluation, some that focus on "proving" a programme's value or worth and others that focus on programme improvement. The three reasons for evaluating zoo education given by the Edinburgh Zoo Workshop (2005) were justification, verification and development. The results from this research show that whilst zoo education staff across all regions have a general understanding of evaluation and its application, the primary purpose for evaluation as practised within zoos is to prove or justify a programme's worth. Half of the responding zoos also recognise their ability to improve their educational offerings via evaluation (see Figure 6). However, the measures used, which include satisfaction surveys, conversations and participation rates (see Table 4), are not likely to provide sufficiently detailed or accurate information for education programme improvement.

The research shows that zoo education programmes are most typically developed to align with school curriculum standards. Consequently, the goals determined to measure success relate to teacher satisfaction, rather than student learning. It is encouraging to learn that the majority of responding zoos collect data from teachers and/or students at least some of the time. However, with

the exception of surveys, much of these data are in the form of informal conversation or anecdotes. There is little evidence that zoos from any region evaluate their educational value from the perspective of student learning for the purpose of programme improvement or development.

Within the literature, authors discuss the need to have a holistic, systematic approach to evaluation and to involve all stakeholders (Hunt 1995; Jacobson 1997). Gutierrez de White and Jacobson (1994) emphasise the need for evaluation being incorporated into the whole process from educational programme development to post provision. The data show that the majority of responding zoos incorporate aspects of evaluation into their programmes during development, including the determination of specific objectives and use of data collection measures. However, the use of evaluation findings was limited, and possibly underused by zoo educators. Evaluation served as a tool for proving rather than for improving. Whilst this research reveals that zoos currently focus on measuring satisfaction, the data also show that zoos have the potential to evaluate the educational value of their programmes, demonstrated by the high percentage of zoos that already determine objectives and incorporate measures and by the considerable understanding of zoo education staff about programme evaluation.

In 2005, WAZA encouraged zoos to evaluate the effectiveness of their conservation education programmes and while this research indicates that zoos are not yet achieving this goal, it does show that zoos have actively implemented evaluation strategies for other purposes or perhaps without a clear purpose. If the intention was for zoos to measure their educational impact for the purpose of programme improvement it becomes important to understand why this is not happening. The perceived barriers to programme evaluation, identified by zoo education staff, were consistent with those listed by Gutierrez de White and Jacobson (1994) and included issues relating to time, cost and know-how. Another possible barrier highlighted by this research is the concern expressed about sharing less than positive evaluation results. Although further research could help refine understanding of why zoos are not currently evaluating for the purpose of programme improvement, we feel that zoos would benefit more immediately from the systematic provision of guidance.

Given the findings within this study, we suggest that governing associations, including WAZA, collaborate with zoos and aquariums to develop professional standards, specifically relating to evaluation practices. If the intention of evaluating education programmes within zoos is to improve the value of their offerings, then clear guidelines need to be established to assist zoos in implementing these practices. An evaluation model specifically designed for zoos would also be beneficial. For example, Stufflebeam's (2001) Decision/Accountability family of evaluation approaches may provide zoos and zoo associations with an appropriate base for model development. Equipped with clear and specific guidelines zoos would then be in a better position to collaborate with other stakeholders, an important consideration raised by several authors including Jacobson (1991), Weiss (1998) and Norland and Somers (2006). In addition, once equipped with such a model, zoos could seek and encourage collaboration with classroom teachers (Marshdoyle et al. 1982) to further refine the model for specific purposes including providing evidence of satisfaction and information directly from students that could be used to improve the zoo's educational value – evaluation to improve as well as to prove.

Sound educational practices involve a dedication to collaboration and continual programme development for the improvement of student learning. Sound evaluation can provide zoos with a toolbox of processes and strategies to systematically gauge their educational success. The provision of evaluation guidelines, including clearly defined purposes, will provide zoos with the opportunity to use those tools in ways that strengthen their educational capacity at the forefront of conservation education.

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