Workshop and Concepts in Constructivist Conservation Education

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Salient Concepts and Tags for Constructivist Conservation Education

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Paragraph 1 – Constructivism and Intellectual Virtues	Environmental epistemology, intellectual virtues, diversification of knowledge, meaning making, learning framework.
Paragraph 2 – Paradigm Shifts in Conservation Education	Paradigm shift, situated knowledge, culturnomics, interdisciplinary efforts, community outreach, cultural/social relevance, public interest, language, prior knowledge, scaffolding.
Paragraph 3 – Learning Principles and Constructivist Activities	Learner engagement, educational practices, educational techniques, interactive learning, knowledge ownership, knowledge internalisation, knowledge output, eLearning, social outreach, technology, gamification.
Conclusion	Impact, further research, collaboration.

Salient Concepts and Motivation for Constructivist Conservation Education

Conservation education generally refers to conservation biology, or conservation science, entailing research that analyses and proposes conservation practices or environmental protection and policy. A much-overlooked aspect of conservation education, however, is public education aimed at informing communities about surrounding ecosystems and how to integrate more sustainable practices into daily life. Zoos, aquariums, museums, botanical gardens, rehabilitation centres and other public organizations with conservation ties are in a unique position to educate visitors about conservation issues and inform conservation action by exposing visitors to new environmental knowledges. Whilst there have been increasing efforts to fulfil these educational goals, they are often situated in the realm of 'traditional' educational frameworks where information is transferred to a learner in a factual, linear way via signage or poster-based information often laced with scientific language. This educational approach is susceptible to perpetrating public biases of inability to make any significant impact on conservation efforts or alienating audiences with almost-exclusively scientific knowledges and language. This paper motivates a constructivist framework for public conservation education in order to combat these current downfalls. With constructivism's learner centred approach, organisations can involve visitors in meaning making processes when interacting with the educational experiences on offer and thus increase the possibility of instilling a sense of environmental stewardship and conservation action in daily life. Furthermore, constructivist frameworks allow for the integration of diverse knowledges, involving local or indigenous knowledges alongside scientific knowledge, and encouraging organisations to integrate culternomics into their outreach efforts to make education socially meaningful.

Over the last few decades, educational research and practice has moved from focusing on traditional teaching approaches to learner-centred constructivism. This entails a shift away from the notion that information can be transferred and memorized, toward considering learning as a process in which a learner utilizes their own experiences and perspectives to scaffold information onto their pre-existing knowledge, thus constructing new insights and understandings autonomously (Fosnot, 2013). Without situating a framework within either social or cognitive constructivism, a general sense of teaching and learning can be drawn from So (2002) which looks at factors likely to promote learning with a loose constructivism. This understanding proposes that individuals should be active participants in the learning process with both cognitive and social pre-existing ideas being included in the learning process by

shaping how individuals respond to and makes sense of new stimuli. Drawing from a vast literature review, undertaking this practice would include situating new knowledge in the context of learner's pre-existing knowledge, guiding learners through a process of viewing, formulating explanations and then finding alternative interpretations to their original positions, encouraging learners to ask and answer questions or partake in discussions, and providing resources and environments for learners to express, test, utilize or play with new ideas or knowledges (So, 2002). Information gained in this way is internalised by the learner, who has ownership of the new knowledge and an inherent understanding of its applicability and useful in any given context. Public organisations that offer visitors conservation education experiences would benefit greatly from this type of process, increasing the possibility of conservation action being taken up and a sense of environmental stewardship being developed. Furthermore, this approach has the potential of developing visitor's intellectual virtues, thus creating environmentally oriented epistemologists that have the ability to actively seek understanding where possible rather than seeking factual pieces of knowledge (Pritchard, 2018). This will aid in informing conservation action that visitors have justification for their knowledge and extended cognition systems to analyse and independently create appropriate environmentally friendly behaviours in private spaces without the aid of ongoing educational efforts.

Scaffolding new knowledge onto visitor's pre-existing knowledge is one of the first major paradigm shifts needed in conservation education, as knowledge is currently scientifically situated and is not diversified for the audiences it is presented to. These challenges are being recognised in research seeking ways to better educate and motivate individuals to personally commit to sustainable, energy-saving activities, labelled as critical psychological and social barriers to conservation (Zaval & Cornwell, 2017). Conveyance of scientific and conservation research knowledge is clearly not enough to change behaviour and attitudes, particularly when there are pre-existing rational biases regarding the public's understanding of wildlife conservation and the impact of individual sustainable practices (Zhou, Wan, Jin, & Zhang, 2016). Since local communities are considered key players in the sustainability of any conservation program, offering conservation education that is related to already existing knowledge paradigms in a community is vital to bridging this gap (Grúnová, Brandlová, Svitálek, & Hejcmanová, 2017). Constructivism's use of individual's prior knowledges as well as knowledge diversification via the inclusion of local knowledge alongside scientific knowledge may greatly aid in resolving aspects of the current shortcomings' researchers have

identified in conservation education. Ladle et al. (2016) offer a complimentary theory of culturomics that can be used to fulfil this constructivist mandate by helping instructional designers in conservation education respond to cultural trends, building and reinvigorating its societal relevance. These include reframing conservation issues, promoting public understanding, demonstrating public interest in nature, identifying local conservation emblems or language and assessing the cultural impact of conservation interventions to hone and adapt efforts in conservation education (Ladle et al., 2016). These aspects could impact a visitor's learning process by making the content approachable and culturally situated as well as disrupting existing visitor biases around not holding enough knowledge to partake in conservation action. The fields of anthropology or religion and nature could be invaluable data sources for informing this approach and assuring that educational knowledges align with the social or cultural climate of the region. If engagement strategies were reformed in this way, conservation education could be much more impactful, allowing visitors to meaningfully internalise conservation knowledge with greater ease and translate it into environmentally friendly behaviours.

When conservation knowledge is personally, socially and culturally relatable to visitors, constructivist learning principles easily follow as participants are primed to actively engage and could be more willing to partake in a learning process. With organisations being in a unique position to educate the public about conservation issues, there is a need to improve public education practices and to understand how various educational techniques will influence visitor learning and experience. Currently, exhibit signage remains the most prevalent medium for the conveyance of conservation information and thus render the viewer as a passive participant in their learning process (Roe, McConney & Mansfield, 2014). A recent study by Perdue, Stoinski, and Maple (2012) showed that visitors spent significantly more time at the exhibit when a video or live presentation occurred and scored significantly better on knowledge questions than those who were not there during a presentation, even though all information was available on signs throughout the exhibit. These results suggest that technological additions within a constructivist framework, such as educational video presentations, have the potential to positively influence visitor behaviour and knowledge internalisation (Perdue, Stoinski, & Maple, 2012). Essentially, when visitors are offered interactive experiences with conservation knowledge being presented, they are more able to formulate explanations for the new information, challenge their pre-existing ideas and develop interpretations of the new knowledge. Socialising learning, such as offering spaces for visitors to ask or answer questions

and partake in discussions, will also aid conservation education efforts. Finally, a constructivist conservation education model would require providing resources and environments for students to express, test, utilize or play with new ideas or knowledges seeking tasks to promote meaning-making and offer a sense of ownership of the new information to visitors. This process could take a variety of forms ranging from augmented/virtual reality headsets, to research stations with interact access, gamification of information, reward incentives for knowledge demonstrations, social evenings with talks and discussions, multiple choice quizzes with feedback sessions, systems for social media information posting or further innovative methods catered to the specific educational goals. This also lends itself to organisations utilizing websites and social media platforms for e-learning based conservation education, creating opportunities for asynchronous and non-geographically tied environmental knowledge development. These approaches could motivate people who may have no physical connection to nature spaces to experience and understand them and possibly result in more prevalent conservation action or a sense of environmental stewardship (Colleton et al., 2016). Immersive and interactive efforts will encourage visitors to develop new understandings of conservation and the environment through independent production of meaning and shows rich potential for efforts to elicit conservation action in public communities.

Conservation education for the public is becoming increasingly important. Whilst various factors may be responsible for the current divide that exists between conservation research and action, a conceptual paradigm shift in public conservation education toward constructivist practices could greatly increase the impact of these efforts. A constructivist educational framework encourages individuals to internalise and construct knowledge and works with an understanding that perception and experience are important in the learning process. It is also a pedagogy which embraces notions of cultural or social shaping of knowledge and integrates socio-cultural filters into conservation education in diverse environmental and social contexts to guide and improve the outcomes of environmental stewardship initiatives. If public organisations begin integrating visitor's prior knowledges, creating dissonance about current misunderstandings or biases as well as providing opportunities for application of knowledge and feedback, they could shape environmental epistemologists who can analyse and respond to new events from their base of environmental knowledge. Whilst more research along with pilot programmes developed with interdisciplinary efforts would be needed, this proposal puts forward a strong motivation for

conservation education rooted in constructivism to prompt more wide spread conservation action.

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Part B:
Conference Workshop in Constructivist Conservation Education

Workshop Rationale

Conservation education is a field in which science meets social science, often with dissonance in efforts to get these worlds to work together. This workshop will consider work done in epistemology and constructivism to investigate and better understand how effective, socially situated, conservation education can be offered by public organisations such as zoos, museums, botanical gardens and wildlife rehabilitation centres in order to encourage visitors to take up appropriate conservation action. We will not be looking at the content of conservation education, but rather at the systems and frameworks for conveying conservation information to diverse public audiences through a constructivist learning lens with suggested frameworks, practices and techniques.

Participant Description

Participants at this workshop will likely come from one of these three camps:
- individuals from organisations/institutions that offer some form of public conservation education and would like to broaden their knowledge on the topic or create more far-reaching educational experiences for visitors.
- researchers who work in conservation education aimed at policy, practice or consultation in expert fields looking to bridge their work into public spaces.
- academics from the fields of religion and nature, anthropology or other related departments looking for pragmatic implementation strategies for their research findings.

Other interested participants may include instructional designers or media creators wanting to work in conservation or with conservation related organisations, game designers or e-learning specialists wanting to create content that carries conservation content in their products, activists wanting to inform public interaction strategies for the conveyance of conservation information that results in community mobilisation

E-Learning Activities

Whilst this is intended as a synchronous activity, preferably conducted at a conference relevant to this topic or field of interest, below are a number of e-learning activities that participants can undertake after the workshop to further their learning or it can be used by individuals unable to be present at the workshop but still interested in engaging with this material. This information will be re-designed for ease of interaction in a MOOC style and would be posted on a stand-alone website with discussion platforms. It will also be shared via the conference's social media or communication platforms and will be sent out to a mailing list of interested individuals. It will entail a learning process of prediction, observation, reflection, creation, sharing and assessment.

eLearning Stages	Content and Platform
Prediction Stage	Input/Multiple choice test, concerned with creating awareness about current perceptions and understanding of constructivism, conservation education, and the relationship between them. Basic demographic information may also be collected at this time. Platform: SurveyMonkey
Observation Stage	A list of recommended videos and articles to outline constructivism, conservation education, and other major themes such as culturally situated/diverse knowledges or eLearning, will be provided for participants to engage with. Platform: Website/Blog Resource Page
Reflection Stage	A short, written reflection of 200-500 words on a selected resource from the observation stage posted to a discussion area for others to interact with. Platform: Website/Blog Forum
Creation Stage	A small assignment that requests participants to create an overview of either a specific exhibit/learning experience to be installed at an organisation of their choice, a specific reform in conservation education modelled on constructivist principles or an asynchronous eLearning/gaming experience offering some form of conservation education. Platform: Website/Blog Submissions Page
Sharing and Assessment Stage	The assignment is to be posted to a forum for feedback from peers and will also be reviewed, assessed and commented on by the workshop presenter. Platform: Website/Blog Forum

Workshop Plan

Time	Title	Description	Activities
5 mins	Review of Constructivism	Tags: *constructivism, learning framework.* - Drawing from Fosnot (2013), So (2002) and Bybee (2009), participants will be given a brief review of constructivism. This will give a short insight into the history behind the learning theory, the foundational assumptions and subsequent learning processes it suggests. It will also consider how this differs from traditional education systems and the reasons behind its popularity for current efforts in educational reform.	A short talk by the workshop host and presenter.
5 mins	Current Public Conservation Education	Tags: *globalisation, environmental crisis, conservation education, public education, public outreach, rehabilitation, organisation.* - Following the review of constructivism, participants will be taken through the current efforts in conservation education in organisations across the world, ranging from wildlife rehabilitation centres to zoos, aquariums and botanical gardens. This section will rely heavily on showing photographs from these types of institutions with an emphasis on the 'what', 'where' and 'how' of current public conservation education trends.	PowerPoint presentation, features images and descriptions of organisations undertaking conservation education across the world.
10 mins	Constructivist Reforms in Conservation Education	Tags: *environmental epistemology, intellectual virtues, meaning making, paradigm shift, prior knowledge, scaffolding, learner engagement, educational practices, educational techniques,*	A short talk by the workshop host and presenter with input and questions from

		interactive learning, knowledge ownership, knowledge internalisation. - After the review of constructivism and the current public conservation education landscape, a more interactive discussion section will be undertaken. This will entail the presenter asking questions and requesting ideas from participants about how constructivism could aid in an educational paradigm shift in conservation education. Toward the end of the discussion, the presenter will put forward any main points or focus areas that have not yet been covered so that a baseline understanding of the relationship between these two areas is achieved for all participants.	participants. Guest speakers from educational research fields may also present this section.
5 mins	The importance of socially and culturally oriented knowledges	Tags: *environmental stewardship, diversification of knowledge, situated knowledge, culturnomics, community outreach, cultural/social relevance, public interest, language.* - This will be a short digression to focus specifically on knowledge diversification, scaffolded knowledge, indigenous knowledge and conservation education that is made to be culturally and socially relevant to visitors. The discussion will be primarily between the participants, motivating for/against this point and sharing insights and ideas on the topic. The workshop host will act as a guider and intermediary, furthering or honing certain points where needed.	A discussion between participants guided by the presenter.
5 mins	Reaching beyond borders:	Tags: *eLearning, social outreach, technology, gamification.*	Group brainstorming

	asynchronous and distance learning/engagement	- A short group brainstorm and discussion about public conservation education conducted asynchronously and a-geographically will be had. The presenter will begin by outlining current research around gamification and eLearning strategies that participants can then apply to their new understandings of constructivist conservation education goals.	and discussion session.
15 mins	Brainstorming and Collaboration	Tags: *interdisciplinary efforts, further research, collaboration.* - Participants will now divide into 5 small sub-groups, preferably with others from fields different to their own. They will then be provided with stationery and requested to brainstorm either a specific exhibit/learning experience to be installed at an organisation of their choice, a specific reform in conservation education modelled on constructivist principles or an asynchronous eLearning/gaming experience offering some form of conservation education. They will have up to 15 minutes to put together a basic pitch to present in the final section of the workshop.	Sub-groups of collaborators splitting up to put together a novel idea or pitch to be presented in the next section.
15 mins	Presentation and Assessment	Tags: *impact, knowledge output.* - Groups will be given 2 minutes to present their brainstorm, whilst being assessed by their peers. They will also be asked to fill in a self-assessment and an assessment of the workshop and the presenter to be submitted at the end of the session.	Sub-groups will have 2 minutes to present their brainstorm pitches to be enjoyed and assessed by their fellow participants.

Assessment

These assessments will be handed out for use (or provided on technological platforms where possible) during the brainstorming section before for use in the last 15 minutes of the workshop. Participants will complete them and hand them back to the workshop presenter, who will compile the information to use for future workshop improvements and developments. Feedback on the presentations given by other participants will be gathered and emailed to those wanting feedback.

Peer Assessment

Groups will have a rotational peer assessment system, i.e. group 1 will be responsible for assessing group 2, group 2 for assessing group 3 etc. These assessment sheets will be handed out prior to the final 15-minute presentation stage of the workshop and the peer assessment will happen in real time whilst the presentations are taking place and will be assessed anonymously.

Please indicate which group number you are assessing by circling the appropriate name: Group 1   Group 2   Group 3   Group 4   Group 5
Please indicate which topic they are primarily engaging with: 1. A specific exhibit/learning experience to be installed at an organisation.   2. A specific reform in conservation education modelled on constructivist principles.   3. An asynchronous eLearning/gaming experience offering some form of conservation education.
Please indicate the clarity and presence of relevant concepts in the group's presentation using the likert scale below: 1 – not addressed, confusing, irrelevant   2 – vaguely addressed and explained   3 – averagely addressed and explained OR not applicable   4 – addressed and explained   5 – clearly addressed, well explained, relevant   Constructivist Principles   1   2   3   4   5   Conservation Education Strategies   1   2   3   4   5   Inclusion of Knowledge Diversification   1   2   3   4   5   Context/Environment for implementation   1   2   3   4   5   Learner Centred/Culturally Responsive   1   2   3   4   5   Instructional Design   1   2   3   4   5
Do you think this group has shown an understanding and inclusion of the major themes and concepts provided in this workshop?   Yes/No
Do you think the group has put together a relevant, innovative pitch that tries to address current challenges or gaps in public conservation education efforts using constructivism?   Yes/No
Further Comments/Feedback:

Participation Self- Assessment

Participants will be encouraged to fill this in at the end of the workshop and may either keep it for their own conference packages or can drop it into the feedback box along with their presenter/workshop assessments.

Name:
Field/Profession:
Affiliated Organisation (if applicable):
Please select the most appropriate option for your learning process during this workshop. During this workshop I think I was: 1. A passive learner who preferred to listen rather than engage. 2. A participant who spoke out when I had something relevant to say. 3. An engaged individual who took every opportunity to speak out or become involved. 4. A slightly disruptive individual who impacted the experience of other participants. 5. Other, please specify: _____.
Please complete the following statements to reflect on your learning experience: What I liked most about this workshop was _____. What I disliked about this workshop was _____. My favourite part of this experience was _____. Collaborating with other participants was _____. I discovered that I _____. The new thing I learned was _____. What I will take from this experience is _____.
Please rate yourself on a scale of 1-5 on the following points. 1 - poor, 2 - minimal, 3 - average, 4 - good, 5 -excellent. Interest 1 2 3 4 5 Willingness to Participate 1 2 3 4 5 Efforts to understand 1 2 3 4 5 Use of prior knowledge 1 2 3 4 5 Contribution to group work 1 2 3 4 5 Helpfulness to others 1 2 3 4 5
Other comments, reflections or feedback:

Presenter/Workshop Assessment

Participants will be encouraged to fill this in anonymously at the end of the workshop and to drop it into the feedback box available. Contact details for further communication/discussion will also be provided at the end of the workshop.

Reason for attending this workshop:					
Level of prior knowledge in constructivism:	Low		Intermediate		Expert
Level of prior knowledge in conservation education:	Low		Intermediate		Expert
Please rate the workshop on the following points: 1- not useful/poor, 2 – minimally useful/effective, 3 – average, 4 – good/useful, 5 – excellent					
Information/Content	1	2	3	4	5
Design/Flow	1	2	3	4	5
Pace	1	2	3	4	5
Relevance	1	2	3	4	5
Usefulness	1	2	3	4	5
Other, specify _____	1	2	3	4	5
Please rate the workshop presenter on the following points: 1- poor, 2 – unsatisfactory, 3 – average, 4 – good, 5 – excellent					
Approachability	1	2	3	4	5
Understandability	1	2	3	4	5
Clarity of Speech	1	2	3	4	5
Responsiveness to questions	1	2	3	4	5
Encouragement/Supportiveness	1	2	3	4	5
Knowledge on topics	1	2	3	4	5
Project Guidance	1	2	3	4	5
Attitude/Demeanour	1	2	3	4	5
Other, specify _____	1	2	3	4	5
Did you find that this workshop imparted useful knowledge that you will use in upcoming projects/research? Yes/No					
Did you enjoy the flow/style of the workshop? Yes/No					
Other comments, reflections or feedback:					