INTEGRATING CONSERVATION EDUCATION CONTENT IN THE NATIONAL SCHOOL CURRICULUM THROUGH EDUCATIONAL TECHNOLOGY TO PROMOTE ENVIRONMENTAL ACTION

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Lewa Wildlife Conservancy, Kenya, is a wildlife reserve and a UNESCO World Heritage site sprawling from the base of Mount Kenya on the leeward side to the northern part of the country. The conservancy, now an integral part of the 93,000-acre Lewa-Borana Landscape (LBL), played a key role in bringing back the Black rhinoceros *(Diceros bicornis)* from the brink of extinction. Currently championing the conservation of Kenya's key species and improvement of lives and livelihoods, Lewa is proof that conservation can be a significant tool for empowerment, economic development and poverty alleviation.

Through protection of the endangered species, community development, education and healthcare programmes, Lewa has demonstrated the value of wildlife to the surrounding community and become a renowned model the world over, for pro-community and development-centred conservation. Through these programmes, the conservancy currently positively impacts over 60,000 lives annually, a number that rises each year. Among the programmes driving these impacts are the Conservation Education Programme and the Digital Literacy Programme.

The Conservation Education Programme was re-structured in 2011 to help schools in northern Kenya deliver conservation lessons in order to empower the younger generation to play a critical role in addressing the challenges facing the environment and wildlife in the region. This was done through a number of approaches that included game drives around the conservancy and exploration of exhibits at the Conservation Education Centre (CEC), among other learning activities facilitated by a team of conservation education officers.

The learners participating in these experiential learning trips were also introduced to the use of laptops – initially intended to build information and communications technology (ICT) skills – in a small computer room at the Centre. Through these laptops, the learners would play pre-installed conservation-themed games, record names of the animals seen during game drives, explore nature photography, and so on. The laptops were also used to evaluate the programme's impact. The results of these evaluations indicated that, apart from building ICT skills, these digital experiences cemented the learners' understanding and appreciation of the natural world and the interconnectedness between wildlife and our wellbeing.

However, due to limited staff capacity, space and time necessitated by high demand, such engagements were mostly one-off for the schools thus limiting the number of students gaining such experience per year. This inspired the birth of the Digital Literacy Programme to make ICT integral to the teaching-learning interaction in the 23 public schools (within the surrounding community) supported by Lewa. Central to the restructuring was recruitment of more instructors, who currently visit each of the schools weekly to engage teachers and students in an effort to guide seamless integration of ICT in education and effective delivery of content through technology.

Educational technology in schools - Digital Literacy Programme (DLP)

In 2003, the government of Kenya declared education would be free for its citizens. However, children in rural communities remain challenged by poor quality education in under-resourced schools. With technology inaccessible and a lack of soft digital skills, disadvantaged populations are hard pressed to meet the emerging challenges of the 21st century. The DLP addresses these needs directly via equipment provision and training. It results in learners well-equipped to pursue alternative livelihoods beyond those that depend on finite natural resources - livelihoods which will eventually lead to greater economic stability for the students and their communities.

The DLP has used technology to improve the quality of the school curriculum and increase engagement in the students' learning. In partnership with the Government of Kenya and Lewa's sponsors, schools received computers, tablets, Spectron screens and projectors to bring technology to the classroom. Devices are connected, off or on-line, with software and content loaded, regularly updated and maintained by Lewa staff. Teachers are trained on how to use tools and computer applications in their lectures and class activities, and to produce lesson plans, projects, quizzes and assessments. Students can work independently (Figure 1), log into and follow lessons, with links to the content referenced for each lesson. By 2021, the DLP had digitised the bulk of Kenya's primary curriculum, which was being used in their schools.

Figure 1: Digital learning at Kilimani Primary School.

Digitising the national curriculum required a platform that would offer easy access to the content by learners and teachers, as well as monitoring the usage of the content. An open-source program called Kolibri (Learning Equality, 2022) was chosen as it provided a learner management platform ensuring easy content uploading, access, usage monitoring, learner evaluation, feedback, and an option for presenting various learning resources as channels. Once the content is in the learner management platform, students can access this offline using the Spectron boards, laptops, tablets or other gadgets, provided they have an infrastructure for local area network connectivity (Lewa Wildlife Conservancy, 2022).

COVID related school closures and restrictions in 2020 and 2021 meant that the Lewa team, working from home, were able to invest time to swiftly progress the digitisation, particularly the uploading of content.

Using education technology to support conservation education as well as the National Curriculum

Kenya has a relatively new, competency based national curriculum (Kenya Institute of Curriculum Development, 2017), that was introduced in 2018 and is gradually being rolled out. Instead of focusing on learners mastering content (which encouraged rote learning), it is based on observable performance of skills and competencies. Learners now spend the bulk of their time working on practical projects. There are seven core competencies in the competency based curriculum (CBC) that are embedded in all the learning areas at all levels of schooling. ICT serves as a learning tool in all areas, along with digital literacy and contemporary issues.

The practical and cross-cutting aspects of conservation education, addressing issues that rural north Kenyan communities encounter and deal with on a daily basis do not create extra work for teachers delivering a CBC, but actually help them (Njobati, 2019). In 2020, the DLP embarked on a collaborative approach to supporting teachers and their learners to access environmental and wildlife resources through the digital platform described above. They partnered with Tusk's Pan African Conservation Education (PACE) project which provides multi-media materials, content and educator guides free of charge to educators in Africa (PACE, 2021a). PACE content is arranged in modules with background information, case studies illustrating successful grassroots solutions to everyday problems people encounter in these areas, short films, and action sheets that explain how to put the solutions into practice. Partnering with DLP was an innovation for PACE, as while its materials are multi-media, these had not been deployed to users on a purely digital platform. DLP's extraordinary digital and educational experience and expertise ensured that PACE content was appropriately delivered, with the necessary training, monitoring, and support provided. All partners were thrilled to find a new route to provide more learners with a pool of rich environment and conservation content - 94% of which relates directly to the national curriculum.

In 2021, the DLP created a PACE channel with 214 of its conservation education resources and deployed this in their schools (Figure 2). Partners collaborated closely to ensure that the content going to the learning platform was accessible, relevant to the learners' age, supported the national curriculum, and provided practical ideas that could be easily adopted by the learners in their schools and communities to address pressing environmental challenges. The channels are used for extra-curricular, independent student learning and school clubs as well as curriculum activities. School clubs play a key role in school environmental learning (Odongo & Mugo, 2020).
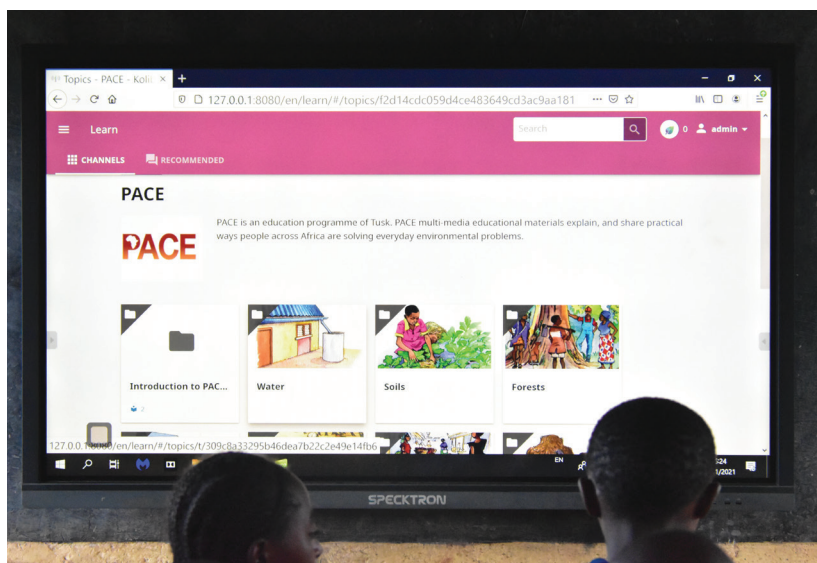

Figure 2: Conservation education resources (from PACE) on Kolibri.

With over 300 school visits by Lewa's Digital Literacy and Conservation Education team, and through these resources and the Conservation Education Programme, the following has been achieved:

- More than 4,500 learners and 500 teachers across 23 schools have access to relevant conservation education resources.

- More than 800 learners' devices and 100 educator devices accessing conservation education resources.

- In the first term, 8 out of 23 primary schools supported by Lewa adopted projects and action sheets in their schools, specifically:

  - actions that improved school environments, related directly to the learners' daily lives, involved problem solving, collaboration, learning to learn, self-efficacy and were student-led (organised by school environment clubs; Figure 3).

  - more schools are looking to implement action sheets with more teachers and learners participating. Our target is to have 15 more schools implement at least 2 action sheets each with an objective of learners implementing the action sheets back at their homes.

  - based on the success of these practical interventions, DLP wrote a new action sheet (PACE, 2021b) in vertical gardening (Figures 4 and 5). It was integrated into the PACE pack - now shared with a network of conservation projects, informal and formal educators in 33 African countries.

- The confidence in use of ICT by students and teachers has increased.

Figure 3: Ntalabany Primary School - shading and mulching of plants (adopted from PACE pack).

Figure 4: Vertical farming by the Environmental Club at Ntalabany Primary School.

Figure 5: Vegetables grown by vertical farming by the Environmental Club at Ntalabany Primary School.

Lewa recognizes every learner has diverse needs that constantly evolve over time. The Digital Literacy Programme (DLP) harnesses this individual learning potential and allows young people to flourish in enhanced schooling environments. The programme allows for a more tailored approach to education, learners can work at their own PACE and level, and be given access to a wider range of material, which in turn increases overall learner performance (Afolake Adedokun-Shittu & Jaleel Kehinde Shittu, 2013).

With more teachers integrating conservation education resources as teaching aids and learning resources in their classroom activities, we are looking to have three more learning areas integrated with the PACE (conservation education) resources over the next 12 months.

Conclusion

All the interventions outlined are aimed at helping learners and the communities acquire the desired knowledge, skills, values, and attitudes to cope with contemporary life challenges while promoting wildlife and environmental conservation. These outcomes are aligned with the goals and objectives of Lewa and PACE, as well as the government of Kenya and UN sustainable development goals. The government of Kenya has eight national goals for its education system. One of these is to promote positive attitudes towards good health and environmental protection, that education should inculcate in the learner the value of physical and psychological well-being for self and others and promote environmental preservation and conservation, including animal welfare for sustainable development. The DLP has worked closely with the Ministry of Education throughout, and are proud that they are keen to roll out the model described nationwide. A plan that is supported and encouraged by key conservation sponsors.

The DLP's initial aim was to extend the benefits of digital technology to 23 schools in communities surrounding the conservancy. After the first annual evaluation, this was extended, aiming to have 1,000 more learners accessing environment and conservation resources on the e-learning platform over the next 12 months. It will be rolled out to partner conservancies in northern Kenya in 2022. This will be a pilot, particularly in terms of assessing the viability of using the system in schools that will have a lower degree of technical support than was provided during the development phase in Lewa communities.

It is particularly exciting that using educational technology resulted in practical environmental outcomes, shown by the vertical gardening example. Children used and adapted ideas in the action sheets to suit their context, substituting materials they had freely available to them (i.e. old tyres, animal manure, river sand), and crops they were familiar with and were appropriate for the design and location. They also choose and devised a school project that is ideal to transfer and implement in their home contexts - a perfect exercise to build and demonstrate the competencies of problem solving, creativity, collaboration, critical thinking, creativity, and learning to learn.

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