26 Jordan: Leveraging Edtech without Internet connectivity using Kolibri

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Type of intervention: non-governmental with support from intergovernmental and governmental organisations
Website: http://learningequality.org/kolibri

General description

Kolibri, developed by Learning Equality, is an adaptable end-to-end suite of openly licensed learning resources, tools and do-it-yourself support materials designed for teaching and learning with technology but without requiring connectivity to the Internet. This product ecosystem aims to provide supportive learning experiences in environments where there is little or no Internet connectivity, particularly during the COVID-19 pandemic. It is flexible and adaptable to varied learning needs and environmental constraints, and is devised to work within or complement existing infrastructure and initiatives. This ecosystem is centred around an open-source learning platform that provides robust functionality to support the kinds of personalised and differentiated learning that are typically only available in online learning environments. This is complemented by a specially curated library of open learning resources, a tool to support curriculum

alignment, and a toolkit of resources to support the use of this platform and open educational resources in varied blended learning environments.

As part of a four-country collaboration (Jordan, Kenya, the United Republic of Tanzania and Uganda), the UN Refugee Agency's (UNHCR) Connected Education team and Learning Equality have been working since 2018 with the UNHCR's Jordan office, with support from Google.org, to assist with use of Kolibri across ten connected learning hubs. These hubs, located across Amman, northern and southern governorates, as well as in Azraq and Zaatari refugee camps, closed down temporarily with the onset of the pandemic. Prior to closures and social distancing measures, the UNHCR Jordan's implementing partners, Jordanian Hashemite Fund for Human Development, CARE and Blumont/IRD ran these centres, with the support of coaches, to provide 13-17 year-old learners with daily access to digital Arabic learning materials on Kolibri. In a typical use case such as in Jordan, Kolibri can be accessed by multiple learners in the same learning environment via a server over a local area network connection; this enables real-time tracking of learner progress by an educator; it can also run on a single device for individual self-study. The combination of an adaptable technology platform with a relevant content base and an implementation model that can be accessed in environments without consistent Internet connectivity has enabled the delivery of digital education to learners with a diversity of educational backgrounds, as well as language and learning needs.

With the onset of the pandemic, Learning Equality and UNHCR Jordan evaluated how to ensure continuity of learning during the closures of the hubs, which resulted in several initiatives to support learners at home. In Jordan, there was a swift effort within weeks to place the offline servers in the hubs on the public Internet, and boost connectivity through paid Internet bundles. UNHCR Jordan also leveraged new materials developed by Learning Equality to provide pedagogical and technical resource guides in Arabic to use Kolibri at home with or without the Internet. Globally, Kolibri continues to address the breadth of learning needs during the pandemic and support continuity of learning going forward.

Main problems addressed

Addressing the equity gap in learning is at the core of Kolibri. The global challenges that the Kolibri product ecosystem aims to address, including lack of connectivity and the need for tools to support learning in low-resource environments, have become more readily apparent with the onset of COVID-19. With social distancing measures in place, Learning Equality evaluated how to best support the continuity of learning using the current functionality in Kolibri. Because Learning Equality's products and tools are designed for low-resource contexts, the main problem was less about how to mobilise large-scale investment and more on how to continue to work within existing infrastructure and initiatives.

In Jordan specifically, the initiative aimed to address three main challenges:

1. limited available infrastructure
2. limited availability of discoverable, relevant resources that can be leveraged during the pandemic and beyond
3. limited support for educators, particularly around the use of technology.

More generally, what makes Kolibri innovative is a focus on equity: it is an adaptable solution created for and responsive to the diverse learning needs in these environments. It has an offline distribution and access model, meaning that it can be preloaded onto a device like a laptop, low-cost Raspberry Pi or a USB, brought to a location without Internet connectivity and/or shared peer-to-peer, and accessed over a local area connection. It can be leveraged in contexts with limited access to electricity, and where the Internet is costly and/or not prevalent.

Kolibri is low maintenance: while it is not low tech, it is a robust learning platform extensively tested in low-connectivity contexts that does not require significant digital literacy skills to use. Educators and learners with limited exposure to technology can get started with Kolibri swiftly.

Kolibri responds to the needs of the low-resource learning environments where it is being used: it leverages existing hardware and responds directly to limited teacher capacity and training, limited digital literacy, large class sizes, and differing learning abilities among a group of learners.

Last, it is open source, which is critical to ensure that learning needs, particularly for the most marginalised learners, are met: it is free of charge and open, it can be used and adapted to one's own needs, it can benefit from open contributors to build and improve the product, and new functionality is driven and prioritised by the feedback and needs from the Kolibri user community.

Amidst school closures, Kolibri enables a continuum of learning possibilities: a learner who is at home can access Kolibri offline and an educator with Kolibri can provide remote support via WhatsApp. When there is periodic connectivity through an online server or when a learner periodically visits a learning environment with a central Kolibri server, the teacher can assess and support learner progress at a distance using Kolibri's built-in educator support tools.

Mobilising and developing resources

At the beginning of the pandemic, Learning Equality continued to make available its ecosystem of products, which includes the open-source Kolibri Learning Platform, the Kolibri Content Library of curated and openly licensed resources, the Kolibri Content Pipeline to import new materials for use in Kolibri, the Kolibri Studio curricular tool and the Kolibri Edtech Toolkit with resources to support implementation.

After evaluating learning needs, Learning Equality developed pedagogical guidance materials and technological documentation for at-home learning. This new "At-Home section" of the Kolibri EdTech Toolkit includes resources to support parents, educators and learners in light of the shift to distance learning amidst the COVID-19 pandemic, which UNHCR Jordan adapted to meet its needs.

While implementers have continued access to these resources, the mode of delivery may change during COVID-19. As an example in terms of what was already available in Jordan, two key areas from the existing implementation were leveraged:

1. ***Relevant learning resources.*** The Connected Learning Hubs use Kolibri's digital materials in Arabic focused on subjects such as STEM, Arabic language and life skills. At the end of 2019, Madrasati, an initiative of the Queen Rania Foundation, established a committee to evaluate these materials and map them according to the Jordanian national curriculum for Grades 7-11. Later, it established a committee with Ministry of Education experts from the Queen Rania Center to align the approved content and make it available via Kolibri. As of December 2020, more than 60% of the content was aligned with the national curriculum. These efforts were leveraged by the government platforms, Noorspace and Darsak, to support online learning and complement the Ministry of Education and the Queen Rania Center's efforts.

2. ***Servers with Kolibri.*** Within weeks of the pandemic impacting hub closures, UNHCR Jordan, with the support of the Jordanian Hashemite Fund for Human Development, placed a subset of the offline servers from the Connected Education Hubs on the public Internet. This enabled not only those who had Internet at home to access their same accounts as in the hubs, but also other non-governmental organisations which were previously unable to reach these hubs, to access Kolibri on line. For those with intermittent connectivity, UNHCR Jordan and Learning Equality developed quick-start guides in Arabic to install Kolibri with relevant materials on available laptops and desktops. UNHCR Jordan also distributed Internet bundles for home use.

Beyond Jordan, there are additional examples where existing learning resources and servers with Kolibri were similarly utilised to support learning during the COVID-19 school closures. For example in Uganda, leveraging existing efforts from the National IT Authority and the National Curriculum Development Centre with the support of UNICEF Uganda, Ugandan learners have access to an online, zero-rated instance of Kolibri on the government site with aligned learning resources that can also be accessed via MyUg Wi-Fi hotspots primarily around Kampala and Entebbe. Zero-rating by the mobile network operator enables learners to use the government site at no cost. Recognising that the current version of Kolibri could not fully support the needs of learners at home during the pandemic, even with additional guidance materials, Learning Equality has been working to support continuity of learning, particularly as schools reopen and/or experience periodic closures, in two areas:

1. ***Enabling asynchronous facilitation.*** The pandemic reinforced the need for Kolibri to support hybrid at-home and in-school models of learning, and enable asynchronous facilitation. In this model, a learner's device (which can be an Android device, laptop or other low-cost device) will synchronise with the centralised offline server when a learner periodically visits their school, or when a roving staff member visits their home to synchronise the user's data to an intermediary device.

2. ***Increasing portability of Kolibri with Android app.*** During the pandemic, Learning Equality has prioritised the release of the Kolibri Android app to support individual use by learners and educators at home, with functionality for also sharing content via messaging tools from within the app. Currently, in its initial private release version, it is being tested by organisations such as UNHCR Uganda (with the support of Education Cannot Wait), CARE Peru and UN Women Mexico. When the functionality to sync individual learner data is complete, and a more seamless experience for self-directed learning and asynchronous facilitation is supported, the Kolibri Android app will be released publicly (currently slated for Q2 2021). Learning Equality's existing implementing partners around the world have consistently communicated their needs around this new functionality and are eager to roll it out once it is available.

Fostering effective use and learning

The core principles of Kolibri focus on supporting student-centred learning. As the Jordan example demonstrates, the pandemic has further emphasised the need for more personalised learning experiences, even within some of the constraints present in lower resource contexts. The following are three key aspects of how Learning Equality enables effective learning environments in these contexts:

1. ***Educator support.*** Learning Equality conducted several 90-minute virtual training-of-trainers workshops with varied partners to introduce and enable the effective use of Kolibri during the pandemic. Within the learning platform, educators can refresh their own content knowledge and move through guidance materials at their own pace on how to integrate Kolibri for distance learning.

2. ***Aligned resources.*** Learning Equality expanded the public Kolibri Content Library to serve a broader set of needs, including the curriculum alignment process of supplemental digital content to national curricula, through the Kolibri Studio curricular tool. For example, existing aligned materials were imported into Kolibri, including Khan Academy maths aligned to nine countries' curricula, with additional Khan Academy subject areas for some countries.

3. ***Support for offline distance learning.*** Kolibri aims to support educators in effectively facilitating remote learning by capturing learning analytics, allowing teachers to track learner progress and receive notifications for when additional support for individual learners is needed, all without needing access to the Internet. The two-way interaction between learners and educators enabled by offline data synchronising in Kolibri aims to support continuity of learning and accelerate rates

of improvement. A few examples of ways in which implementing models can be adapted with Kolibri is outlined in this Home Learning Modalities Matrix.

Implementation challenges

COVID-19 required rethinking the underlying design assumption of Kolibri that there is a physical space of social connection: that people with devices would be able to be in the same location, such as a Connected Education Hub, at a determined point in time. Based on feedback and lessons learnt from implementations, how Kolibri was used shifted during the pandemic. Some key related challenges addressed through that approach are outlined below.

Reaching remote areas. Due to lockdown restrictions, travel to remote locations has been difficult. To overcome this barrier, Learning Equality facilitated connections between implementing organisations, governments and mobile network operators to set up servers, provision devices and support hardware distribution programmes to make organised content widely available. For example, Elimu, based in Kenya, is expanding local area network connections to reach home communities with Kolibri. In the United States, Tuscarora Intermediate Unit 11 (TIU-11), a regional educational service agency meeting the needs of the public and non-public schools, personnel and students in Pennsylvania school districts, is distributing Kolibri with relevant learning resources on Raspberry Pis to learners that do not have consistent connectivity at home. There have also been varying distribution models of Kolibri that are more direct to consumers (e.g. a forthcoming Android app publicly available in the Google Play Store) with built-in training and supportive guidance materials. These models, when used in conjunction with existing government efforts, help to support greater buy-in, scale and sustainability.

Shifting to distance learning. Supporting educators in adopting newer methods of pedagogy (especially the use of technology and digital learning tools) is a key aspect of enabling effective transitions to distance learning. This can be achieved by maintaining contact between educators and learners through messaging services like WhatsApp and sharing links to online servers, when available, to support learning. Learning Equality expanded its Kolibri Content Library with materials specific to the COVID-19 response, with an emphasis on psychosocial and mental health support. This provides support for more hybrid models of learning where learners work through resources on their own, away from a designated learning environment, but also return to a centralised location to receive personalised support from educators.

Limited device availability. Learners do not have regular access to individual devices at home. More often than not, they can only access their parent's mobile devices. Through the development of the Kolibri Android app, learners can engage in learning through these more common types of devices without a separate server, whenever they are accessible at home.

Limited availability and usability of relevant digital learning materials. The dearth of digital learning resources was another broader challenge, along with curricular documents which are often not publicly available or digitised, and the time taken for curricular alignment and approval by curricular bodies. These challenges impact the ability of implementing organisations to effectively leverage products and tools such as Kolibri. With continuous deployment in online systems, the mantra of the technology world is "move fast and break things". But since Learning Equality designs for communities without connectivity, a focus on meeting well-defined user needs and creating robust core user experiences results in a longer release cycle. This means that every time a user uses limited Internet to download Kolibri and identified learning resources, they are receiving a robust platform with materials that are specific to their needs. As a result, rapid changes to support self-directed learning during COVID-19 focused on documentation, tooling and minor interface tweaks.

Monitoring success

Learning Equality monitors the success of Kolibri both within Jordan and beyond, primarily by observing increases in access to learning resources and tools, as well as improvements in educator and learner confidence, development of skills, and boosts in learning outcomes. To understand the use of Kolibri across its community of users, anonymous (and pre-aggregated) statistics are sent back to Learning Equality's telemetry server from offline installations in cases where they periodically connect to the Internet. Kolibri also includes a distributed peer-to-peer model through which offline devices can synchronise directly with one another, making data collection possible even from devices that are always offline and may not even be used in proximity to a more central server such as in a school. Additionally, Learning Equality is currently piloting the Kolibri data portal, a centralised online tool for aggregation and exploration of learner data, with a small set of partners, including the UNHCR. This enables the UNHCR to track more detailed learner data through the Kolibri data portal and review session logs directly in the platform. These quantitative data are supplemented by implementing organisations that can collect and capture qualitative data through educator and learner interviews, post-training feedback surveys, and focus group discussions.

Learning Equality can also monitor the availability of relevant materials as an indicator of access to quality learning opportunities. Increased availability of aligned materials helps to further reduce equity gaps for marginalised learners. Sourcing aligned content and adapting existing documentation to enable effective implementation programme rollouts can be a promising model in other contexts around the world.

Adaptability to new contexts

The adaptability of the Kolibri product ecosystem has already been demonstrated in its use globally. The example in Jordan shows a strong focus on adapting from existing infrastructure, providing supplemental support with Internet bundles and relevant content, but there are other examples globally of how Kolibri is being used in a variety of different contexts to support both learners and educators during the COVID-19 pandemic and beyond.

Kolibri is generally leveraged through its organic do-it-yourself adoption model comprising products and tools that are open source and leverage openly licensed learning materials. In particular, the Kolibri Edtech Toolkit supports implementing organisations with integrating Kolibri into learning environments by providing training materials, teacher resources, blended learning strategies, hardware suggestions and other types of do-it-yourself resources. The platform itself is translated into 23 languages (see the demo site for reference) with plans for more translations, based on identified needs.

Learning Equality takes a needs-based approach to product development, gathering insights from its global community of users, as well as from working closely with a core network of collaborators, including national non-governmental organisations, UN agencies, government and corporate partners, to co-design its solutions. The combination of organic adoption and work with partners has led to use in over 200 countries and territories.

There have been innovative examples of how the Kolibri product ecosystem has been adapted to support communities around the world amidst COVID-19. For example, Instituto Paramitas, based in Brazil, adapted the Kolibri EdTech Toolkit to train teachers on Kolibri with activities shared via WhatsApp, using Google Hangouts for instruction, so that teachers could be prepared for school reopening. ShiftIT, based in Malawi, focused on context-relevant materials and created a "COVID-19 prevention" content channel on Kolibri, and sharing with others to use. Cassava Smartech provided zero-rated access to Kolibri via its Akello Digital Classroom, with relevant assessments created in Kolibri Studio and recordings of daily video lessons to learners in Zimbabwe, becoming one of the available COVID-19 response resources that beneficiaries of the Higher Life Foundation will receive as part of a partnership between Higher Life Foundation and the Ministry of Education. Vodafone Foundation in the Democratic Republic of Congo,
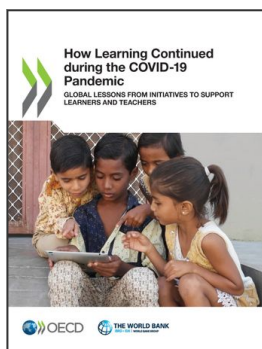
through the Vodaeduc platform, focused on distribution, based on the recommendation by the Ministry of Education for students to use the Vodafone Instant Schools for Africa Kolibri server, with its library of relevant content, during the pandemic.

Box 26.1. Key points to keep in mind for a successful adaptation

1. Conduct needs assessments of infrastructure available for remote learning: Identify the availability of hardware such as mobile devices, tablets and desktop computers, as well as access to connectivity, to understand which implementation models can be used for learning. Kolibri can work on a variety of low-cost and legacy devices without needing the Internet; where possible, guidance can be tailored based on existing infrastructure and pedagogical needs.

1. Provide pedagogical guidance to educators to ensure adequate support for transforming their teaching practices due to COVID-19. Teachers might feel overburdened and under pressure to quickly adopt new and innovative strategies for teaching at a distance. Provide virtual training workshops and guidance materials and check in regularly to help support educators in transitioning to distance/hybrid learning. Connect teachers to one another via existing virtual networks wherever possible to support one another and strengthen communal lessons learnt.

2. Support motivation for learning by providing relevant and interactive learning resources. Through Kolibri, learners are able to access videos, books, interactive games and exercises. Support learners in personalising their learning journey by setting learning goals and considering ways to enable strong social and emotional well-being, building a more effective at-home learning environment. The Kolibri Content Library has resources to support social and emotional well-being in addition to traditional academic subjects.

3. Design for sustainability with education technology. Kolibri is designed to be integrate with other existing solutions; it has a plug-in architecture to enable rapid feature iteration and context-specific adaptations, without affecting the core open-source platform. Costs are reduced since it is open source. When thinking about pairing it with other products or learning resources, lean towards leveraging openly licensed materials. Considering the long-term implications of technology and digital resource choices will help to support buy-in, which in turn supports the sustainability of the initiative.

4. Enable strong feedback loops. Building tools and products quickly to meet the needs of users can prove to be fruitful if there are strong feedback loops in place. Ensure that there are ways to gather information on how the tools and products are being used and what improvements need to be made to best support learning. Similarly, during implementation, conduct interviews analysing multiple stakeholder and user perspectives with periodic surveys to adapt implementation models with Kolibri.

5. Build coalitions. Build relationships and foster mutually beneficial collaborations to support learners, highlighting some of the inequities in learning and the need for creative solutions and public goods that meet learner needs in low-resource contexts.