Program Assessment of Kolibri FLY

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NOTES

Details about the references used in this report can be found in the OpenDevEd Evidence Library at https://docs.opendeved.net/lib/V8RPQRWX. Individual references are hyperlinked throughout this report.

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EXECUTIVE SUMMARY

Kolibri FLY and Its Assessment

Kolibri is an open source edtech platform and toolkit designed for multiple contexts, with a focus on increasing the availability of relevant and aligned learning materials and overcoming infrastructural barriers that prevent equitable access to learning. The Kolibri FLY program utilizes Kolibri, Learning Equality's end-to-end ecosystem of products and tools designed for offline-first teaching and learning, to deliver flexible, blended learning opportunities focused on STEM, life skills and literacy to secondary school students in refugee and host communities in Kenya, Jordan, Uganda and Tanzania.. The objective of the program is to engage refugee and host community learners in the process of identifying how Kolibri should be adapted to meet their teaching and learning needs, testing different variables including hardware, content, and training in a variety of learning environments, emergency settings, and localities.

Open Development and Education (OpenDevEd) was contracted by Learning Equality and UNHCR to conduct a qualitative assessment of the program and understand the implementation model of the Kolibri FLY programming, the factors that demonstrate its strengths, and the learnings from the four current implementation countries that can be used to inform future implementation,. The intention of the assessment was to both understand the implementation of Kolibri FLY to date, and to inform future implementation and scaling of the program.

Findings

The assessment consisted of 34 virtual semi-structured interviews and focus group discussions with 70 stakeholders across the four implementation countries, that were conducted throughout the period of September to November 2021. The main findings from the assessment are as follows:

Kolibri FLY is fit for low-resource contexts.

The program is engaging for teachers and students.

The program benefitted from diverse partnerships.

1. **Kolibri FLY is fit for low-resource contexts:** Stakeholders highlighted that Kolibri's offline-first platform serves the needs of learners in low-resource environments, making it a unique platform that sets Kolibri apart from other online learning platforms. Additionally, many interviewees expressed appreciation for Kolibri's ability to help underserved learners in refugee hosting areas continue to learn throughout COVID-19 formal school closures.

2. **The program is engaging for teachers and students:** Stakeholders noted that the diversity of content types like edugames, videos and simulations were considered a strength because they are deemed more engaging than traditional textbooks by students and cater to the different learning needs of learners. Further, the design of the platform was said to help learners learn at their own pace and during their free time, which is facilitated by the ease at which learners can navigate the platform on their own.

3. **The program benefitted from diverse partnerships:** Most stakeholders noted that the collaboration amongst stakeholders was underpinned by their commitment to achieve the same goals. Even when supported to differing degrees, government bodies played an important role in institutionalizing the program in government training programs and national IT priorities.

Looking ahead, stakeholders identified opportunities for improvement in existing gaps around content coverage and depth, capacity building, infrastructure, and partnerships that could benefit from further investment from Kolibri FLY partners. These include increasing the breadth and depth of locally relevant and accessible digital resources that support broader curriculum coverage and diversely abled-learners, addressing capacity limitations that stem from trained implementing partner (IP) staff turnover, and expanding the trainings to capacitate teachers with soft skills, hardware maintenance, and professional support. Further, increasing the availability of hardware and ensuring sufficient broadband connectivity during distance learning during school closures have been noted as additional needs of the program.

Recommendations

Based on the findings of the assessment, the following recommendations should be considered by Kolibri FLY partners who have not yet launched Kolibri, and support partners who are currently implementing Kolibri with guidance on how to further strengthen program implementation and scale-out the program. The recommendations can be actioned by any stakeholder involved in the design and implementation of the Kolibri FLY program, with the understanding that the extent to which they can action the recommendations depends on their capacity, mandate, and role in the program.

1. Align the content available on a country's Kolibri installation to the national standards, when possible, to maximize the potential of OERs.

2. Scope and support local content creation, particularly in the areas of the humanities, languages, and life skills.

3. Build capacity through an initial cascade approach of ToT, incorporate refresher training into the program design and co-design training agendas with IPs and coaches where possible to promote local ownership.

4. Build communication channels and sharing opportunities between Kolibri FLY partners within and across country implementations to support ongoing peer support and mentoring of educators and coaches.

5. Invest in programming to expand accessibility of digital learning initiatives to learners with disabilities.

6. Engage governments to design and deliver the program from the start.

7. Scope what is available in terms of infrastructure, hardware and content in an effort to determine how existing and new partners can help fill gaps.

8. Consider embedding within existing programs for sustaining hardware or, when sourcing new hardware, consider the maintenance and technical knowledge required.

The findings from the assessment will inform the development of a rubric by Learning Equality and UNHCR to include in the Kolibri Edtech Toolkit Implementation Guide for future programming.

INTRODUCTION

This report details the results of a qualitative assessment of the Kolibri FLY program conducted by Open Development and Education (OpenDevEd). The assessment sought to understand the implementation model of the Kolibri FLY programming, the factors that demonstrate its strengths, and the learnings from the four current Kolibri FLY implementation countries (Jordan, Uganda, Kenya and Tanzania) which can be used to inform future implementation, as well as scale up and scale out of current implementation.

The OpenDevEd team utilized a thematic framework of Product, People and Process to assess the strengths of the program and identify recommendations for future implementations of a Kolibri FLY program. The assessment took place from September 2021 to November 2021 and consisted of virtual, semi-structured interviews and focus group discussions with key stakeholders in each country including teachers, coaches, Implementing Partners (IPs), government stakeholders, Learning Equality, the United Nations High Commissioner for Refugees (UNHCR) Headquarter, country and field teams and other development partners.

1.1. Kolibri Product Ecosystem

Kolibri is an open source edtech platform and toolkit designed for multiple contexts, with a focus on increasing the availability of relevant and aligned learning materials and overcoming infrastructural barriers that prevent equitable access to learning. Kolibri is an adaptable end-to-end suite of openly licensed learning resources, tools, and do-it-yourself support materials developed and maintained by Learning Equality. Central to Kolibri's design is the utilization of Open Educational Resources (OERs). OERs are teaching, learning and research materials that reside in the public domain or have been openly licensed for no-cost access, use, adaptation, and redistribution by others with no or limited restrictions.[1] OERs may include course materials, modules, textbooks, videos, tests, software and any other tools or techniques used to support access to knowledge. OERs, especially in digital format, have the potential to give people around the world equal access to knowledge and a quality education for little or no cost.[2]

Kolibri is also uniquely designed for teaching and learning with technology, but without requiring the Internet. The product aims to provide supportive learning experiences in environments where there is little or no Internet connectivity. This design was important prior to the COVID-19 pandemic but has become even more relevant and critical since the onset of the pandemic.

Further, the product is flexible and adaptable to varied learning needs and environmental constraints, and it works within or complements existing infrastructure and initiatives. For

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[1] UNESCO. (2021). *Open Educational Resources (OER)*. Available at: https://en.unesco.org/themes/building-knowledge-societies/oer

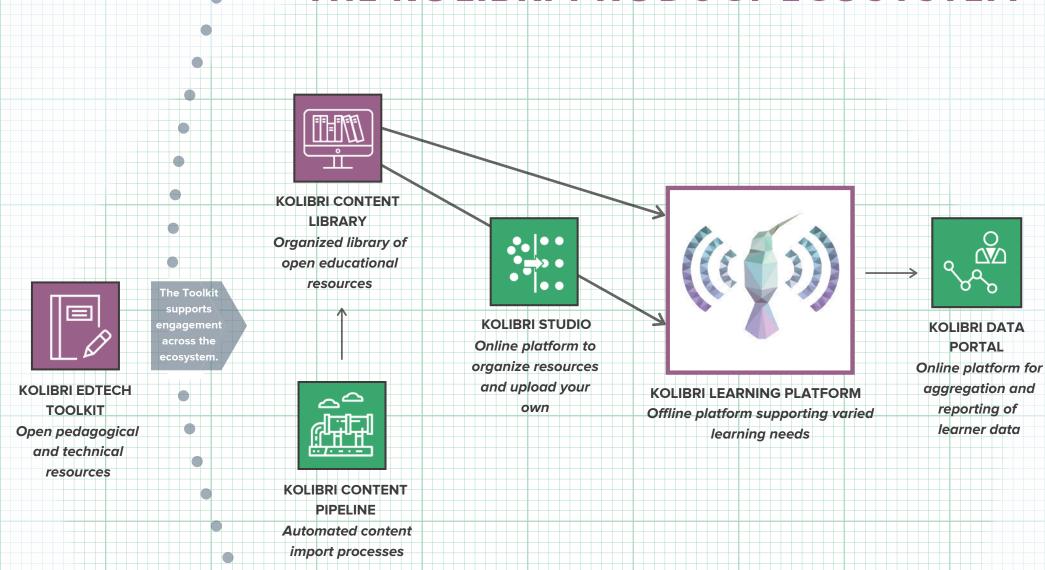[2] The William and Flora Hewlett Foundation. (2013). "White Paper: Open Educational Resources: Breaking the Lockbox on Education.", Available at: https://hewlett.org/wp-content/uploads/2016/08/OER%20White%20Paper%20Nov%2022%202013%20Final_0.pdf

example, Kolibri can be accessed by multiple learners in the same learning environment via a server over a local area network (LAN) connection, enabling 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 aligned to an implementation context's needs, and an implementation model that can be accessed in environments without consistent internet connectivity has enabled the delivery of digital education to learners with diverse educational backgrounds, languages and learning needs. The support provided to educators and implementing organizations through a Kolibri FLY program also contributes to effective education delivery to these learners.

The **Kolibri Product Ecosystem** is centered around an open source, offline-first Learning Platform that provides robust functionality to support the kinds of personalized and differentiated learning that are typically only available in online learning environments. This is complemented by a specially curated library of open learning resources (the Kolibri Content Library), a tool to support curriculum alignment (Kolibri Studio), and a toolkit of resources (Kolibri EdTech Toolkit) to support the use of this platform and open educational resources in varied blended learning environments.

THE KOLIBRI PRODUCT ECOSYSTEM

KOLIBRI CONTENT LIBRARY
Organized library of open educational resources

KOLIBRI EDTECH TOOLKIT
Open pedagogical and technical resources

The Toolkit supports engagement across the ecosystem.

KOLIBRI STUDIO
Online platform to organize resources and upload your own

KOLIBRI CONTENT PIPELINE
Automated content import processes

KOLIBRI LEARNING PLATFORM
Offline platform supporting varied learning needs

KOLIBRI DATA PORTAL
Online platform for aggregation and reporting of learner data

LEGEND

- Online only
- Offline and online

1.2. Overview of the Kolibri FLY Program

A Kolibri FLY program is an implementation development program which uses the Kolibri Product Ecosystem to extend quality learning opportunities for refugee and host community learners. The program utilizes Kolibri and complementary tools to deliver flexible, blended learning opportunities to secondary school students in refugee and host communities in Kenya, Jordan, Uganda and Tanzania focused on STEM, life skills and literacy. The program seeks to provide EdTech programming specifically for use in refugee and host community learning environments.

Kolibri FLY addresses and responds to many of the observed global trends in emergency and crisis contexts, including:

- Connectivity which may be present but often unreliable or uneven

- Smartphones and personal devices are increasing in prevalence

- Staying connected is a demonstrated priority for the community

- Digital skills are acknowledged as vital and relevant skill sets

- Educational resources, particularly digital ones, are limited in refugee and host community contexts

- Youth remain out of school or idle for long periods, in large numbers

- Training and learning opportunities are in high demand by refugee and host communities

- Aligned content to the national curriculum is requested

The unique strength of a Kolibri FLY program is that it is adaptable and flexible depending on the context where it will be implemented, but a Kolibri FLY program will generally require:

- **Content alignment of OERs** to select the OERs that are relevant to the needs of the local students. This may or may not require alignment with the national curriculum. While this could be completed by a curriculum designer consultant, a government NGO partner, the Ministry of Education, or the national curricular body itself, aligning OERs to the national curriculum improves discoverability of content and adoption within learning environments, and may at times be required to ensure accurate alignment to supplement learning. As a result, each Kolibri FLY program has content that is selected for that country context, and at times is aligned to the relevant curriculum.

- **Hardware** including a server running Kolibri and a variety of devices (like tablets) for students. Some implementations also include laptops for teachers, though this is not required. Hardware can be cross-utilized from other programs and educational initiatives, or procured specifically for a Kolibri FLY program.

- **Training** for various levels of Kolibri FLY partners. A Training of Trainers (ToT) model may be employed whereby training on Kolibri is cascaded from a core team of trainers down to IPs/trainers in each country who then pass the training on to coaches and teachers.

A strong coalition of stakeholders support the implementation of Kolibri FLY, referred to going forward as "Kolibri FLY partners". While this group of partners may vary by context, with the initial Kolibri FLY programming, it included a combination of development and private sector partners who used their unique expertise and organizational mandates to work together to deliver the Kolibri FLY program. Specifically, it included Learning Equality, the developer of Kolibri; UNHCR; Vodafone Foundation and other private sector partners with expertise in education technology; Google.org; local and international non-governmental organizations (NGOs) with an education focus who act as Implementing Partners (IPs); and government entities. The extent to which Learning Equality and a UN organization are involved in the program depends on the country context (needs and delivery model).

The Kolibri FLY program assessed in this report is spearheaded by Learning Equality and the UNHCR's Connected Education team, in collaboration with Vodafone Foundation with support from Google.org. Other Kolibri FLY partners, including government stakeholders, local and international NGOs and other development partners, also contribute to each country's implementation in varying capacities.

The Kolibri FLY program took an adaptive and phased roll-out approach, starting in 2018, whereby Learning Equality and UNHCR provided different levels of support for the Kolibri FLY partners in each country's implementation. Each of the four implementation country contexts was intentionally chosen so that they represented a diversity of testing models including urban, rural, refugee camp and host community settings; different natures of protracted crises; different country curricula; different available infrastructure; and different hardware provision models. More information about each country's implementation and the Kolibri FLY partners involved is provided in section 1.6. The aim of the program was primarily to understand what was needed depending on each of these different factors in order to provide evidence for future implementation as well as scale up and out of current implementation.

1.3. Objective of the Assessment

In late August 2021, Open Development and Education (OpenDevEd) was contracted by Learning Equality and UNHCR to conduct an assessment to answer the following research question: What success factors observed in Jordan, Uganda, Kenya, and Tanzania can be

leveraged to strengthen the program design and delivery models of Kolibri FLY in different country contexts?

01
PRODUCT

The Kolibri FLY offerings as it relates to content alignment and the usability of the product

How can Kolibri, including the Learning Platform, content and complementary materials be improved to enhance learning?

02
PEOPLE

The success factors as it relates to the connectedness and value-proposition of the stakeholders in the Kolibri FLY ecosystem

How can fostering collaborations between different stakeholder groups strengthen Kolibri FLY programming?

03
PROCESS

The mechanisms in which the program is reaching its end users, considering the resources that are needed and the way it can be sustained

How can Kolibri FLY delivery models be adapted to respond effectively to evolving crisis situations in a variety of contexts?

OpenDevEd conducted a literature review, key informant interviews, and focus group discussions to answer the above research question using a framework developed around the themes of Product, People and Process. This framework was inspired by the framework for the 6Ps in the education system (People, Provision, Place, Policy, Pedagogy, Product), originally developed by the EdTech Hub. OpenDevEd adapted the 6Ps to be the 3Ps (Product, People, and Process), after analyzing program literature, to capture the main components that are critical to assess Kolibri FLY program.

IMPLEMENTING COUNTRIES:

The Kolibri FLY program has been implemented in Jordan, Kenya, Tanzania, and Uganda.

1.4. Overview of Assessed Kolibri FLY Country Implementation Contexts and Program Design

Each of the four implementation country contexts for this Kolibri FLY program differed in terms of the Kolibri partners engaged in implementation, geographic location, political policies towards refugees which impacted content alignment and program delivery, existing hardware and infrastructure available for use, the training approach, and the impact of COVID-19 on implementation. The following sections give an overview of each country's implementation context and related program design.

1.4.1 - Kenya

Kolibri FLY Partners: The Kolibri FLY partners in Kenya include Learning Equality, UNHCR, Vodafone Foundation and Windle International Kenya. Windle International Kenya is the IP responsible for managing the secondary schools in the refugee camp and the Government of Kenya manages the schools in the host community. Windle International Kenya, with support from UNHCR, hired a team of coaches (local-termed "Experts") to support implementation of the program.

Content Alignment: In 2018, UNHCR hired a digital curriculum consultant to align OERs available through Kolibri's Content Library to the Kenyan syllabus. The OERs aligned to Form 1 and 2 (first two grades of lower secondary school) were reviewed and approved by the Kenya Institute of Curriculum Development (KICD), which is responsible for approving content used in Kenyan schools.

Infrastructure and Hardware: The program was integrated within UNHCR and Vodafone Foundation's existing Instant Network Schools program primarily by leveraging the existing infrastructure from the program. Based on identified need, Vodafone Foundation also provided newly developed standalone servers running Kolibri to be tested during Kolibri FLY, in addition to the existing hardware from the Instant Network Schools program including tablets, a laptop, a projector, a screen, an additional built-in local server, internet and solar power sources. The two schools located in the host community utilized their schools' computer labs, along with laptops that had been configured into Kolibri servers, to run the program.

Training: The initial ToT was jointly led in-person by Learning Equality and UNHCR, with the support of Vodafone Foundation volunteers, for Kolibri Experts and IP staff. Immediately following this, Learning Equality, UNHCR and Kolibri Experts led the training of teachers and other IP staff in August 2018. Subsequent refresher trainings were conducted jointly by Learning Equality and UNHCR, both virtually and in-person. Kolibri Experts, with the support of UNHCR Kakuma, lead the periodic training of teachers in Kakuma Refugee Camp and the Kakuma host community.

COVID-19 Timeline and Implications on Kolibri FLY: In response to COVID-19, the Kenyan government instituted partial and total lockdowns, including a national curfew between March and July 2020. Schools were closed for nine months from March 2020 to December 2020. They reopened in January 2021, but then closed again for seven weeks when Kenya locked down again from March 2021 to May 2021. During this time, all in-person events were also banned, and a curfew was instituted which, similar to other countries, impacted the delivery of Kolibri FLY. Schools opened again for a compressed third term from May-July 2021 and have remained officially open since.

1.4.2 - Jordan

Kolibri FLY Partners: The Kolibri FLY partners in Jordan include Learning Equality, UNHCR, and four IPs: Jordanian Hashemite Fund for Human Development (JOHUD), CARE, Madrasati, and Blumont (formerly International Relief Development (IRD). JOHUD, CARE, and Blumont manage the centers and delivery of the program to provide 13 to 17-year-old Jordanian and refugee learners with access to digital Arabic learning materials on Kolibri, while Madrsati implements the program in MoE-supported schools.

Content Alignment: Learning Equality hired a consultant who worked closely with UNHCR Jordan, MoE, IPs to identify the Arabic content gaps on Kolibri and manage several partnerships with content developers who were contracted to address the gaps. The MoE's Education Programs Division was responsible for overseeing the alignment process to ensure the content on the platform is in line with the national curriculum.

Infrastructure and Hardware: IPs leveraged the existing infrastructure in their respective centers and schools to deliver the program, and some assistance was provided by Learning Equality and UNHCR to increase the availability of hardware.

Training: Learning Equality led four in-person ToTs with each of the IPs and UNHCR Jordan staff in February 2019 and subsequent in-person customized refresher trainings the following year. UNHCR Jordan conducted follow-up refresher trainings once with the UNHCR Connected Education team.

COVID-19 Timeline and Implications on Kolibri FLY: With the onset of the COVID-19 pandemic, the Jordanian government instituted a lockdown in March 2020 which included the suspension of all school activities, which disrupted the delivery of Kolibri FLY in the Learning Hubs and schools. While some restrictions eased throughout 2020, schools remained closed and restrictions such as curfews and safety precautions such as mandatory masking and social distancing stayed in effect. Schools opened again in February 2021, only to close about one month later in March 2021 following a surge in COVID-19 cases though opened again in September 2021, which had some implications on Madrasati's delivery of the program.

The lockdown measures necessitated that the Kolibri FLY partners in Jordan find innovative ways of ensuring continuity of learning during the closures of the Hubs and

schools, which resulted in several initiatives to support learners at home. 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 to support learners to access the content on Kolibri from their home. UNHCR Jordan also leveraged new materials developed by Learning Equality to provide pedagogical and technical resource guides in Arabic to support use of Kolibri at home with or without the Internet.

1.4.3 - Uganda

Kolibri FLY Partners: The Kolibri FLY partners in Uganda include Learning Equality and UNHCR as well as the IPs (Windle International, Finn Church Aid and Norwegian Refugee Council) which were responsible for running the program on the ground. Additional support for the collaboration came via Education Cannot Wait, UNICEF Uganda, the Global Business Coalition for Education and Hewlett-Packard (HP), which included the use of the HP School Cloud server. Government agencies in Uganda have also been involved in the program including the National Information Technology Authority - Uganda (NITA-U) which hosts an online version of Kolibri's mobile application in Uganda's National Data Center; and Secondary Science and Mathematics Teachers (SESEMAT) which participated in the ToT model in Uganda.

Content Alignment: Kolibri FLY partners, especially UNICEF Uganda, have worked closely with the National Curriculum Development Centre (NCDC) to review and align OERs for use on the Ugandan Kolibri Learning Platform.

Infrastructure and Hardware: In 2018 and 2019, Kolibri was accessed on computers and servers in secondary school computer labs. After COVID-19 closed schools in Uganda and access to the computer labs was paused, UNHCR and Learning Equality worked together to procure 2000 tablets to ensure continuation of learning through IP facilitation of the Kolibri mobile application (which includes the same content as the servers) at specific learning institutions.

Training: In Uganda, the cascade approach of the ToT was achieved through the utilization of SESEMAT teacher trainers throughout 2019. Learning Equality first trained national SESEMAT trainers who then trained regional SESEMAT trainers who then trained Champion Teachers, with Learning Equality co-facilitating at each juncture. Kolibri Experts from Kakuma supported the Champion Teacher regional SESEMAT trainings. Champion teachers then facilitated single day training sessions at their respective schools, with support from Learning Equality's Ugandan consultant at the time. Follow-up refresher trainings were either conducted by UNHCR Uganda staff, or virtually by Learning Equality, UNHCR Connected Education and UNHCR Uganda.

COVID-19 Timeline and Implications on Kolibri FLY: The Ugandan government instituted a lockdown from March to May 2020, including the suspension of all school activities, which paused the delivery of the Kolibri FLY program for some time. Severe restrictions on in-person events remained in effect through October 2020. In January 2021, only

candidate classes were allowed back to school, followed by semi-candidate classes in March 2021. However, a new wave of COVID-19 cases caused the country to lockdown again in June and July 2021, closing all schools and severely limiting in-person activities again. Schools are expected to reopen in January 2022. Evening curfew and safety precautions such as mask-wearing and social distancing have also remained in effect continuously since March 2020.

Kolibri FLY leveraged existing efforts from NITA-U and the National Curriculum Development Centre (NCDC) with the support of UNICEF Uganda to support ongoing use of Kolibri during lockdowns and school closures. This collaboration enabled Ugandan learners to 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 WiFi hotspots primarily around Kampala and Entebbe. Zero-rating by the mobile network operator enabled learners to use the government site at no cost to them. Students were also able to access the offline version of Kolibri in small groups at school sites in refugee settlements and host communities throughout the official school closures, supported by the IPs and adhering to COVID-19 Standard Operating Procedures (SOPs).

1.4.4 - Tanzania

Kolibri FLY Partners: The Kolibri FLY partners in Tanzania include Learning Equality, UNHCR and the International Rescue Committee (IRC), who was responsible for implementing the program in all sites.
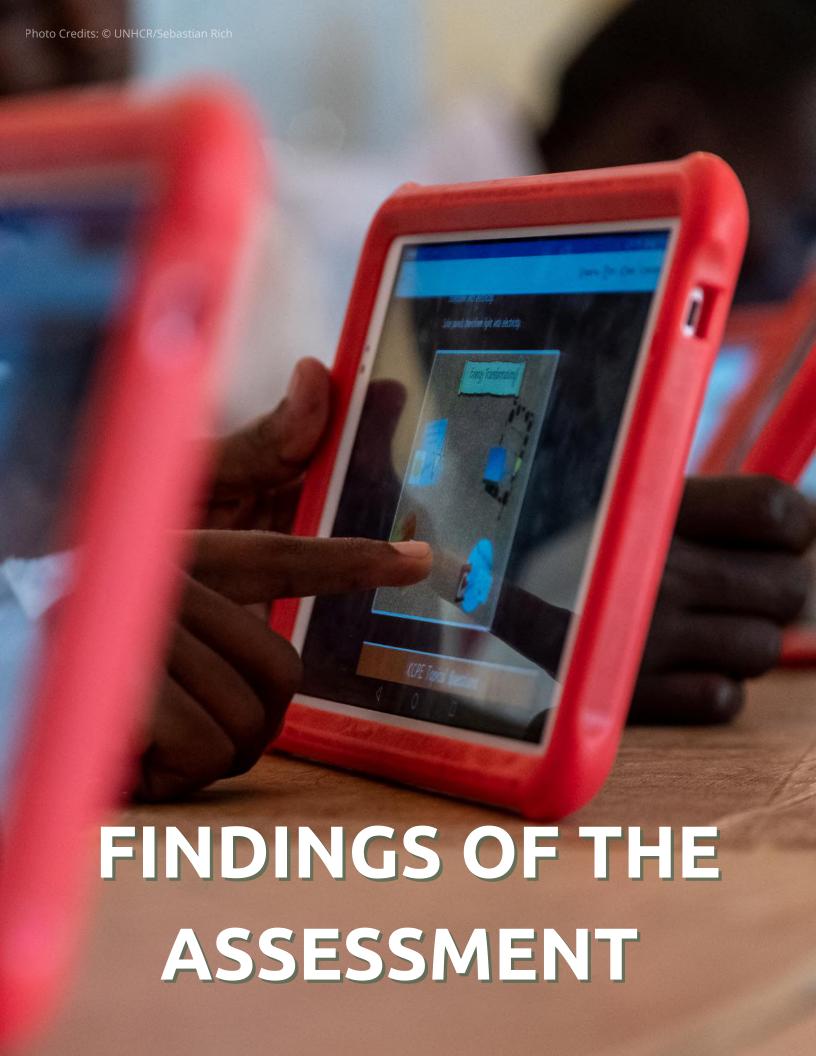
Content Alignment: The Tanzanian government prohibits access to the Tanzanian curriculum to non-citizen students, so Burundian and Congolese students using Kolibri learn from resources aligned to their home curricula instead. As such, Learning Equality provided the learning centers with a version of Kolibri that included OERs relevant to the Burundian and Congolese curricula.

Infrastructure and Hardware: The program was integrated within UNHCR and Vodafone Foundation's existing Instant Network Schools program primarily by leveraging the existing infrastructure from the program. Based on identified need, Vodafone Foundation also provided newly developed standalone servers running Kolibri to be tested during Kolibri FLY and a backpack containing a server and 5 tablets, in addition to the existing hardware from the Instant Network Schools program including tablets, a laptop, a projector, a screen, an additional built-in local server, internet and solar power sources.

Training: Kolibri was initially introduced to some coaches at an INS workshop in December 2018 by Learning Equality, UNHCR Connected Education and Vodafone Foundation. Learning Equality and UNHCR Connected Education led the initial ToT of Kolibri coaches and IP staff in May 2019 with initial follow up training provided by UNHCR Connected Education in November 2019. Learning Equality and UNHCR Connected Education along with SESEMAT trainers from Uganda and Learning Equality's Ugandan consultant led a

second follow up training in December 2019. IP and country staff led subsequent follow-up on training of teachers.

COVID-19 Timeline and Implications on Kolibri FLY: During COVID-19, the Tanzanian government banned public gatherings and closed the schools between March 2020 and July 2020, but they have since remained open with social distancing measures in place. As such, Kolibri FLY in Tanzania was not significantly disrupted by COVID-19 compared to the other three country contexts.

FINDINGS OF THE ASSESSMENT

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2.1. Overview of the Findings

Overall feedback about the Kolibri FLY program was positive from all stakeholders across all four countries. Kolibri was regarded as highly adaptable and flexible for different contexts, as evidenced by the different ways it was implemented in the four Kolibri FLY programs and the variety of hardware models the programs utilized. Many interviewees expressed appreciation for Kolibri's ability to help underserved learners in refugee hosting areas continue to learn throughout COVID-19 formal school closures. Stakeholders highlighted that Kolibri's offline-first platform serves the needs of learners in low-resource environments, making it a unique platform that sets Kolibri apart from other online learning platforms.

The design of the platform was said to help learners learn at their own pace and during their free time. Stakeholders noted that the diversity of content types like edugames, videos and simulations were considered a strength because they are deemed more engaging than traditional textbooks by students and cater to the different learning needs of learners. Moreover, the alignment of OERs to each context's curricular needs was noted as a strength, particularly in Kenya and Jordan where teachers had previously struggled to sift through many resources to find those relevant to their contexts. In Tanzania, the ability for teachers to contribute to the content library through Kolibri Studio was well appreciated by teachers, who said that platform provided them flexibility to upload content that met the specific needs of their students and national curriculum.

Kolibri FLY in all implementation countries benefited from numerous partnerships across different sectors. Most stakeholders noted that the collaboration amongst stakeholders was underpinned by their commitment to achieve the same goals. This was evident in how the stakeholders worked well to implement the Training of Trainers (ToT) model to build the capacity of implementing staff on the Kolibri FLY program, and the inclusion of local stakeholders throughout the design of the trainings. Even when supported to differing degrees, government bodies played an important role in institutionalizing the program in government training programs and national IT priorities.

Looking ahead, stakeholders identified opportunities for improvement in existing gaps around content coverage and depth, capacity building, infrastructure, and partnerships that could benefit from further investment from Kolibri FLY partners. These areas include:

1. Increasing the breadth and depth of locally relevant and accessible digital resources that support broader curriculum coverage and diversely abled-learners

2. Addressing capacity limitations that stem from trained IP staff turnover, and expanding the trainings to capacitate teachers with soft skills, hardware maintenance, and professional support

3. Increasing the availability of hardware and student-to-device ratios

4. Ensuring broadband connectivity is not a limiting factor in student's ability to use Kolibri at home, especially during distance learning during school closures.

2.2. Theme 1, Product in Kolibri FLY Program

The Product theme of the assessment sought to examine stakeholders' reflections on the accessibility and usability of Kolibri, specifically on the Learning Platform and whether it was meeting teachers' and students' needs; if users could navigate it with ease; if it facilitated personalized learning journeys for students; and if the platform was accessible to students with disabilities, low digital literacy skills and special needs. The theme also included other aspects of Kolibri, including the extent to which the content on the platform is aligned with the national curriculum, and whether it was suitable to meet the needs of learners and teachers for learning and teaching.

Findings showed that Kolibri is easy to use and navigate for students and teachers with low digital literacy skills and it has accessibility features for students with disabilities. In terms of content suitability, content available on Kolibri is engaging and helps with practical and applied learning in contexts where textbooks are often the only teaching and learning tools.

Stakeholders suggested adding capability for more multimedia content such as Word documents and PowerPoint Presentations, as well as features to allow for direct communication between students and teachers. Stakeholders also expressed a desire for expanded content coverage, localized content, more formative assessment options and additional content that accommodates people with disabilities. Respondents felt that these can be achieved through strong government partnerships to facilitate the content alignment process, frequent alignment of additional OERs to an individual country's Kolibri instance, the ability for local stakeholders to upload their own content using Kolibri Studio, and by creating partnerships with local content developers.

2.2.1. Platform Usability

Overall, the consensus is that the Kolibri Learning Platform interface is easy for learners and teachers to navigate, even for those with low digital literacy skills, and that it supports teaching and personalized learning.

Stakeholders across all countries agreed that the Kolibri Learning Platform is easy for teachers and learners to access and navigate. Learning Equality interviewees emphasized that designing with users is a core aspect of their work as a whole and in this project. As such, Learning Equality's designers worked and continue to work with end users and engineers to ensure the user interface of the platform meets the needs of low literacy

learners (e.g. through the addition of like icons), so that teachers and students are able to navigate it on their own after basic training.

> *"After just one session of learning how to use the Kolibri platform, learners now come on their own to use it in their spare time and ask for assistance when needed." – A coach in Kenya*

Stakeholders across countries highlighted several aspects of the platform that they considered especially helpful for teaching and learning, including personalized learning and the ability for teachers to track learners' progress. For example, the IPs in Tanzania and Kenya noted that Kolibri supports individualized learning by allowing learners to be independent and progress at their own pace. The IP in Tanzania also noted that teachers enjoy using Kolibri because it gives them control over the management of their classroom because they can follow-up with individual learner progress through the built-in educator tracking tools. For example, teachers can see which subjects students need additional support in, and then allocate more time to these subjects accordingly.

Additional features that were well received by stakeholders include the ability to use the platform in guest mode, ease of accessing channels, and the search bar. Stakeholders also appreciated that using Kolibri has helped to improve teachers' digital literacy skills, which are skills they often use in a limited capacity during their formal teacher training or on a normal basis in the classroom.

> *"Kolibri has even helped teachers develop their digital literacy skills. Teachers who otherwise were not familiar with using computers are now able to use them to utilize the Kolibri platform." – A teacher in Kenya*

Overall, the consensus is that the Kolibri Learning Platform interface is easy for learners and teachers to navigate, even for those with low digital literacy skills, and that it supports teaching and personalized learning.

Teachers in Tanzania felt that expanding the types of multimedia content that can be supported on Kolibri beyond its current support of MP3, MP4, ePUB, PDF, and HTML5 Apps would further strengthen the platform's ability to facilitate learning to a wider group of learners and promote creativity among teachers. They specifically noted that they wished Kolibri had the ability to support PowerPoint presentations or Word files that would otherwise need to be converted to PDF for use. Learning Equality is already responding to this need by supporting H5P and SCORM in the version of Kolibri being released December 2021 and has plans to support a viewer for PowerPoint slides. One challenge is that supporting proprietary products would require a license, so Open Office products could address issues of licensing and accessibility.

"In Uganda learning has been traditionally between a learner and a teacher, but the Kolibri platform has changed the configuration of this relationship. We are wondering how to continue the teacher-student interface in the virtual world to be able to communicate with and assess students." – A manager at an IP in Uganda

Teachers also highlighted the importance of communication between teachers and learners through these interactive features which can mimic in-person learning. Specifically, UNHCR staff in Jordan, and government stakeholders and IPs in Uganda requested the addition of an instant messaging feature and a feature that allows for group meetings to facilitate direct communication between teachers and students, and between students when working in groups even without the Internet. These additional features are included in Learning Equality's long-term roadmap, though it is important to recognize that providing real-time communication features in an offline environment requires a unique design given there are different expectations around response time and notifications.

The platform has been designed to be accessible for learners with disabilities.

The design of the Kolibri Learning Platform follows [accessibility principles](#) to support learners with disabilities with WCAG 2.1 Level AA partial conformance. Some examples of learner-facing features include ease of navigation around the platform, contrast considerations, carefully monitored zooming functionalities for larger representation, closed captioning and live transcription, directly visible media and more. This could be expanded to improve use of multimedia content, such as a mechanism for annotation or highlighting. However, given some of the constraints of the content itself (discussed in Section 2.2.2. below), the experience of using Kolibri as a whole can be limiting for learners with disabilities depending on the context and the severity of their disability.

"We cannot say that the Kolibri platform is sufficient for learners with disabilities because it does not specifically cater for students with severe disabilities." – A teacher in Kenya

2.2.2. Content Alignment and Suitability

The content used in Kolibri is deemed beneficial to teachers and students, with many stakeholders highlighting that it is engaging and useful for learning and teaching.

Across the board, stakeholders in all countries appreciated the majority of the content available on their local installation of Kolibri for supplemental learning. Stakeholders in Kenya and Jordan particularly highlighted the benefit of having OERs aligned to their national curriculum on Kolibri, as it assists them to find relevant supplemental resources which were sometimes previously very tedious for teachers and students to locate.

> *"It used to take Form 1 and 2 students a long time to surf through all of the content on Kolibri that was not aligned to find what they needed. But now that it's aligned to the curriculum, they can quickly get to the content they need, so they are happy and motivated now." – A UNHCR Kakuma staff member*

Further, the diversity of the content types including videos, pictures and games were also deemed engaging and helpful in supporting learner retention.

> *"The students' feedback on the platform is very positive. They find the resources on Kolibri useful, helpful, and engaging." – A UNHCR staff member in Jordan*

Stakeholders also highlighted that Kolibri's visual and applied simulation content helps students better understand complex concepts. This is especially beneficial in contexts where students have limited learning resources aside from textbooks, making the visual and practical learning content available on Kolibri highly engaging for stakeholders.

> *"Kolibri's engaging games are a point of strength, and they help the country move from memorization-based, rigid content to edugaming." – An IP in Jordan*

For example, stakeholders in both Uganda and Jordan noted that the applied physics content is practical and helps students gain a deeper understanding of key theoretical concepts, which are often more difficult to understand in textbooks.

> *"Students are really excited to interact with the content. Students are able to move at their own pace and there's no need to rush – they are able to slow down the video to help them understand the content better. This helps make the content unique and applicable." – A coach in Kenya*

The same is true for science subjects, where government stakeholders in Uganda praised Kolibri for the animations that helped demystify science concepts.

"There are limited resources for learners to visualize concepts and practice, but with some of the models in Kolibri, students can visualize concepts and it helps explain concepts that are otherwise too difficult to comprehend via traditional textbooks." – A government stakeholder in Uganda

Stakeholders expressed that the platform can benefit from increased content coverage in existing and new subject areas.

Stakeholders highly appreciated the available content on the Kolibri platform for teaching and learning, though the majority of stakeholders across countries also expressed a need for broader content coverage. While the content on Kolibri is intended to be supplemental, stakeholders requested for greater breadth and depth of the subject matter available on the platform. For example, stakeholders noted that in some content areas, only one video was available for a topic, leaving students wanting more to continue learning. An IP in Uganda noticed a marked decline in Kolibri use recently, which they attributed to students exhausting the content available on the Ugandan platform. Further, stakeholders in Jordan noted major gaps in the Math, Chemistry and English content available. The content available on Kolibri can at times fall short of what teachers and students expect, if they are not properly briefed on the use of OERs, and how these can be used in conjunction with other learning resources. While objectively assessing and quantifying the perceived gaps is outside the scope of this assessment, it remains important to relay the sentiment from IPs that they would appreciate access to additional, relevant content.

Beyond deepening the content of existing subject areas, stakeholders requested for additional subject matter to be added to Kolibri, and the addition of humanities subjects was a high priority. In Uganda, stakeholders asked specifically for Kiswahili, Physical Education, History, Geography Art and Agriculture. An IP in Jordan requested for content around software/computer programming and another requested additional language content for French and Spanish. The addition of non-academic subjects were also highlighted in Jordan. In Uganda, an IP also requested for additional life skills and career guidance content so that students in different grades could receive appropriate content that matched their age and their appropriate stage in career guidance. UNHCR Jordan staff also reiterated that finding content which appeals to adolescents (so that it is not too advanced or too elementary) is key, especially in career guidance.

"As we expand the content in the Kolibri Content Library, optimizing the discoverability of content becomes equally important to address." – A Learning Equality staff member

Learning Equality acknowledges that having local content enhances the usability of Kolibri, but recognizes that finding openly licensed materials which are relevant for each individual context in which Kolibri is used is difficult for a multitude of factors, including ecosystem needs to support local content creators and limited availability of digital content in local languages more generally. At the same time, content creation requires significant financial and human resources to oversee. However, Learning Equality noted that the version of Kolibri (0.15) being launched in December 2021 expands content discoverability with the inclusion of a new metadata schema.

Emphasizing scoping for digital Arabic content for use in the Jordanian context demonstrated the value of localized content, tailored to meet the needs of different nationalities.

As part of the preparations for Kolibri FLY, Learning Equality and UNHCR dedicated efforts to identify digital Arabic resources that could be included in the Kolibri Content Library. The impact of this was demonstrated in Jordan; while digital Arabic content is highly scarce, the implementing partners appreciated that the Arabic content was developed by native Arabic speakers (as opposed to translating English to Arabic), which helped with localization and relatedness. Stakeholders in other countries advocated for a similar approach, with the inclusion of contextually relevant, locally developed content. Several stakeholders pointed out that the content they are using on Kolibri seems Westernized or from foreign contexts but suggested that content should be relevant to the local student. For example, in Kenya, UNHCR staff mentioned that life skills content available on Kolibri is not very relevant to the Kenyan context because what Kenyans define as life skills is different from content categorized as life skills available on the platform. While there is limited quality local digital content available for these subjects, this could be an area of future investment for the sector, working with local developers and education partners.

> *"The priority was to find content in Arabic designed by Arabic-speaking learners because they know the context. I really wanted the content to bridge learning needs. Whenever I found there was limited content on robotics or life skills, I would make it a priority to reach out to a local organization that creates good content to ensure content creation is a priority." – A Learning Equality staff member*

> *"The funding for this project was unique in that it included resourcing to align digital resources as well as scope, create, (re)digitize or localize content particularly in Arabic, though this model cannot be easily replicated and scaled up." – A Learning Equality staff member*

Further, several stakeholders mentioned that while the basic content available on Kolibri is relevant to the local context, the specific examples provided are not always relevant. A Ugandan government stakeholder gave the example of how a lesson about counting money is relevant in most contexts, but the currency used in the examples is not relevant for their individual context because it uses Western currency. While this does not negate the value of the content, it can make it harder for students to fully relate to some examples. A UNHCR Kenya staff member also mentioned how some content may have examples which can be foreign (e.g. referring to "baseball" despite the fact that it is not a common sport in Kenya). A Learning Equality staff recommended that additional support be given to educators to help them better use the OERs available on Kolibri by supplementing with their own local examples.

> *"When you look at the content that we have now on Kolibri – the modality and simulations are either Westernized or from another context outside of Uganda. People ask if they can have content that reflects the real African child." – A UNHCR staff member in Uganda*

Several stakeholders mentioned that some accents in videos are difficult for students to understand. This problem could be two-sided, with one problem being foreign accents and another problem being video speed, which some respondents did not realize could be slowed down. Learning Equality staff recognized that the English used in Khan Academy content in Kolibri in Kenya comes from a United States context, which can create challenges for learners in Kenya. An IP in Uganda noted that South Sudanese refugees who speak Arabic have trouble with the fast English used in videos since English is not their first language.

> *"The biggest feedback from the students is that the audio pace should be slower because there are language deficiencies. There are a number of tribes and ethnicities where students can't understand the actual words in the audios and videos." – A teacher in Uganda*

One potential solution is drawing greater attention to the functions within Kolibri that allow users to slow down the speed of videos, or also using closed captioning, so that students can better understand the foreign accents.

A key gap highlighted by teachers is the lack of formative assessments provided in the program.

Stakeholders feel that incorporating more formative assessments by leveraging Kolibri's formative assessment mechanisms and educator reports can help attract more students who are motivated by seeing evidence of their progress and can help teachers track learning outcomes of students. For example, an IP in Jordan suggested the inclusion of pre- and post- assessments for each channel so students can monitor their own growth. In addition, the type of assessments can be extended in the Kolibri Learning Platform to include methods beyond multiple choice questions. Explaining this point, one stakeholder in Uganda mentioned that multiple choice assessment does not sufficiently capture the needs of teachers, as students need to be measured on how they have been learning, and multiple choice is not always the most appropriate method of assessment. Teachers expressed the desire to create and upload their own assessments.

> *"As much as learners have been learning on Kolibri, we realize that learners are more motivated when they are assessed." – A manager at an IP in Uganda*

Presently, Kolibri only supports four question types, but it is in Learning Equality's roadmap to expand the assessment types and incorporate the Question and Test Interoperability Standard to support assessment creation locally within the Kolibri Learning Platform and centrally online on Kolibri Studio. Having this tooling addresses the gap identified in Jordan where most academic content is copyrighted, so assessments are not openly available. It also helps teachers in Uganda who want more autonomy to upload varied assessment types to monitor students' progress.

Stakeholders also noted that there are limits to how students with disabilities can engage with the content on Kolibri.

The availability of accessible digital content is limited. Within Kolibri, not all PDFs are screen reader friendly. Stakeholders across countries reported that learners with hearing disabilities are often left out when videos do not include closed captioning and learners with visual disabilities are often excluded when there are limited or no audio files/videos with sound on a particular topic.

> *"The platform has many images without sound which disadvantages blind people, and so more specialized content for learners with specific disabilities is needed." – An IP in Jordan*

Positively, some work has been done in Kenya and Jordan to ensure resources are accessible for people with hearing and visual disabilities such as including closed

captioning on videos and including audio resources, but overall stakeholders suggested making more existing content accessible as well as adding more content that can meet the needs of students with disabilities in order to add additional value to Kolibri.

> *"There is always a gap in digital content for people with disabilities, stemming from a funding gap and difficulty in finding content creators that specialize in Arabic content for students with disabilities." – An UNHCR staff member in Jordan*

This includes commissioning the development of content for persons with hearing disabilities, such as adding closed captioning to videos where it does not exist and including more podcasts and audio files (for students with visual disabilities).

Stakeholders feel that the ability to upload their own content could help solve issues around content contextualization and lack of formative assessment, but ensuring quality control and formal approval of content should be taken into consideration.

Stakeholders believe that the ability for teachers to upload their own content on Kolibri can address some of the challenges they face related to lack of context-specific content and limited formative assessments. In Jordan, facilitators and teachers have opted to download content to their own devices and share content via WhatsApp to learners, though they noted that they would like the autonomy to be able to upload their own content on the platform, a process which thus far has been centralized by MoE.

Enabling teachers to upload their own content to Kolibri is a model that has proven to be effective in Tanzania, where the IP believes that between 40 percent to 70 percent of the content available on their instance of Kolibri (which is a subset of the wider Kolibri Content Library), was not suitable for Burundi and Congolese students. This may be because the content loaded on the Tanzanian installation of Kolibri was limited due to limited server storage space and will increase with the roll out of greater capacity servers from Vodafone Foundation. As a result, Burundian and Congolese teachers routinely upload content to Kolibri Studio that is relevant for their national curricula. However, one notable consideration for this situation is refugees in Tanzania follow their curriculum of the country of origin, and not the Tanzanian curriculum, so the oversight for content being used may look different than in other contexts where the national curriculum is followed. Another important consideration is that giving coaches and teachers direct access to Kolibri Studio may not always be practical due to connectivity challenges and should be decided on an individual basis with IPs.

In the three other Kolibri FLY countries, oversight for education for refugee learners falls under the national MoE. While the content used in Kolibri is deemed a supplement for supporting the textbook or other classroom materials, curricular bodies that are centrally

responsible for reviewing and approving content used in the classroom often want to approve these materials. Another key consideration for allowing educators to upload their own content is how to ensure the quality of the content uploaded. It is important to balance between the urgent need for locally available content that teachers can develop and upload themselves, and ensuring that content is of high quality.

> *"One risk that has to be managed in allowing teachers to upload their own content is the quality of the content and ensuring that the high quality of content on Kolibri is not compromised by allowing any teacher to upload their own content." – A UNHCR staff member in Kakuma, Kenya*

If teachers are given access to Kolibri Studio, Kolibri partners must devise methods of quality control to ensure that students are learning from accurate, high-quality content. In addition, if access to Kolibri Studio is granted to teachers, training is required to ensure it can be used effectively. This need has been acknowledged by Learning Equality and plans are currently underway to train coaches and teachers on how to use Kolibri Studio depending on the feasibility of it being used due to connectivity, beyond the training materials on using Kolibri Studio for alignment that already exist in the Kolibri Edtech Toolkit. These plans also include local content import as part of the Kolibri improvement roadmap, which Learning Equality and UNHCR are operationalizing for 2022.

Fostering strong government partnerships can facilitate the content alignment process.

Albeit some challenges, stakeholders identified that it is important to work with governments to create, align, review and approve content for Kolibri. They expressed that a well-functioning partnership with the government can support the effort to mainstream Kolibri, since the government is ultimately responsible for digital content development and approval in countries like Kenya, Uganda and Jordan. Having a curricular body approving the digital learning materials used in the program creates buy-in from the teachers, particularly when the content is aligned and organized according to the national curricula. This improves discoverability of content and is one way to contextualize content originally developed for use in another context. Separate and apart from how these contents are received, engaging the curricular bodies and MoE was a key aspect of the process in each of these three countries.

Notably in Jordan, Madrasati, an initiative of Queen Rania, worked with teachers to review digital Arabic content and align it to the national curriculum. These reviewed, aligned and approved contents were further distributed on a national online platform, and offline in the Kolibri Content Library to any users of Kolibri. In Uganda, content organized and reviewed by NCDC were used in the program. In Kenya, Learning Equality and UNHCR built the capacity of content reviewers selected by the Kenya Institute of Curriculum

Development to review content aligned according to the national curriculum. However, working with curricular bodies can take a considerable amount of time and can be costly in terms of human and financial resources.

Further, these can be newer processes for digital content (particularly OER) where there may be less consensus in practice as to what content should be approved. As today, there is not a clear process established with these bodies for when new content is made available and organized within the existing aligned set of materials. The implication is that the introduction of new curricula, including the competency-based curricula in Uganda and Kenya, will pose additional resource and capacity challenges in the near future . This is one of the reasons that the broader Kolibri FLY project funded by Google.org is also looking at the process of automating the curriculum alignment process to more readily identify crosswalks between curricula to support this process.

> *"Initially we started with open source content, but now we want localized content developed in Uganda from the National Curriculum Development Center, which requires resources from their end that they say they do not have. This is one of the big challenges we need to address because without content the sustainability of Kolibri hangs in the balance." – A government stakeholder in Uganda*

A guiding, national, digital education policy can also support government involvement in digital education resource development, alignment and approval. In Uganda, stakeholders expect that the recent approval of a digital education policy will help mainstream digital learning and focus the government's attention on developing digital resources and supporting initiatives like Kolibri. In Kenya, stakeholders report that a fit-for-purpose digital education policy would greatly facilitate the development and approval of digital resources that can be used on platforms like Kolibri.

> *"The government needs to put an equal investment into digital education as it puts into print material." – A UNICEF staff member in Uganda*

2.3. Theme 2, People in the Kolibri FLY Program

The People theme of the research framework sought to examine stakeholders' opinions about **how capacity is built** among Kolibri stakeholders mainly in terms of training and technical support. Specifically, the Training of Trainers (ToT) model was analyzed to understand if it effectively equipped stakeholders with the knowledge and skills needed to deliver the program, what aspects of the ToT worked well and what can be improved to strengthen the model further.

The People theme also focused on gathering information about Kolibri's **ecosystem stakeholders** to understand whether there was sufficient collaboration amongst each country's coalition of stakeholders, what forces may have facilitated and hindered collaboration and how collaboration can be improved for future programming.

Findings showed that the ToT model was effective in cascading training so teachers and students can use Kolibri for teaching and learning. The content in training sessions was deemed sufficient by stakeholders, with some suggestions for improving training by providing broader training on digital literacy skills. A need for frequent refresher trainings was also suggested in order to frequently touch base with end-users about software updates and ensure enough stakeholders within a country implementation know how to use Kolibri. Evidence in Uganda highlighted the benefits of engaging government stakeholders in the ToT model in terms of mainstreaming Kolibri into a national education system. Communication channels between Kolibri FLY partners are generally positive though stakeholders expressed they would benefit from additional cross-context collaboration.

In terms of ecosystem stakeholder cooperation, there was sufficient opportunity for collaboration among Kolibri FLY partners and they built strong relationships with a variety of stakeholders invested in each country's program. In the future, Kolibri FLY partners can reach out to additional partners in civil society, private sector and government actors to make programming even stronger, as well as strengthen intra-country and inter-country communication channels between Kolibri FLY partners.

2.3.1. Capacity Building

Stakeholders noted that the ToT model was deemed effective and efficient for this program, largely because the ToT contributes to the creation of a critical mass of people who are trained to use Kolibri and can train others. Further, stakeholders think that the ToT model encourages ownership of Kolibri because local stakeholders and communities feel involved in the program. In Kenya and Jordan, the training sessions were co-designed with coaches so that they bought into the program early and felt a strong sense of pride and ownership. Those around them feel that they have been motivated to make Kolibri a success from the beginning because they were involved in decision-making early on.

"Adopting a cascade model of training allowed the program to reach more people who could teach on the platform and mentor others on how to use Kolibri." – A government stakeholder in Uganda

This ownership is facilitated by Learning Equality with support from UNHCR Connected Education and country teams in how they plan training sessions based on the needs of the IP, coaches and teachers in order to create a training agenda that meets their needs. One member of UNHCR's Connected Education team also praised Learning Equality for their strength in creating comfortability with partners on the ground to share any challenges with the software, suggest software adaptations and request for training or support. This was a characteristic that the respondent deemed especially important when working with frequently marginalized communities like refugees.

"The coaches in Kenya are great and are effective in supporting the program. The coaches show a lot of ownership over Kolibri because the training was co-designed with them, which made them feel like core stakeholders in the program. In phone calls with the coaches, there was always a strong sense of motivation, ownership and pride." – A Learning Equality staff member

Another strength is how the ToT model takes a practical approach, which stakeholders felt was engaging and relevant to their work. Learning how to use Kolibri was central to the training, and theory was kept at a minimum. During the trainings, coaches, IPs and teachers all had access to devices to be able to use the platform in real time, although this was hindered when there were more limited devices for practice during some training sessions in Uganda. The training in Tanzania was noted as being especially practical and well-received because the Ugandan SESEMAT trainers joined the Learning Equality consultant to lend their expertise during the initial training sessions with the Tanzanian IP and teachers.

"In Tanzania there was an element of actualizing the usage and application of Kolibri in the teaching and learning process. The participants became learners, and the facilitators became teachers. This ensured practice utilizing Kolibri and not just the theory of using the platform. This focus on practice was missing in the Ugandan training." – A government stakeholder

Many of the trainings included technical staff from the IPs which was beneficial so that they could be trained and supported to help advise on technical aspects of maintaining Kolibri. In Kenya and Tanzania, Vodafone Foundation played a technical capacity-building role during training which was appreciated by other stakeholders. Their involvement was important because a stakeholder in Uganda recognized that the burden of providing

follow-up support to IPs on technical aspects should not fall squarely on Learning Equality but can rather be shared by a contracted firm with expertise in ICT, similar to the inclusion of Vodafone Foundation in the Kolibri FLY partner coalition Kenya and Tanzania.

The content of the training sessions were sufficient for understanding implementation of Kolibri and blended learning pedagogies as well as for building capacities, but expanding training content to include training on broader digital literacy skills can be beneficial.

Across all four countries, IPs expressed satisfaction with the training and capacity building they had received to be able to implement Kolibri, however most stakeholders indicated that they would benefit from additional training in understanding use of digital resources. Specifically, several stakeholders requested additional training on how to use ICT materials in the classroom, as integrating digital content into their teaching is new territory for many of them (training they did not receive in their formal teacher training) and they feel that they would benefit from more sustained training to become fully comfortable. In Uganda and Jordan, IPs wanted teachers to have more extensive training on integrating technology like Kolibri into their classroom lessons.

In Uganda especially, stakeholders recognized the very limited ICT skills among both teacher trainers and teachers. For example, SESEMAT teacher trainers who specialize in training STEM noted that they do not have adequate skills to easily manipulate digital devices and navigate digital resources. While ICT skills were part of the ToT stakeholders felt that the duration of the ToTs were too brief to develop and practice these skills. For example, SESEMAT teacher trainers were trained for two days, and classroom teachers were trained by the SESEMAT trainers for one day. Although the teachers felt that the trainings were short, Learning Equality and UNHCR noted that they had to carefully balance the time required to capacitate teachers and the opportunity cost of pulling teachers away from their teaching. Meanwhile, IPs in Kenya and Tanzania received training on using technology from Vodafone Foundation, but in Tanzania, additional training was requested because technical aspects of Kolibri were noted as a particular challenge for the implementing team and teachers.

> *"If we are going to use tablets during school, we need to train teachers on how to integrate classroom teaching with technology teaching so they have a learner-centered approach." – A manager at an IP in Uganda*

> *"There is limited ICT knowledge among teachers and they have not been given the opportunity to develop their ICT knowledge and how to navigate gadgets. Some learners are ahead of the teachers. There*

needs to be more frequent training to make teachers ICT experts."– A UNHCR staff member in Uganda

Teachers and coaches also indicated a need for additional training on communicating with students as well as other soft skills (e.g. leadership, conflict management, interpersonal skills, etc.) needed for facilitating lessons. This was noted specifically as a point of improvement among teachers and facilitators in Jordan. A UNHCR Jordan staff member felt that only 50% of an IP's coaches are well-equipped with the skills needed to communicate to students and facilitate sessions. In general, additional soft skills are needed by most people who facilitate Kolibri in the classroom. For example, an IP in Uganda noted that teachers need support taking a learner-centered approach to teaching.

"Facilitators need more training on communication and soft skills so they can improve their facilitation. They're well equipped with using the Kolibri platform, but they need more support on the soft skills aspect." – An IP in Jordan

Technical training was provided to relevant IP staff and coaches (at times), but IPs also indicated a need for additional training on the technical aspects of using and troubleshooting problems with Kolibri. This additional training was especially needed during the initial rollout of Kolibri FLY because new hardware was developed and tested specifically for the model in three of the countries. Stakeholders recognized that it is relatively easy to understand how Kolibri and its hardware (servers, devices) work, however working with some of the hardware, including the new server solutions tested by Vodafone Foundation in Kenya and Tanzania, was challenging because troubleshooting technical issues can be particularly difficult.

Capacitating IPs to resolve technical faults is important for ensuring that a Kolibri program can run smoothly and obviate the lengthy time and process needed to send faulty hardware to be fixed. While challenges with technical issues were anticipated due to the testing nature of the initial program, this should be considered for future rollout when using limited tested solutions. In addition, Vodafone Foundation highlighted the need to create sufficient documentation about how hardware works that can be left behind as a reference for IPs to solve some of their own challenges. While the technical Kolibri documentation is sufficient, they felt that both the hardware-specific training and documentation for administrators was limited and IPs would likely need more instructions to be comfortable trouble shooting problems. This was also a common challenge cited by IPs in Tanzania and Jordan, who noted that hardware issues often disrupted the learning process and they would like the capacity to fix hardware issues on site rather than needing to send hardware for repair to UNHCR or Vodafone Foundation.

"Training people how to use Kolibri is easy and straightforward. Troubleshooting the hardware is more difficult because you need a problem-solving methodology." – A Vodafone Foundation staff member

In terms of software, stakeholders mentioned the need to improve basic digital literacy of other common software. A UNHCR Connected Education team member emphasized the need for digital literacy training on Microsoft Office programs to give users more confidence utilizing basic ICT software programs, but Learning Equality staff noted that Microsoft Office is not always available for use so training on Open Office could similarly help to build further digital literacy skills.

Stakeholders also requested for more training on how to use Kolibri Studio. In Jordan, an IP noted they have not received a dedicated training on Kolibri Studio, but that they need additional training on how to create channels. Learning Equality developed do-it-yourself training materials on how to use Kolibri Studio which could be leveraged in the program. As noted earlier, if coaches and IPs are given access to Kolibri Studio in Kenya, Uganda and Jordan, additional training will be required to ensure local stakeholders can successfully use it to appropriate content in a manner that supports the centralized content management and alignment process. Given connectivity challenges, it may be difficult to provide access to Kolibri Studio to teachers and thus, it may be more effective to improve the functionality in Kolibri for local content importing to suit the program's offline-first model.

Several stakeholders noted that refresher trainings built into the Kolibri training model using a combination of in-person and virtual methods can provide continuous support to IP staff, coaches and educators.

Implementing partners, coaches and teachers in every country requested for more frequent refresher training. Most stakeholders requested for training every term (every 3-4 months), while some requested for it at least once per year. They noted that using Kolibri well requires practice, and additional refresher training is one way to increase practice. One stakeholder in Uganda pointed out how practice helps make teachers more adept at navigating Kolibri and finding appropriate content. Stakeholders also emphasized that since Kolibri's software is frequently updated with new and improved functionalities, they want refresher trainings so they can stay current on the software updates. Learning Equality hosts refresher trainings periodically, such as the recent trainings in Kenya and Tanzania to introduce stakeholders to the new release of Kolibri happening in December 2021.

In addition, since some Kolibri FLY programs leverage refugee coaches and teachers who are only semi-permanent at schools, Kenyan stakeholders pointed out their high turnover rate as a key reason for needing frequent refresher trainings. These frequent trainings are important to ensure that there are a sufficient number of people trained to use Kolibri at any given time.

"In refugee schools we have a number of teachers looking for better opportunities, which creates a knowledge gap when they leave. As such, we need continuous training of teachers to minimize these disruptions." – A coach in Kenya

Prior to COVID-19, stakeholders in Jordan experienced success with frequent refresher training. A Learning Equality consultant in Jordan conducted follow-on site visits every 2-3 months to build on users' Kolibri skills after the initial training and also to address any challenges they were facing. An IP mentioned that in-person trainings held every year were helpful before COVID-19 and since then trainings have been conducted virtually instead to keep the momentum going.

"There should be opportunities for frequent refreshers in the form of face-to-face training to allow trainees the opportunity to ask questions and share best practices to learn more effectively." – A UNHCR staff member in Uganda

Although stakeholders prefer in-person training, there is scope to incorporate virtual refresher trainings to optimize resources and expand reach. In-person training can be advantageous for collaboration, knowledge exchange, and engagement, but virtual training sessions can also achieve this goal. In Tanzania the IP suggested that new recruits can also be onboarded using an online training model. Similarly, in Uganda, an IP asked for up-to-date training manuals for teachers so they can keep up independently with changes to Kolibri's features.

Evidence of building sustained communication channels between Kolibri FLY partners demonstrates promise and can ensure on-going support is provided to educators and coaches, and that cross-context experience sharing can happen.

The Kolibri FLY program laid the groundwork for creating supportive communication channels to ensure that stakeholders are well-supported and equipped to implement the program. Evidence of this was seen in Kenya where frequent interactions between Learning Equality, UNHCR Connected Education, UNHCR's Kakuma team, coaches and occasionally Vodafone Foundation were integral in empowering the coaches so that they felt confident supporting teachers and felt pride and ownership of Kolibri. This engagement was the most involved programmatic approach for Learning Equality and UNHCR, but it has yielded excellent results in terms of coaches' capacity and their ability to sustain the program in Kakuma.

"Every end of the month, we have a discussion between coaches, the UNHCR Kakuma office staff, Learning Equality and UNHCR Connected

Education to share challenges, successes, and new features." – A UNHCR staff member in Kakuma, Kenya

Inter-country exchange trips were also a strength of the program before COVID-19 disruptions because they allowed coaches and trainers to share their experiences and provide guidance to Kolibri FLY programs in other countries. Kenyan coaches facilitated teacher training in Uganda, based on their extensive knowledge of Kolibri. They also gave remote feedback to stakeholders in Tanzania. SESEMAT teacher trainers from Uganda supported Learning Equality and UNHCR on training in Tanzania, based on their recent experience being trained and training others in Uganda. Some Kenyan coaches also had the opportunity to go to San Francisco for a "hack-a-thon" related to the project focused on automating the process of curriculum alignment, which they spoke highly about because they valued the ability to share their experiences working with Kolibri.

"One time we had the SESEMAT trainers from Uganda come to do a workshop and it was really great because the teachers and coaches had time to question them and how they were implementing their program. It was great to be getting inspiration from teacher trainers as well as the cross-country exchange." – A manager at an IP in Tanzania

All of the coaches and trainers involved in these inter-country experiences emphasized how important it was to travel to other contexts to share their expertise with other Kolibri users. IPs who benefitted from these exchanges also echoed this, explaining how motivating it was for them to be trained by coaches or trainers who were successfully implementing Kolibri in another context. Further, Kenyan coaches requested that there be a frequent regional meet-up between the Kenyan, Tanzanian and Ugandan Kolibri coaches and teachers so that they can learn from Kolibri users in other countries. They noted that it would be important to include as many people as possible in these meet-ups, rather than just a few members of the teams which has been the case in the past due to a lack of funding to facilitate everyone's participation. One key consideration in these exchange trips and interactions is the funding needed to facilitate travel, which may need to be cost-shared among partners.

"We want regional meet-ups and experience sharing between the Kenya, Tanzania and Uganda teams. When you are asked to share your experience, you are sharing values. Learning from different sides will shape a better understanding of the program and also help you know how to adapt it based on others' experiences and challenges." – A coach in Kenya

Virtual meetings and exchanges are also another option to facilitate interaction and keep connections between Kolibri stakeholders within and across countries. A Learning Equality staff expressed the power that simply staying in contact with Kolibri stakeholders over

WhatsApp can have to keep motivation and commitment high. To evidence this, Learning Equality set up WhatsApp groups between Kolibri FLY partners in every country's implementation which they felt helped to facilitate the program in Kenya, Uganda and Jordan, which had less frequent scheduled meetings between partners to touch base than Kenya did. Learning Equality is also planning to make more effort to include coaches, teachers and Implementing partners in virtual sharing events and webinars so that they can connect and share their experiences.

Evidence of integrating Kolibri training within government initiatives showed how Kolibri can be mainstreamed in the national education system, as a model to explore for sustainability of the program.

In Uganda, involving SESEMAT trainers was widely considered to be a promising approach that can be replicated in other contexts. In this approach, Learning Equality trained national SESEMAT trainers and then brought some of them to train regional SESEMAT trainers who then went on to train Champion teachers and students. The SESEMAT trainers were enthusiastic about their involvement in Kolibri and they were eager to see training on Kolibri integrated into their annual training work plans. Stakeholders in Uganda felt that going forward Kolibri FLY partners in Uganda should capitalize on this enthusiasm and seek agreements with Ministry of Education stakeholders to integrate Kolibri training into SESEMAT's training calendar. Working within SESEMAT's pre-existing cascaded structure is expected by some stakeholders to be both effective and sustainable.

> *"When thinking about capacity building, it is recommended to work with the Ministry of Education to identify a particular structure or entry point for building capacity to sustain training through their own programs. The SESEMAT trainers we worked with were very interested in Kolibri and learning about the platform and how to use it."– A Learning Equality staff member in Uganda*

> *"We need to provide more support to SESEMAT so that they own the training fully. I think that if we deliberately put a fund for SESEMAT so that it is in their usual programs to monitor the usage of Kolibri, it would help with ownership and to make Kolibri part of the government system. Even schools could directly contact SESEMAT about Kolibri training." – A UNHCR staff member in Uganda*

One suggestion for how to improve this approach is to ensure that all trainers can pass their knowledge on to others. While Learning Equality trained 12 national SESEMAT trainers, due to the small scope of the Kolibri FLY program in Uganda, only 2 were selected to train the regional SESEMAT trainers, which was discouraging for those not picked to

share their skills in Kolibri with others. There was discussion that longer term integration of Kolibri into SESEMAT's existing training sessions would facilitate the opportunity for all national trainers to train on Kolibri.

2.3.2. Ecosystem Stakeholders

Sufficient opportunity for collaboration amongst stakeholders is benefited by intra-country and inter-country communication channels.

In every country, the fruitful relationships between stakeholders are a primary reason for Kolibri FLY's success. Stakeholders in every country reported a good working relationship between Learning Equality, UNHCR, IPs, and Vodafone Foundation (in Kenya and Tanzania). These partners were praised for good collaboration and the openness in their working relationships.

In Jordan, government relationships were a particular strength, thanks in large part to a strong relationship between UNHCR Jordan and the Ministry of Education. Similarly, in Uganda, emerging interest in blended learning by key government agencies and Ministry of Education departments presents an opportunity for Kolibri to embed in the education system in the future. In Kenya, where Learning Equality and UNHCR's involvement was the most frequent and greatest over time, the coaches are especially dedicated to Kolibri and the close relationship between Learning Equality, UNHCR Connected Education and UNHCR Kakuma team is a point of strength and conducive to problem troubleshooting.

> *"Learning Equality has an incredible and long-standing relationship with stakeholders in Uganda. They worked closely with partners. They were not only a technical support, but also great in working with UNHCR country offices to support their engagement with national ministry officials. This was an effective partnership that led to a lot of in-roads and pivots that were necessary." – A UNHCR Connected Education staff member*

Effective communication channels are critical to the success of Kolibri. In Tanzania, the IP requested a method for remote feedback for troubleshooting hardware issues. Staff expressed their hope for Vodafone Foundation and UNHCR Connected Education to remotely see and fix problems with hardware being tested, allowing issues to be addressed in an efficient manner and in turn, reducing disruptions in learning. This suggestion for remote maintenance was recognized by Vodafone Foundation, and have since included it in their roadmap for future versions of Kolibri with the new server kits for Instant Network Schools in Kenya and Tanzania. Vodafone Foundation also expressed that a better delineation of their responsibilities in Kenya and Tanzania would have helped them understand how to engage in follow-up with partners on the ground.

As the Kolibri FLY program reaches the end of its initial grant period, and donor funding for refugee education continues to reduce each year, challenges are emerging with planning for future programming and training. One member of the UNHCR team in Kakuma reported a lack of understanding about Kolibri FLY's timeline and budget, making it difficult for her office and the IP to plan and request for activity funding.

> *"Sometimes we give the IP something to implement, but they don't know how long the program is going to run and it's hard for them to budget. I even don't know what the budget of the Kolibri program is and I don't know how long it is going to run, so it's hard for me to plan for things. Orientation about these things is needed to help collaboration."*
> *— A UNHCR staff member in Kakuma, Kenya*

Learning Equality noted that more collaboration between country implementations could yield beneficial results. Although it was positive that each country program was capable of creating their own technical plan, sharing experiences and ideas between IPs could be a method for strengthening programming in the future.

Kolibri FLY partners built strong relationships with a variety of stakeholders who were supporting the program, but the program can further benefit from establishing partnerships with more civil society and private sector stakeholders, as well as stronger relationships with government.

Learning Equality was appreciated for their ability to forge strong relationships with partners. This strength can be utilized to create additional partnerships with civil society organizations and the private sector, a gap that was revealed by stakeholders. Stakeholders also recommended creating relationships with other civil society partners who work in education and digital learning. Specifically, one UNHCR Connected Education team member mentioned that UNHCR can improve in terms of how they engage with similar digital learning programs, including strengthening the linkages between Kolibri FLY and UNHCR and Vodafone's Instant Network Schools program. This might also help to both expand the use of Kolibri as well as provide recurrent funding for implementation. Further, leveraging additional private sector partners who can contribute to hardware and Internet connectivity was also highlighted as an important goal going forward. This is especially vital because hardware in terms of number of devices and Kolibri servers were key challenges across all implementation countries.

> *"It is important to leverage partners like Vodafone Foundation that have a digital footprint in the country because there are zero-rated*

Internet connection possibilities." – A UNHCR staff member in Kakuma, Kenya

Stakeholders recommended that Kolibri programs should engage with the government to position Kolibri as a valuable digital learning tool which can be beneficial to a country's national education system. For example, some respondents felt that the development of a national strategy for digital and inclusive education in Uganda and Jordan has the potential to benefit Kolibri FLY programming. Stakeholders suggested that Kolibri FLY partners should engage with the government to encourage Kolibri to be recognized as an important digital education solution that can complement the national digital education strategy. In Uganda, stakeholders also recommended creating strong relationships with district local governments in addition to the national government as well as reaching out to the government department in charge of refugees, the Office of the Prime Minister (OPM).

"Digital education is the topic of the century, so all the attention is moving in that direction. Jordan developed a national strategic plan which clearly indicates the importance of using technology in education and so government interest is high." – A UNHCR staff member in Jordan

"Government ministries, civil society, development partners and even end users themselves need to see Kolibri as their first choice of learning application. We need to increase awareness about Kolibri to get more people on board." – A government stakeholder in Uganda

Finally, greater awareness about Kolibri and its potential to support learning is key to establishing additional partnerships. Stakeholders highlighted that when more people get to know about Kolibri, the potential for partnerships increases because everyone who engages with Kolibri can clearly see its value addition, especially when working in low-resource contexts like refugee hosting communities.

2.4. Theme 3, Implementation Process of Kolibri FLY

The Process theme of the research framework sought to examine stakeholders' opinions about the implementation mechanisms of Kolibri FLY, including whether the blended learning model adopted in each country's context met the needs of learners and teachers. It also sought to collect information on the feedback loops between stakeholders and if they strengthened the learning model.

The Process theme also focused on gathering information about Kolibri's infrastructure in terms of the hardware and connectivity and if they were sufficient for supporting an effective program as well as how any challenges might be mitigated in the future.

Results showed that the offline-first nature of Kolibri's blended learning model was especially appreciated as a valuable and unique EdTech tool. To strengthen the delivery model, Kolibri FLY programming could benefit from a more standardized, formal feedback system that incorporates feedback from all stakeholders so that Kolibri FLY partners can improve on the continual reiteration of the learning model. In terms of infrastructure, Kolibri is adaptable and flexible in terms of the hardware models that can be used to run it, which is important in contexts with limited access to new technology. Stakeholders across countries emphasized that ensuring sufficient hardware was integral to a successful Kolibri FLY program and that further efforts should be made to reduce the student-to-tablet ratios. Some stakeholders expressed hope that Kolibri could someday be used on personal devices to maximize use, though this was noted as a potential safety risk for a program that is otherwise physically safe for students.

2.4.1. Blended Learning Model

The blended learning model was regarded as effective in all country contexts by all stakeholders and helped lessen the digital divide that affects the most underserved learners, though students with physical disabilities sometimes face barriers to access.

The offline design and access model of Kolibri was highly appreciated by stakeholders across countries. In Kenya and Tanzania, stakeholders mentioned that the ability to work offline is invaluable due to the poor internet connectivity in the camps. Kenyan coaches feel that Kolibri's offline nature is also a unique selling point to get other partners involved.

> *"I believe in the differentiated approach. This model allows learners to learn at their own pace and get feedback on specific areas of weaknesses without hindering the classroom harmony. It is extremely*

> *smart and this is how we should be transforming the education system overall." – A Learning Equality staff member*

Underserved groups have specifically benefited from Kolibri FLY's approach to blended learning. In Uganda, IPs explained that Kolibri has helped encourage girls to keep learning during school closures whereas they would normally have been expected to stay home and do all the housework. One IP in Uganda also explained that the belief in rural and refugee areas is that students in urban areas are continuing to learn during school closures while they do not have the same opportunities. Therefore, being able to use Kolibri to learn has created hope that refugees and rural students also have the opportunity to continue learning.

A few stakeholders reported that some students with physical disabilities face difficulty traveling to the learning centers where Kolibri is being implemented in, often leaving them out of the program. Kolibri is largely used in common meeting spaces like learning centers, schools and community centers where students with physical disabilities are not always able to reach easily. In Uganda, some learners with physical disabilities need to travel up to 10 kilometers from host communities to the common learning spaces in the refugee settlements and back to use Kolibri, which is not feasible for most, causing them to opt out of participating in the program. Distance issues also exist within settlements, and students with physical disabilities who live inside the settlements also face challenges traveling to the learning centers. Socio-economic impediments further marginalize students with physical disabilities as most do not have sufficient access to smart devices at home to use Kolibri. Special consideration for how these learners can use Kolibri could be further explored by Kolibri FLY partners to ensure inclusion and participation of students with disabilities.

Kolibri FLY programs would benefit from a more streamlined, standardized, formal feedback system that includes all stakeholders and consolidates feedback about how to continually improve teaching and learning with Kolibri.

Feedback between stakeholders is important for adapting and improving the Kolibri learning model within a unique context and unique Kolibri FLY program. While monitoring and assessment is conducted on a monthly basis within some IPs, it is not Kolibri-specific. Each country reported slightly different experiences with gathering and reporting feedback to Kolibri FLY partners, with primarily informal feedback mechanisms between stakeholders, indicating that Kolibri FLY programming could benefit from a more standardized approach to feedback collection and actioning.

> *"The monthly feedback routine is something that is really helpful. UNHCR Connected Education and Learning Equality were prompt with*

my requests and they would always come back to me on time." – A UNHCR staff member in Kakuma, Kenya

Feedback mechanisms in Tanzania and Jordan were largely not formalized and partners noted they would benefit from more formal feedback tools and procedures in order to strengthen the delivery model moving forward. In Tanzania, coaches work closely with teachers to gather feedback, but according to the IP there is no well-constructed method for teachers and coaches to pass along this feedback. There is also only informal feedback sharing internally between IP field staff on the ground and the staff at their headquarters. In Jordan, stakeholders reported that feedback between IPs and other partners is ad hoc.

In Uganda, feedback mechanisms were not structured but were helpful in adapting the learning model. Teachers would engage frequently with students to gather feedback from them and write recommendations to the IP about what can improve. This was beneficial in identifying that students wanted teachers to help them use Kolibri rather than purely using it for self-directed learning. This type of feedback loop is indispensable for ensuring that the blended learning model is working optimally for students. Kenya likely has the most well-organized feedback procedures whereby coaches, the UNHCR team and Learning Equality meet monthly to discuss challenges and solutions. Coaches also talk daily and report weekly to the UNHCR team in Kakuma and their progress and challenges are recorded in a Google Spreadsheet.

"I talk with coaches on a daily basis and we have a WhatsApp platform if there is something that needs to be solved immediately. We have weekly reports for how many students we have reached and challenges they have faced. I go through their reports and figure out how to solve problems. I have a Google Spreadsheet for keeping track of the coaches' progress. The sheet also helps coaches see each other's progress on the number of learners reached". – A UNHCR staff member in Kakuma, Kenya

2.4.2. Infrastructure

Kolibri FLY programming is flexible for varied hardware and hardware models, but having sufficient hardware strengthens its delivery and sustainability.

A cross-cutting theme across all countries was a limited number of devices (e.g., laptops and tablets) for students to use with Kolibri, and stakeholders were concerned about how this limited students' contact time with the platform. Although sharing tablets can assist in peer learning, the ratio of student-to-tablet still likely needs to be reduced to facilitate it effectively. Many respondents expressed concern about how a Kolibri program will continue to function well when schools reopen and student enrollment dramatically increases, putting further stress on the existing tablets or further limiting students' contact time. In Uganda, Kenya and Tanzania, stakeholders described how scheduled shifts for accessing Kolibri maximized the use of the tablets but meant that students and teachers could not utilize Kolibri as frequently as desired. Physical space constraints were also identified as limiting. For example, in Kenyan host community schools, Kolibri is loaded on the schools' computers in the computer lab so when a computer lesson is ongoing, the students using Kolibri must vacate the computer lab to make way for the students taking an examinable subject. In Uganda, stakeholders also highlighted how sharing tablets for Kolibri was challenging due to the social dynamics between different refugee nationalities.

> *"There are only 40 tablets in a school, but 900 students. We have been conducting Kolibri in shifts, but we need to increase the number of tablets so everyone can have access to it." – A teacher in Uganda*

Stakeholders in Kenya, Uganda and Tanzania expressed a need to reduce the student-to-tablet ratio, but a UNHCR staff in Jordan recognized that one tablet per child is unrealistic, although it would be preferable. Considering that Kolibri's success is largely dependent on students' access to the platform, stakeholders recommended that focusing on increasing the number of tablets so that a few entire classrooms within a school can use it at the same time should be a priority among Kolibri partners going forward. Key considerations here are whether to equip fewer classrooms with more equipment, or whether to spread equipment thinly across more locations, to reach more underserved learners with Kolibri, even if it means limited contact time. A UNHCR Connected Education staff noted that funding limitations and sustainability implications for providing more equipment also raises questions about how to approach better equipping classrooms implementing Kolibri FLY. In addition, global shortages caused by the COVID-19 pandemic have affected the supply chain for some hardware. This, coupled with an often-lengthy procurement time, pose further challenges to providing more tablets to increase students' contact time with Kolibri.

"We can dream of providing learners with enough devices. Right now there is only one smartphone for many brothers and sisters, so we would ideally provide students with devices and Internet bundles, but this is too far from reality." – A UNHCR staff member in Jordan

Stakeholders also cited limited server capacity on the servers tested in Kenya and Tanzania for the project as an area of improvement. They reported that the responsiveness of Kolibri on the server decreases dramatically when more tablets are connected and the server becomes overloaded. This is a function of the server itself as Kolibri can support a number of concurrent users. Positively, Vodafone Foundation reported that they are working on a server upgrade which can handle significantly more simultaneous connections and that it will be rolled out to Tanzanian and Kenyan sites soon.

Further, all implementation countries noted the added advantages for content to be added to Kolibri without the Internet. Based on this feedback, the Kolibri roadmap includes the ability to import content locally without the Internet, as well as create assessments offline. Stakeholders also noted that an Internet connection in schools and learning centers could enable the possibility for teachers to use the Kolibri Studio tool to create new channels for use in Kolibri. However, the challenge remains that many locations where Kolibri is used are in settings where no Internet connectivity exists from national telecom companies and Internet via satellite is largely cost-prohibitive. Stakeholders noted that, where possible, Kolibri can work with partners who have a digital footprint in the country so that zero-rated connectivity options are possible where network does exist because Internet connectivity would be an added benefit to the program. Otherwise, the offline functionality of Kolibri still presents consistency and cost savings for content frequently accessed on the Kolibri Learning Platform.

UNHCR and UNICEF stakeholders in Uganda reported how the difficulty of procuring hardware via UN channels slowed the process of importing tablets for use in their Kolibri FLY program. They suggested that using non-UN channels in future procurement can lead to efficiency gains, or alternatively using UN channels to receive in-kind donations of hardware (similar to the way hardware for the INS program were procured) as this allows for faster delivery and fewer challenges with importation. Alternatively, a Learning Equality staff member noted that purchasing new hardware is not always required and that Kolibri can work within existing infrastructure. This was demonstrated in how the Kolibri program shared the INS tablets in Kenya and Tanzania with only the need for a stand-alone Kolibri server. In Uganda, the program used older secondary school computer labs, showing that Kolibri is an adaptable program with multiple avenues for implementation depending on the available resources.

The engagement of the National Information Technology Authority Uganda (NITA-U) demonstrates how collaborations with government agencies responsible for Information Technology (IT) and Internet connectivity in a country can be beneficial. NITA-U is responsible for expanding Uganda's IT and Internet infrastructure backbone, and hosts an online version of Kolibri. Their interest in Kolibri is a good example of how Kolibri FLY

partners can combine efforts with a government agency whose existing mandate is to increase Internet access and infrastructure throughout a country.

Students do not face any safety risks accessing Kolibri in schools and learning centers, but there is a desire for students to use Kolibri on personal devices in the future. This must first be closely analyzed for any potential safety issues.

With respect to safety, there were no identified safety risks for students to use Kolibri at learning centers and schools. Since Kolibri is used in central meeting places like schools and learning centers during daytime hours, IPs largely reported that students are not at risk while using Kolibri. Stakeholders noted they would like to see students able to use Kolibri at home on personal devices either in an offline or mobile application format, but safety risks associated with carrying a device and a general lack of devices prevent this from becoming a reality at the moment.

> *"It would be nice for students to take tablets to their homes, but there are security issues with this. Maybe when it is possible then we can allow students to move with tablets to their homes." – A teacher in Uganda*

RECOMMENDATIONS

Based on the findings of the assessment, the following recommendations are made to support Kolibri FLY partners who have not yet launched Kolibri as well as those who are currently implementing Kolibri, with guidance on how to further strengthen program implementation and scale-out the program. The recommendations can be actioned by the relevant stakeholder involved in the design and implementation of the Kolibri FLY program, with the understanding that the extent to which they can action the recommendations depends on their capacity, mandate, and role in the program. While Learning Equality and UNHCR can help operationalize these recommendations, their involvement is not necessary to design, implement, or adapt a Kolibri FLY program in a successful manner. The findings from the assessment will inform the development of a rubric by Learning Equality and UNHCR to include in the Kolibri Edtech Toolkit Implementation Guide for future programming.

Recommendation 1:
Align the content available on a country's Kolibri installation to the national standards, when possible, to maximize the potential of OERs.

Aligning the OERs available on the Kolibri Content Library to a country's local curriculum is highly important for ensuring Kolibri is delivering relevant content for teaching and learning. Each context where Kolibri FLY programming is implemented is unique and time should be spent ensuring that teachers and students can easily find the OERs appropriate for their grade level and learning needs. If necessary, depending on the context and government policies, the OERs should also be aligned so that they supplement the country's national curriculum.

With this objective in mind, Kolibri FLY partners should work with relevant MoE bodies and potentially with the support of curriculum consultants or relevant NGOs to align OERs to the national curriculum. If feasible, this process can be repeated as new OERs become available for inclusion. Various Kolibri FLY partners, especially local partners, can identify learning resources, both OERs and locally created content, that are relevant for use in the country.

In addition, Kolibri FLY Partners should aim to engage with national curricular bodies from the start to communicate how OERs on Kolibri can be used as supplemental, blended learning resources which can complement traditional classroom learning. This contact can also better facilitate any required content approvals so Kolibri's use is in compliance with national requirements.

Recommendation 2:
Scope and support local content creation, particularly in the areas of the humanities, languages, and life skills.

Content that is locally created and locally relevant, particularly in subjects that are highly contextual like humanities, life skills, and languages should be prioritized for inclusion on a country's local installation of Kolibri. To achieve this, Kolibri FLY partners can consider creating partnerships with local organizations to expand what is available on their Kolibri Learning Platform. This can help ensure learner and teacher interest for retention and long-term sustainability. It will be important to ensure that the aligned and locally developed content can be made available (e.g. ensuring periodic internet connectivity at a centralized location (e.g., main office) to import to Kolibri Studio, and once local content import is made available, provide sufficient training and support to teachers to be active stakeholders in this process. Having the ability to import their own content, including formative assessments, for use in Kolibri can help teachers alleviate some of the issues around limited OER content and OER content that is not contextualized for local students. This can be achieved by giving teachers and/or coaches access to Kolibri Studio, where connectivity allows, or another offline mechanism for content importation.

Further, it will be important to balance the autonomy of coaches/teachers importing their content with a country's policies for content approval for use in formal settings. For example, in countries where the oversight of education for refugees falls under the national Ministry of Education, giving teachers the capability to import their own content can potentially create problems with the national curricular bodies that are centrally responsible for reviewing and approving the content available on Kolibri. Finally, considerations about best use of time should also be discussed. In some instances, teachers may want to import their own content while in others this may be a tedious task for them that could be better centralized as a coach's or IP staff's responsibility.

Scoping and supporting local content creation requires highly specialized skills and significant financial investment. This could be considered as part of the funding needed to implement a Kolibri FLY program, if possible, especially in contexts where OERs cannot be adequately aligned to the national curriculum or national language. In addition, investing resources in content review processes so that new, locally developed content is reviewed and approved by national curricular bodies can be integrated into future Kolibri programming to increase the local content available on a country's Kolibri installation, if financial resources exist.

Recommendation 3:
Build capacity through an initial cascade approach of ToT, incorporate refresher training into the program design and co-design training agendas with IPs and coaches where possible to promote local ownership.

The Training of Trainers (ToT) model is effective, appreciated by Kolibri FLY partners and key for the sustainability of a Kolibri FLY program because it builds a critical mass of people who are trained to use Kolibri. Kolibri FLY partners should strive to ensure that ToT activities are practical and hands-on, with an emphasis on practicing with the Kolibri platform rather than theoretical knowledge-sharing. As such, an adequate number of devices should also be made available at training activities to ensure that participants get enough contact time with Kolibri. This is vital for ensuring training participants are able to pass their knowledge on to coaches/teachers/students. Kolibri FLY partners should strive to engage with stakeholders who have expertise in training and those who can add value in terms of their technical expertise during training.

The training schedule should first be shared with the coaches to make sure that the training will serve the right purposes and create ownership. Kolibri FLY partners can explore adopting a virtual approach to onboarding, especially if COVID-19 continues to disrupt in-person training.

Frequent refresher training for coaches, teachers and IPs should be a shared responsibility between Kolibri FLY partners to update end-users on Kolibri software updates, improve their digital and soft skills, and increase their hardware troubleshooting abilities. Regular refresher training can also be one solution to help rectify any challenges teachers may face using the Kolibri Learning Platform or Kolibri Studio (if applicable). Refresher training will also help build relationships between Kolibri FLY partners and local users, keeping coaches and teachers engaged and inspired to use Kolibri to teach. However, it will be important to be cognizant that taking teachers away from instruction can place additional burden on them, and as such, designing refresher trainings in a cascade approach can address this issue, especially if the trainings are integrated with other professional development sessions after the initial training. Key considerations in terms of training that Kolibri FLY partners should budget for include a training budget, venue (if in-person) and connectivity requirements (especially for virtual training).

Recommendation 4:
Build communication channels and sharing opportunities between Kolibri FLY partners within and across country implementations to support ongoing peer support and mentoring of educators and coaches.

Kolibri FLY partners should work together to ensure that IPs, coaches and teachers are well-supported within a country context. Strategies for this include creating active communication channels like WhatsApp groups and regular, virtual check-in partner meetings. Encouraging peer support between coaches and teachers should also be prioritized as it is critical to knowledge sharing and empowerment.

Cross-country learning and sharing experiences can also facilitate interaction and inspiration. Facilitating physical or virtual meet-ups between stakeholders in different implementation countries is an important motivator and opportunity for stakeholders to share experiences and advice. If COVID-19 precludes international travel between sites or exchange trips are cost-prohibitive, virtual interactions like virtual sharing events and webinars can also be valuable for connecting Kolibri users across implementation sites.

Recommendation 5:
Invest in programming to expand accessibility of digital learning initiatives to learners with disabilities.

Students with disabilities can feel excluded from using Kolibri because of the physical barriers for them to attend a learning center/school or because of content accessibility issues. To address this, Kolibri FLY partners can work together to add closed captioning to videos that do not already have them (for students with hearing disabilities) and add additional audio files like podcasts and video files with sound (for students with visual disabilities). Kolibri FLY partners can further explore how to accommodate students with physical disabilities who are limited in terms of their ability to travel to learning centers and schools for communal Kolibri use. This may require additional funding for the provision of tablets for at-home use for these learners, if this is deemed safe for the students and their families.

Recommendation 6:
Engage governments to design and deliver the program from the start.

Kolibri FLY partners should endeavor to foster government partnerships to institutionalize Kolibri into government structures, in countries where possible and appropriate. This may include building strong relationships with the Ministry of Education, national curricular bodies, existing teacher training structures, national IT authorities and government agencies in charge of refugee welfare. This can be done by establishing effective communication channels between Kolibri FLY partners and the relevant government body, either through setting up meetings with key decision makers and/or by establishing a technical steering committee to inform them of the project design, implementation modality, needs, and timeline of the project. Approaching government early on in a Kolibri FLY implementation can help set the stage for future partnerships and can also help determine whether Kolibri has the potential to be mainstreamed into the national education system.

Recommendation 7:
Scope what is available in terms of infrastructure, hardware and content in an effort to determine how existing and new partners can help fill gaps.

When building a Kolibri FLY partner coalition, Kolibri FLY partners should consider how different civil society and private sector organizations can strengthen their effective implementation. Building a strong coalition of partners from different sectors can help each partner contribute through their comparative advantage. Working with the right partners who have fewer barriers to procuring hardware devices through local and international channels can also strengthen Kolibri FLY programming. In addition, because local content is also vital for ensuring students have access to contextualized content in the humanities, languages and life skills, gaps in local content should be scoped and partnerships with local content developers should be considered early on.

Recommendation 8:
Consider embedding within existing programs for sustaining hardware or, when sourcing new hardware, consider the maintenance and technical knowledge required.

Kolibri FLY partners should analyze the existing programs in the implementation country to determine other organizations or programs engaging in EdTech programs that may have existing hardware which Kolibri FLY can leverage. This also may include using hardware already available in government schools and learning institutions. This can reduce costs and create vital linkages between entities working towards similar goals. Where it is not possible to cross-utilize existing hardware and new procurement is necessary, Kolibri FLY partners should consider what maintenance and technical knowledge will be required to sustain it. Ideally, hardware will be procured in-country in order to make maintenance and procurement of spare parts easier.

CONCLUSION

The Kolibri FLY program has demonstrated success in providing learners in low-resource contexts in Jordan, Uganda, Tanzania, and Kenya with access to aligned and engaging digital content and tools that support effective implementation of the program. As educational leaders embark on establishing, scaling-up, or scaling-out Kolibri FLY in their respective countries, it will be important to ensure that leaders, teachers, and the wider beneficiary community is engaged in the design and implementation of the program to maintain local ownership of the learning experience of Kolibri, and safeguard its sustainability for long-term impact. Doing so can support Kolibri to better respond to the needs of learners and teachers amidst the protracted COVID-19 pandemic, and build resilient and adaptive in-school/at-home hybrid learning models for future learning and teaching methods.

APPENDIX 1: METHODOLOGY OF THE ASSESSMENT

The assessment was divided into three phases. The first phase focused on conducting a literature review and analyzing the existing Kolibri FLY documentation material to refine the research scope and questions. The second phase focused on data collection and synthesis, where OpenDevEd conducted semi-structured, qualitative interviews and focus group discussions with key stakeholders to analyze the strengths and areas of development for the program. The third phase entailed consolidating the findings into an assessment report, and developing a rubric to support implementing organizations to assess the enabling environment for the launch and scaling up/out of Kolibri FLY in their respective countries.

Data Collection: Primary Data Collection Overview

The assessment relied on primary, qualitative insights derived from Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs). The KIIs and FGDs were guided by a semi-structured interview tool, which included questions related to each of the three assessment framework parameters (People, Product, Process). The semi-structured Interviews allowed the researchers to tailor the questions to the area of operation or expertise of each stakeholder, so that each person could speak about the areas of the Kolibri FLY program that they were most involved in.

Each KII and FGD took approximately one hour and was conducted online via Zoom, Microsoft Teams or Google Meet, due to travel restrictions and COVID-19 safety measures, which precluded in-person data collection. KIIs and FGDs were conducted between mid-October and early November 2021.

Stakeholders engaged for the assessment were jointly identified by OpenDevEd, with Learning Equality and UNHCR's guidance, and represented the following:

- Learning Equality staff and consultants involved in Kolibri FLY;

- UNHCR Connected Education team and country office staff and consultants involved in Kolibri FLY;

- Implementing partners delivering Kolibri FLY in each country (including IP staff/coaches/educators delivering the program);

- Government partners, particularly those involved in curriculum alignment, connectivity and training;

- Other development partners including UNICEF

- Private sector partners including Vodafone Foundation

Learning Equality and UNHCR provided OpenDevEd with a list of 61 stakeholders involved in the Kolibri FLY program in different countries, prioritized by their level of engagement with the program. Throughout the assessment, 27 KIIs and seven FGDs with 70 participants across the four implementing countries were conducted. The interviews were conducted by researchers located in Jordan and Uganda who are familiar with the local context in these specific countries. Table 1 and Table 2 summarize the number of completed interviews by stakeholder type and stakeholder country of expertise/operation.

Table 1. Kolibri FLY Assessment Final Sample by Stakeholder Type

Stakeholder Type	Number of Interviewees
Learning Equality Staff and Consultants	9
UNHCR Staff and Consultants	9
Government Partners	4
Implementing Partners, including IP Staff, Coaches, Educators and Teachers	44
Other Development Partners	4
Total	70

Table 2. Kolibri FLY Assessment Final Sample by Country

Country of Expertise/Operation	Number of Interviewees
Jordan	33
Uganda	12
Kenya	10
Tanzania	3
Cross-Cutting (headquarters)	12
Total	70

Primary Data Analysis

OpenDevEd followed three stages of data analysis for the interviews and FGDs:

1. Data preparation: Interviews and FGDs were recorded with participants' consent where possible. During the interview, the OpenDevEd team took detailed notes, including verbatim quotes. Interview notes were anonymized and cataloged according to stakeholder type and country.
2. Initial exploration of the data: Interview notes were reviewed and emerging insights were identified according to each framework theme.

3. Coding and analysis of the data: Qualitative responses from interviews and FGDs were coded according to a coding framework and data was synthesized into themes and recommendations for each of the assessment framework's themes.

While it would have been ideal to conduct in-person interviews, the COVID-19 pandemic and accompanying safety measures and travel restrictions imposed by governments on activities that require face-to-face meetings meant that KIIs/FGDs had to be conducted remotely. While this was not a significant challenge that prevented data collection from taking place, it potentially limited the depth of insights captured because building trust and rapport virtually is more difficult than in face-to-face interactions.