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Developing a Proof of Concept for a Regional Learning Hub for Eastern and Southern Africa

Part 5: Final report

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Authors Caspar Groeneveld
Guillaume Michels
Tom Kaye

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Notes

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Contents

Abbreviations and acronyms

ESARO	UNICEF Eastern and Southern Africa Regional Office
INEE	Inter-agency Network for Education in Emergencies
LMS	Learning Management System
MVP	Minimum viable product
NGO	Non-governmental organisation
OER	Open Educational Resources
RLH	Regional Learning Hub

Executive summary

In 2021, the UNICEF Eastern and Southern Africa Regional Office (ESARO), UNESCO Regional Office for Eastern Africa, UNHCR, the Inter-agency Network for Education in Emergencies (INEE), and EdTech Hub came together to collaborate and develop a proof of concept of a Regional Learning Hub (RLH). This RLH is being created to make remedial, catch-up, accelerated, lifewide, and lifelong education and learning resources accessible and ready to deploy by governments across eastern and southern Africa and potentially other regions at a later stage.

The aim of the Regional Learning Hub (RLH) is to try to solve one particular problem in the process of implementing digital or remote learning solutions for governments in sub-Saharan Africa and other regions: the provision of enough content that is aligned with the curricula and appropriate to local contexts. The RLH is envisaged as a platform where digital learning content has been pre-aligned with national curricula to enable use by governments and education stakeholders to facilitate quick selection of content for educational use within their regions. The need for this platform gained urgency during the Covid-19 pandemic, requiring governments around the region to quickly shift to remote education but without the means to do so.

In this final report, we summarise the process that led to the minimal viable product (MVP) of the RLH and then present the main conclusions, dilemmas, and recommendations that emerged during the process and which are intended to inform and shape effective and viable next steps. This report contains links to detailed reports of the different stages that form the foundation and justification of the presented conclusions.

Stages of the development process

The proof of concept of the RLH was developed in several stages.

- The **inception phase** defined the problem, set the scope, and articulated expectations for the proof of concept. It included timelines and roles and responsibilities for the process.
- **User research** tested assumptions on the need for an RLH and the likelihood of adoption of an RLH.
- The **skills taxonomy** identified overlapping skills or curriculum standards and identified what content was needed.

- During the **content curation** process, content was sourced to match relevant skills and for different modalities (TV, radio, feature phone, or digital platforms) and purposes.
- The **publication** process published the RLH as an MVP on UNICEF's Learning Passport platform[1] and as a database in AirTable.[2]

Recommendations

The recommendations below are meant to inform next steps and to ensure that subsequent stages in the development of the RLH will work towards a product that serves a need and that is likely to be adopted.

1. Involve governments where appropriate

Representatives of the four governments emphasised that they should be involved in the design of an RLH. Few governments, however, currently have processes in place that allow for rapid curation of content. There are other ways governments can co-design the RLH, for example by incrementally developing the MVP into a full product.

2. Provide subtopic-aligned, rather than skill-aligned content

During the making of the proof of concept, we tried to curate and align content with the curricula. However, we found that exact alignment with curricula requires expertise that only government experts possess. What is more, some governments appeared to be averse to the idea that other bodies might work on aligning content with their curricula, since curriculum-alignment is their remit. Offering subtopic-aligned content instead of skill-aligned content will be a less granular offering. This would allow governments to quickly find, assess, and select appropriate content but would still leave the final step — exact alignment with individual skills — to governments. This approach respects government remits, would require considerably less effort, and would mean that building and maintaining an RLH is more likely to be sustainable.

3. Manage expectations and usage scenarios

The ambition, scope, and limitations of the RLH were not always clear to governments, and governmental agencies sometimes conflate the concepts of curated content and commissioned content.

[1] Resource available at hub.learningpassport.org
[2] Resource available at airtable.com/appib9azfpGYOwcde/tblpGOaG1XXh5v14a/viwbPgBLnaSkDxQIz?blocks=hide

4. Find more content or create capacity to build it

There is a lack of content for early years and for modalities other than digital. There are several possible approaches to filling gaps in content, for example, by making an effort to find existing but unpublished content; collaborating with content providers; building capacity to create and curate content within countries; purchasing and white branding content; or having donors create openly licensed content.

5. Create and foster a culture of open licensing

Much of the content that has been created is proprietary or has licences that do not allow use of that content through interventions that require any form of payment. There are good examples of policies that require any content that is paid through public means to be in the public domain or openly licensed.

6. Work with countries that have expressed a need

Some country representatives observed that their country already had a sufficient amount of content available, while others remarked that remote content does not serve a purpose owing to a lack of infrastructure. Collaborating with countries that have expressed a need for an RLH may be an effective approach.

7. Plan for the RLH to be sustainable

Having target governments collectively own the RLH does not appear to be a viable option. For the RLH to be sustainable, it should not be seen as a temporary project, but as a long-term service provision where one partner or consortium assumes ownership and takes responsibility for budgets for maintenance.

1. Introduction

The UNICEF Eastern and Southern Africa Regional Office (ESARO), UNESCO Regional Office for Eastern Africa, UNHCR, the Inter-agency Network for Education in Emergencies (INEE) and EdTech Hub have collaborated to develop a proof of concept for a Regional Learning Hub (RLH). The RLH is being created to make remedial, catch-up, accelerated, lifewide, and lifelong education and learning resources accessible and ready to deploy by governments across Eastern and Southern Africa and potentially other regions at a later stage.

The RLH is envisaged as an online platform that will host learning resources that governments and education stakeholders can download, adapt, and deploy through their own platforms for three main purposes. These are:

1. Improved and equitable home learning (during school closures as well as once all schools have reopened) through lifewide learning.
2. Increased learning and improved retention in formal settings through catch-up and remedial programmes.
3. Enabling more learners to gain accredited skills through non-formal learning programmes, including accelerated education programmes.

The aim of the RLH is to try to solve one particular problem in the process of implementing digital or remote learning solutions for governments in sub-Saharan Africa and other regions: the provision of enough content that is aligned with the curricula and appropriate to local contexts. The RLH is envisaged as a platform where digital learning content has been pre-aligned with national curricula to enable use by governments and education stakeholders to facilitate quick selection of content for educational use within their regions. These ready-to-deploy resources could help reduce costs for ministries of education and other stakeholders in deploying content through their education systems and improve the quality of this content.

The RLH's primary target group are ministries of education, official curriculum developers, education providers, and similar stakeholders. In turn, these stakeholders can offer relevant selections of the content available on the RLH to their educational institutions, teachers, students, or other stakeholders via their own platforms, irrespective of the platform they use. In so doing, the RLH only targets learners or teachers indirectly, through other education providers.

This report is a culmination of the activities conducted during the development of the proof of concept for the RLH and details the process, learning, and observations on challenges encountered in delivering the proof

of concept. It ends with suggestions for next steps and notes the challenges and opportunities of bringing the RLH to scale. For the proof of concept, we focussed on four countries: Kenya, South Africa, South Sudan, and Somalia, and on two small content modules: 'listening comprehension for Grade 2 Literacy and on 'photosynthesis' as part of the subject of biology for Secondary Level Biology. However, the ultimate aim of the RLH is to be useful to a large variety of countries and for a wide variety of grades and subjects.

Development of the proof of concept involved five distinct activities that have all been thoroughly documented and have led to the recommendations in this report. The documents include:

1. Inception report
2. User research
3. Skills taxonomy
4. Content curation
5. Final report (this document)

2. Developing the proof of concept

The proof of concept of the RLH was developed in several stages.

- The **inception phase** defined the problem, set the scope, and articulated expectations for the proof of concept. It included timelines and roles and responsibilities for the process.
- **User research** tested assumptions on the need for an RLH and the likelihood of adoption of an RLH.
- The **skills taxonomy** identified overlapping skills or curriculum standards and identified what content was needed.
- During the **content curation** process, content was sourced to match relevant skills and for different modalities (TV, radio, feature phone, or digital platforms) and purposes.
- The **publication** process published the RLH as an MVP on UNICEF's Learning Passport platform[3] and as a database in AirTable.[4]

This section provides a short overview of and the rationale for these activities. The process and outcomes of the different activities have been described in detailed reports (mentioned above). These reports are complete and comprehensive and serve as reference points, providing details on how we identified the conclusions contained in this report.

2.1. Inception phase

The inception phase defined the problem, laid out the scope and the constraints of the proof of concept, including the content modules. It assigned roles for the different team members and collaborating organisations and set timelines. This foundation has been documented in the inception report.

The inception phase defined the problem observed in user research in summer 2020 and by the different partners, prior to the start of the proof of concept. The problem is outlined below.

- Ministries of education face difficulties in curating and offering a coherent set of context-appropriate digital learning materials that cover substantial parts of respective curricula.

[3] Resource available at hub.learningpassport.org
[4] Reource available at airtable.com/appib9azfpGYOwcde/tblpGOaG1XXh5v14a/viwbPgBLnaSkDxQIz?blocks=hide

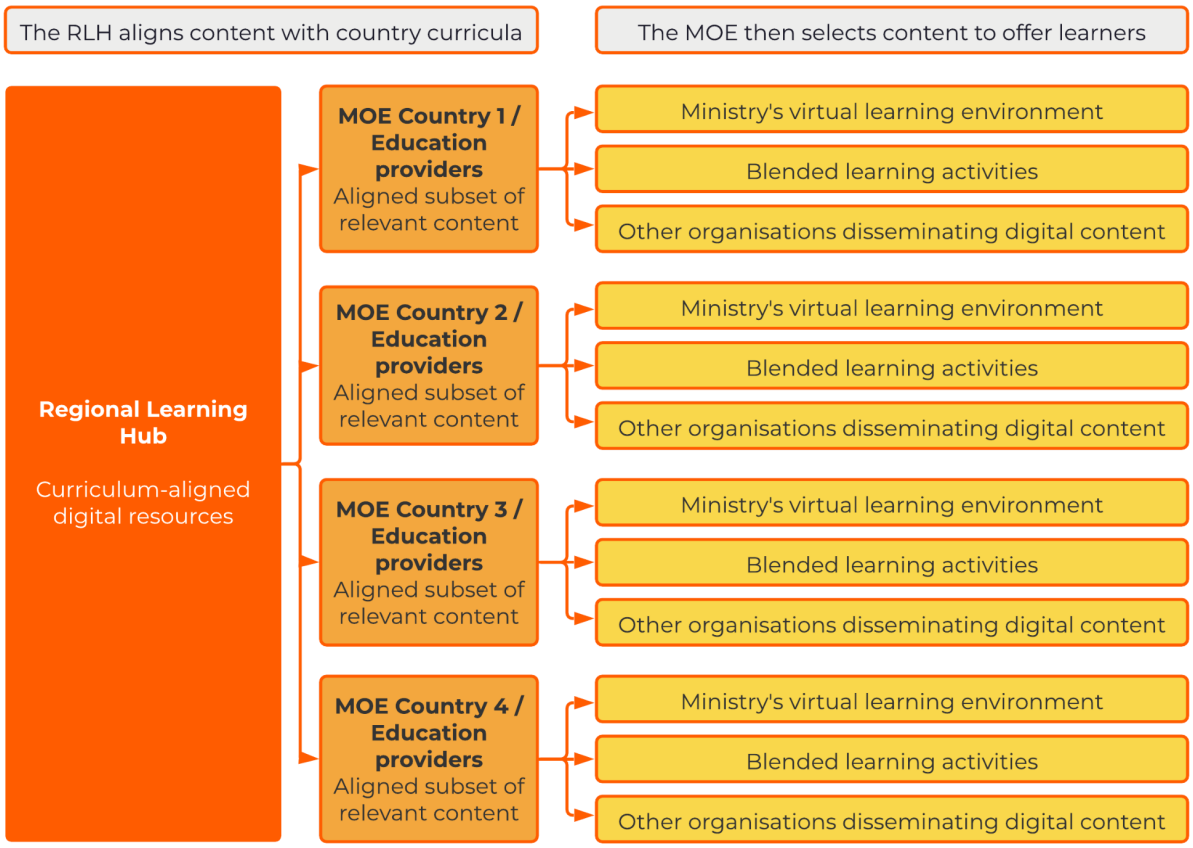
- Capacity and staff availability may be insufficient to provide large amounts of localised educational materials.
- The quality of learning resources available can be low.
- Curriculum departments can localise materials to an extent, but require training to develop digital materials.
- Some geographical areas are underserved by public educational resources.
- Organisations supplementing public services could benefit from access to higher-quality content

Further, the inception report defined the scope of the proof of concept. The purpose of the proof of concept was as follows.

1. Create an MVP of two small content modules.
2. Meticulously document the process, identify obstacles, and inform next steps.

The inception phase envisaged an approach that involved aligning content with different country curricula and offering that to different education stakeholders, most importantly, to ministries of education. The aim was to enable these stakeholders to make their final selection from this content to offer it to their audiences via their own platforms. Figure 1 shows how we envisaged the RLH.

Figure 1. *The Regional Learning Hub's target audience.*



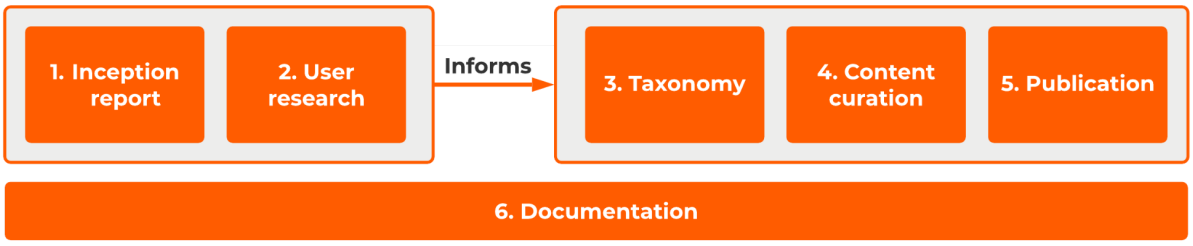
The content modules within the proof of concept were intended to be limited in scope but sufficient to provide learning to inform next steps. The two content modules intentionally targeted different levels and subjects, namely:

- Grade 2 Literacy: listening comprehension
  This content, roughly at Grade 2 level, was to contain content to help and guide listening comprehension in English, Somali, and Swahili.
- Secondary Level Biology: photosynthesis
  A science subject, photosynthesis is considered to be more universal and less context-specific than early grade literacy.

The five organisations collaborating on the proof of concept brought different expertise to the table. UNICEF managed the process, organised meetings, and liaised between the different partners. EdTech Hub undertook the technical work, with UNICEF hosting the MVP and contributing to the curation effort. UNESCO brought expertise on international curriculum frameworks. UNHCR and INEE were involved from a perspective of understanding the potential utility and value of the RLH for displaced communities and national governments.

The inception report and the user research were intended to inform the next activities, as Figure 2 shows. However, user research ran into scheduling challenges and was delayed. The next steps were started according to plan to prevent delays in the overall project.

Figure 2. *Activities in the development of the Regional Learning Hub proof of concept.*



Development of the proof of concept was to last 16 weeks, as shown in Figure 3. Content was published in December 2021, though finalisation of all documentation would not be finished until early 2022. The dearth of content discussed below, caused some delay in the project as the team members pursued different avenues to curate more content. Section 2.4 describes this process in detail.

Figure 3. *Overall timeline for the Regional Learning Hub proof of concept.*

Activities	Week number															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Sep '21				Oct '21				Nov '21					Dec '21		
	6	13	20	27	4	11	18	25	1	8	15	22	29	6	13	20
Inception report	■	■	■	■												
User research					■	■	■	■								
Skills taxonomy					■	■	■									
Content curation								■	■	■	■	■				
Publication													■	■		
Documentation	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

The inception report provided a solid base for carrying out the project. Delays to user research and content curation did not substantially affect the delivery and progress of the project.

2.2. User research

Noting the importance of gaining insight into the utility of an RLH among key stakeholders, the proof of concept included a phase of user research. Designed to build on the first user research conducted in 2020, the user research conducted as part of the proof of concept was undertaken with representatives from the four focus countries.

The first user research activity was conducted by a consultant in the summer of 2020[5] among country representatives in Botswana, Rwanda, Somalia, Zambia, and Malawi. This user research found that, in general, these countries expressed a need for an RLH. They identified the need for localised content and for content for different modalities (TV, radio, feature phones, and digital platforms) and emphasised the importance of political buy-in for an RLH.

The user research we conducted as part of the proof of concept aimed at interviewing two representatives per country, representing roughly two distinct roles: a policymaker and a technical staff member. However, it was difficult to plan meetings with the country representatives proposed by members of the steering committee, and there were several no-shows. Of eight planned interviews, six were held eventually. Table 1 below, shows the roles of the interviewees. Seven interviews were cancelled or were no-shows and had to be rescheduled. The scheduling challenges also meant that user research results were not available until content curation had already advanced and that results, while informative, may not be fully representative of the opinions of the countries' ministries of education.

[5] To see a summary of the research click **here.**

Table 1. *Roles and countries of interviewees for the user research.*

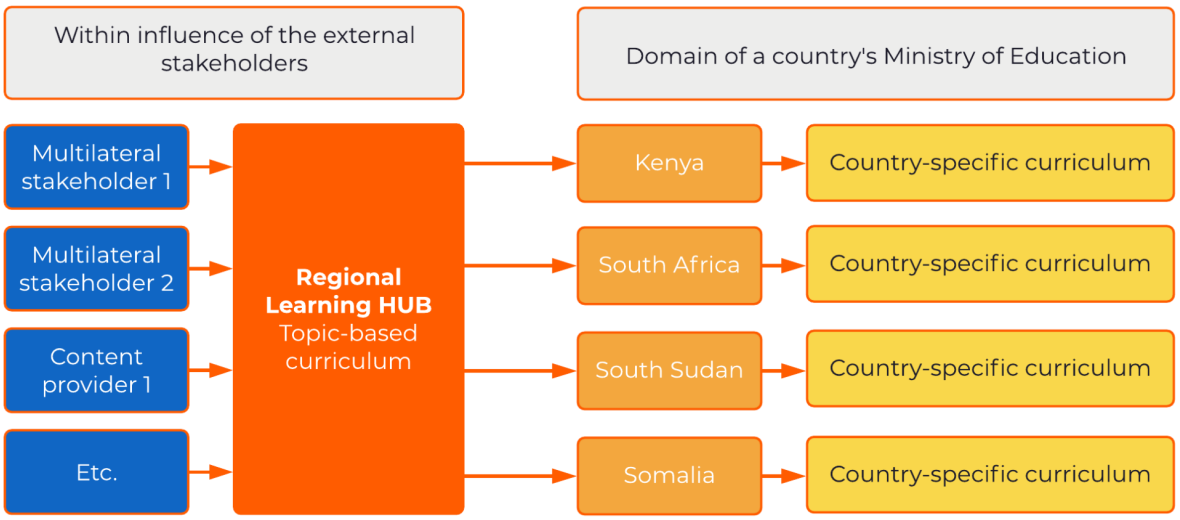
Country interviewee	Role
South Africa 1	Senior staff, Department of Basic Education
South Africa 2	Senior Advisor (consultant) with the Ministry of Education
Kenya 1	Senior staff, Ministry of Education
Somalia 1	Senior staff, Ministry of Education
South Sudan 1	Senior staff, Ministry of General Education and Instruction
South Sudan 2	Senior staff, Ministry of General Education and Instruction

The user research that formed part of the proof of concept confirmed some of the previous findings and added nuance to others. Importantly, users across all countries confirmed that political buy-in during the development of an RLH is necessary. In relation to other findings, the insights seemed to suggest that the four focus countries fit in two main groups. The representatives from the two better-resourced countries — Kenya and South Africa — indicated that there was no shortage of digital or other learning resources. It is worth pointing out that there is no consensus regarding this. For example, ↑Groeneveld et al. (2021) found that the government's Kenya Education Cloud does not contain enough content to serve the remote learning needs of its intended audience. Besides, the Kenyan government has been planning to create its own repository of Open Educational Resources (OER). Regardless, without a perceived need, there is less likelihood for adoption of the RLH by a government. The representatives from the two countries with fewer resources and digital infrastructure — South Sudan and Somalia — indicated a lack of and need for content. However, they also expressed concern that low internet penetration and a lack of access to electricity and devices meant that remote learning resources as yet have a limited audience in their countries.

All representatives emphasised the importance of building an RLH together with their ministries of education and not presenting countries with a finished

product. This may be due to a misunderstanding about what the RLH aims to achieve: the RLH is not intended to target end-users directly but to offer content to governments allowing them to select or reject and disseminate content via their own channels. Nonetheless, it was clear that governments wish to retain control over the curriculum alignment process. A close or exact alignment of content with their curricula may not be appreciated and may even be counterproductive. In contrast to the model presented in Figure 1 above, Figure 4, below, shows a model that is more likely to be acceptable to governments.

Figure 4. *Modified approach of the Regional Learning Hub, leaving exact curriculum alignment to governments.*



While the emphasis on collaborating with governments on building an RLH is in line with the Digital Principles (↑anon., no date), it poses a number of challenges. Some countries, such as South Africa, have devolved the delivery of education to the provinces, and this would mean engagement with several provincial departments. In other countries, such as Kenya, education delivery involves a wide and diverse range of government organisations. Currently, the government of Kenya is struggling to align the work of these agencies in terms of the delivery of digital content. An outside consortium, such as the working group that delivered this proof of concept, may add complexity to an already challenging situation and has little likelihood of succeeding within a reasonable timeframe, especially where a country does not express a need for more content.

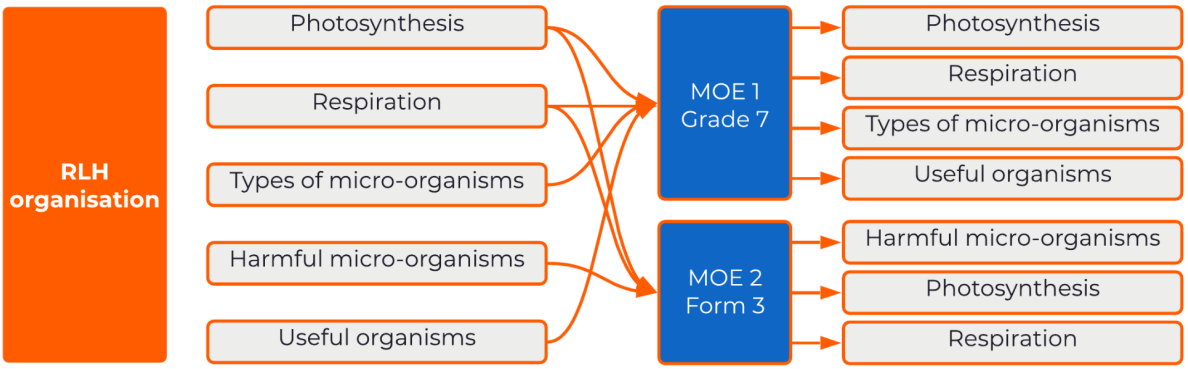
The user research results were available only once we were well into the content curation process. Fewer informants than planned were interviewed, making the results less generalisable than intended. Nonetheless, the research uncovered several dilemmas for the way forward. Not all country

representatives were receptive to an RLH, and the level of digital infrastructure in any particular country will affect the likelihood of adoption: a country with highly developed infrastructure may already have or believe that they have enough digital content on offer, and a country with a lower level of infrastructure may not have the means to disseminate digital content. Government buy-in is necessary but it is not clear at what level or how we can achieve this. The necessity for government buy-in, the perceived need for digital educational resources and a requisite level of infrastructure may necessitate following an approach that targets different countries to those considered for the proof of concept.

2.3. Taxonomy

The planned approach for the proof of concept was to create an overarching skills taxonomy or curriculum framework mapped to all of the learning goals in the curricula of all four countries within the relevant module (i.e., Grade 2 Literacy: listening comprehension; and Secondary Level Biology: photosynthesis). For each country, a country-specific curriculum would be offered in the RLH, but the database of the RLH would contain each digital resource only once — so that it can be easily maintained and updated — mapped against the relevant curricula. Figure 5 shows a schematic representation of this mapping principle.

Figure 5. *The principle of mapping from the Regional Learning Hub to individual curricula.*



Our approach of mapping the content against each country's curriculum proved impractical for a number of reasons.

1. **You need specific expertise**: The precise identification of what content is relevant for a specific curriculum requires expert knowledge of that curriculum. For example, different terms are used for the same process in cellular respiration in different curricula, such as 'TCA cycle', 'citric acid

cycle' or 'Krebs' cycle'. Only professionals intimately familiar with the relevant curricula can make these decisions.

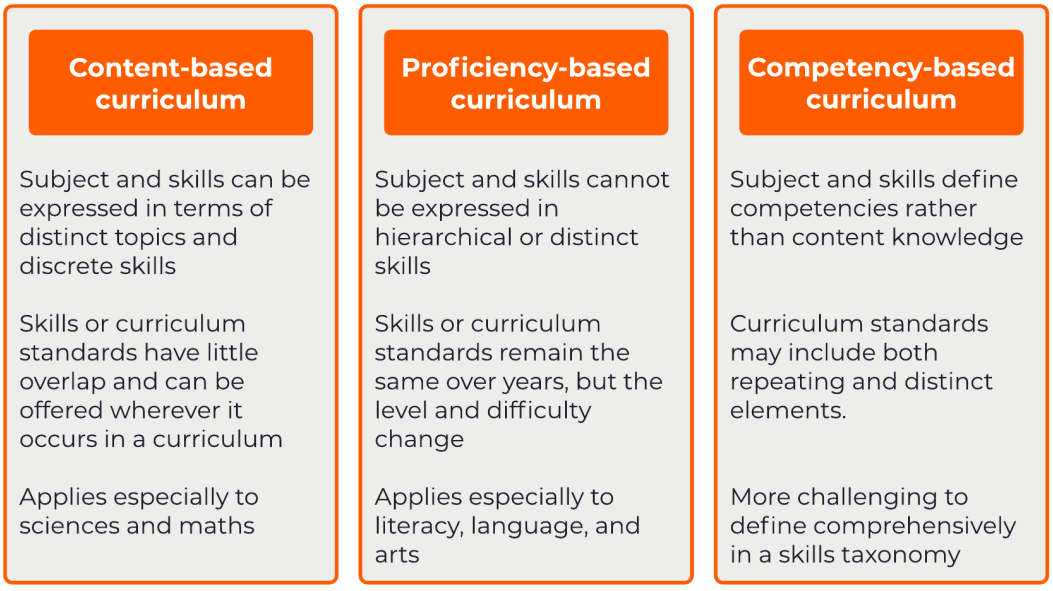
2. **Curriculum alignment is considered the government's domain**: Country representatives consistently indicated that curriculum alignment is their remit. Being seen as encroaching into that domain may not be appreciated and could even be counterproductive.

3. **There are one-to-many and many-to-one relationships**: Many content items cover several skills, and some skills can map to multiple content items. These relationships make coherent and precise mapping a challenging task for anyone not intimately familiar with a particular curriculum.

4. **Precise mapping is easier with content-based curricula**: A content-based curriculum, such as biology, allows for a granular organisation and shuffling of content items. A proficiency-based curriculum, such as literacy, sometimes defines the same curriculum standards, but with increases in difficulty. This makes it challenging to map content to a proficiency-based curriculum with a degree of precision. Figure 6 shows what these different curriculum types entail.

5. **Mapping to individual curricula is not sustainable**: Mapping content against subtopics in one generic curriculum, rather than to the individual skills in each country's curriculum, requires less effort and time and is, therefore, easier to sustain in the long run.

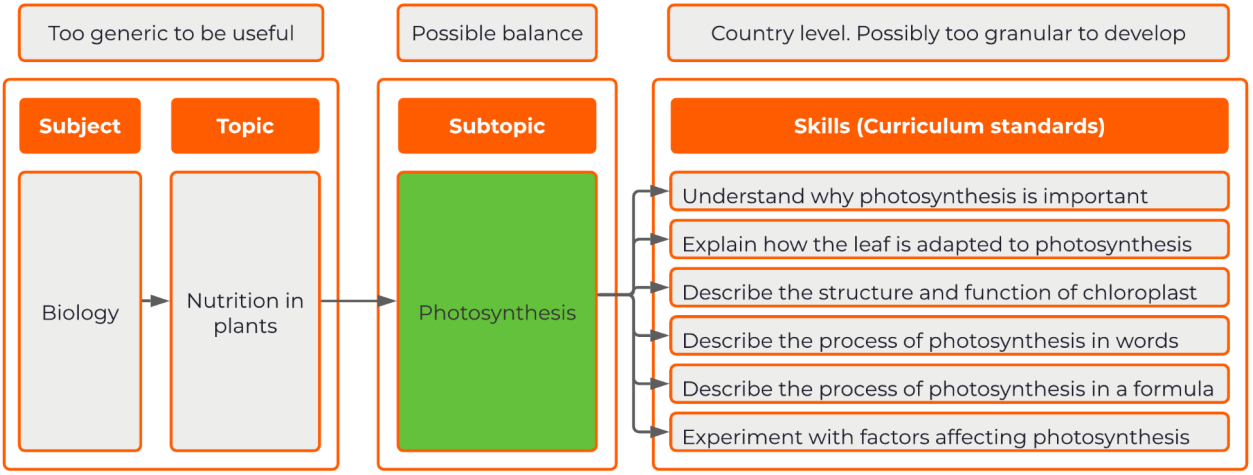
Figure 6. *Three types of curriculum.*



The challenges in creating skills taxonomies for all countries lead us to propose a subtopic-based approach rather than a skill-based approach. A subtopic-based approach is less specific than a skill-based approach and makes it possible to organise content around a concept rather than a specific skill (Figure 7). A subtopic can be compared to a section in a textbook chapter.

The disadvantage of a less specific offering is that countries might find a large amount of irrelevant or redundant content overwhelming, at which point the RLH may lose its utility. A topic, comparable to a chapter in a textbook or a sub-theme in the framework such as the Learning Passport's curriculum framework mentioned below, is therefore probably too generic to be useful.

Figure 7. *Aligning content to 'subtopics' may be more effective than aligning content to skills.*



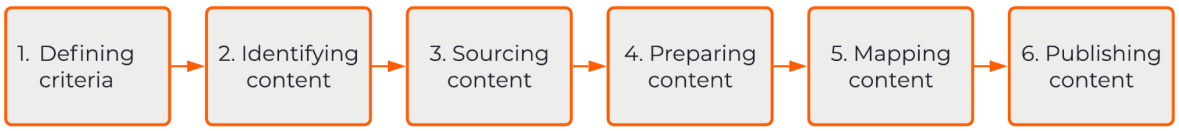
If we organise the RLH according to subtopics, content could be organised and mapped against a general, robust, and international curriculum. Among good candidates for such a curriculum are the Global Proficiency Framework for Reading (↑UNESCO Institute for Statistics, 2020) or Learning Passport's curriculum framework (↑Cambridge Assessment, 2020). This approach would allow countries to identify, select, and adapt content from a wide selection of relevant content without overwhelming content selectors with content that is not relevant for the subject, subtopic, or grade they are curating for.

However, engagement with governments in a next phase should inform the level of organisation necessary for the RLH to be useful while ensuring that developing and maintaining the RLH remains feasible.

2.4. Content curation

We took a deliberate approach to the process of content identification and curation, with the different steps shown in Figure 8.

Figure 8. *Steps in the content curation process.*



These steps were not as successive as the diagram suggests, but are represented as such for the sake of clarity. Following these steps led us to a number of conclusions. We set these out below.

Defining criteria may be more of an obstacle than a help. We identified several sets of criteria for selecting content, including one from ↑Kenya's Institute of Curriculum Development (2018) and sets taken from a guide by UNICEF (↑Belot, no date). However, using these sets entails several problems. The number of criteria they include makes them too constraining for us to use and lead to the rejection of otherwise acceptable content. Also, criteria are sometimes repurposed and were originally developed for creating but not curating content, or were not designed for selecting textbook content. Vagueness of criteria was another issue, for example, what is 'engaging content'? Such considerations led us to the realisation that it would be difficult to predict what content would fit the criteria.

Based on these obstacles, we recommend several approaches that could make criteria more useful for curating content. Limiting the number of criteria to the essential can help remove some that needlessly reject acceptable content. Alternatively, a distinction between 'must-have' and 'nice-to-have' properties can help give preference for one piece of content over another without rejecting content. This is especially useful if no alternative content is available for a particular skill. Moreover, curriculum bodies could assess and treat curated content differently from content they commission or develop themselves. Finally, trying out, testing, and redesigning criteria early in the curation process will help refine criteria and create more useful sets.

In our search for content, we limited our selection to two criteria only:

1. Can this content help the learner and is it better than having no content?
2. Does this content contain anything that disqualifies it?

When **identifying content**, we focused exclusively on Open Educational Resources, so that any content could be reused by any education stakeholder. Besides large content repositories,[6] we tried to identify repositories of content created or owned by large organisations who commission content, such as USAID through RTI, or large non-governmental organisations (NGOs) working on content. Finally, we crowd-sourced a request among specialists to find relevant content. Content created through projects, regardless of the creator or donor, was rarely accessible, findable, or usable. We identified three problems, each of which prevents the use of that content:

1. Content created for a particular project cannot be located once the project has concluded.
2. Content is not tagged, it is not clear in which curriculum it belongs or what it contains.
3. Content is not openly licensed and if found, cannot be reused.

We intended to source content for different modalities (TV, radio, feature phones, and digital platforms), for different purposes (workbooks, learning content, activities, assessments, and lesson plans) and different audiences (learners and teachers). For early grades literacy, we also sought content in Swahili and Somali besides English. Figure 9 shows the different types of content we tried to source. For modalities other than digital platforms, for biology and for all literacy content, we either could not find any content or the amount was insufficient.

Figure 9. *The sought after types of content (indicated in orange).*

	Low-tech					Digital
	TV	Radio	Text	Audio	Phone	All
Workbook						
Learning content						
Activity						
Assessment						
Lesson plan						

[6] These include large international repositories such as CK12 (ck12.org/student), regional repositories such as Siyavula (siyavulaeducation.com), and repositories with specific modalities, such as African Storybook (africanstorybook.org).

Content was prepared for use on any platform or even for delivery as files on a thumb drive. Openly licensed content in online repositories, however, typically contained links, menus, and references not relevant to the content. Saving this content directly from the site does not provide usable content. For the proof of concept, we used a workaround whereby content items were saved through Kolibri, a platform designed for offline content delivery. HTML5 items were thus saved as standalone ZIP files. Videos, audio files, Epubs or PDFs were simply saved. For substantial sets of content, collaboration with large content repositories is recommended.

The sourced content, insofar it could be found, was then mapped to the curriculum. The challenges we encountered (see Section 2.3) included the fact that in many cases, the resources we found covered several skills, not necessarily taught consecutively in specific curricula. In practice, we mapped several content items to one skill, and we mapped the same content items to several skills when possible. However, this mapping does not provide a comprehensive, logical path through curricula.

Finally, we published the content as part of the MVP. We discuss this in Section 2.5.

Overall, our process did not yield a sufficient amount of content to cover the two content modules selected. The content curation process was given extra time in the project and requests for help were floated through relevant networks. However, for literacy, the amount of content was insufficient for all modalities and languages; for biology, there was ample content for digital platforms, but not for other modalities.

2.5. Publishing content

The mapped content has been published as part of two MVPs: a Learning Management System (LMS), showcasing the content as learners or teachers will see it, and a database, containing detailed information and tags associated with the individual files (see below).

For the LMS we used Learning Passport,[7] a learning solution delivered by UNICEF and powered by Microsoft Community Training. Learning Passport is currently used in several countries to provide content to learners through its online platform or through downloadable content in its app (Figure 10). The database of all files, including information on licensing, audience, format, file size, location, format or language is hosted on AirTable and made available

[7] Resource available at hub.learningpassport.org

through a public view[8] (Figure 10, Figure 11 and Figure 12). However, the database does not give a clear and comprehensive view of all content items per skill or curriculum standard. Developing such a database fell outside the scope of the proof of concept. Nonetheless, going forward, creating a usable and clear interface could be effective in providing content to users.

Figure 10. *The RLH's Learning Passport as it displays on a smartphone.*

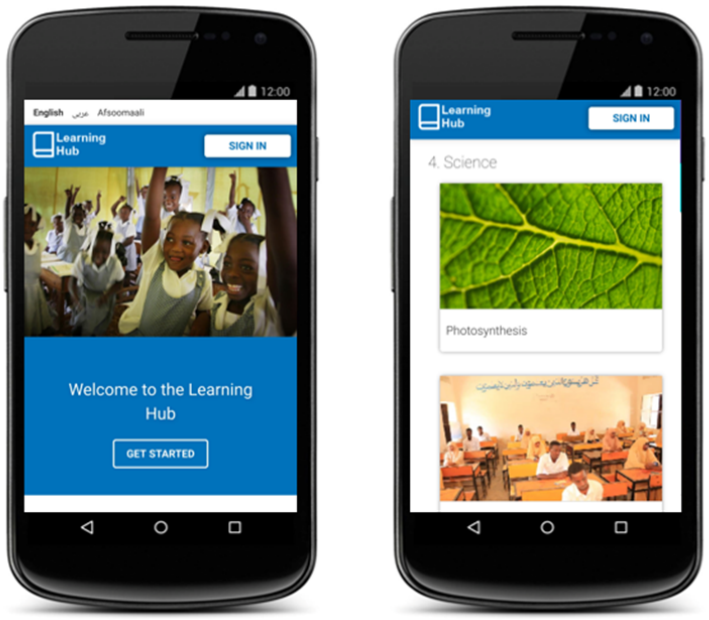
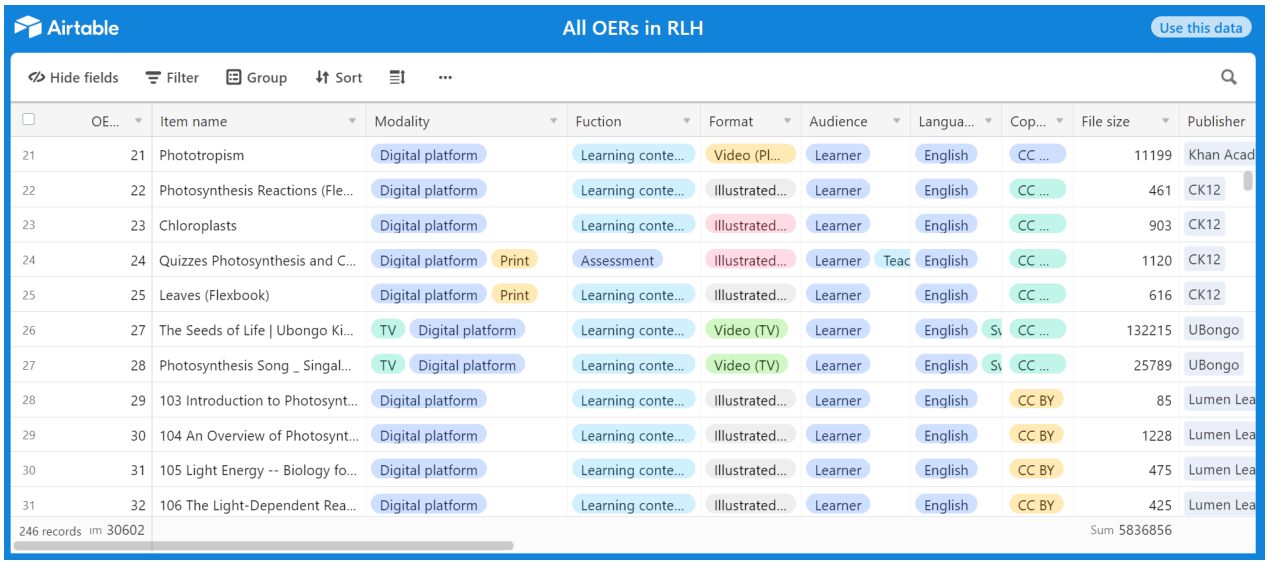


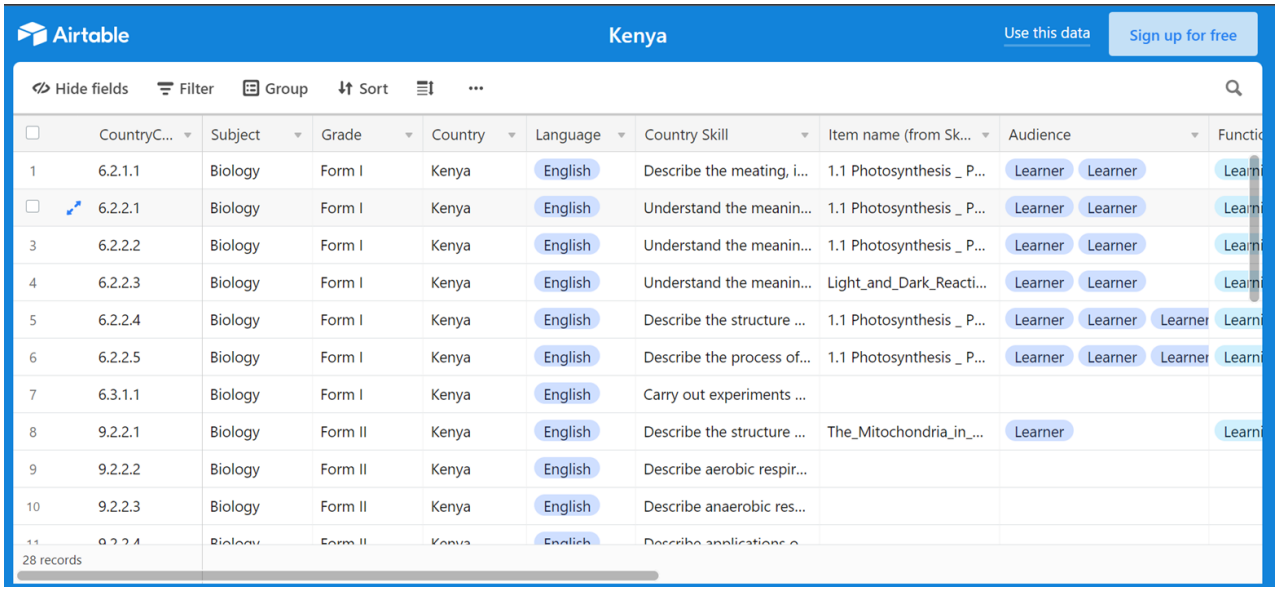
Figure 11. *All resources with metadata in the Regional Learning Hub's database view.*



	OE...	Item name	Modality	Fuction	Format	Audience	Langua...	Cop...	File size	Publisher
21	21	Phototropism	Digital platform	Learning conte...	Video (Pl...	Learner	English	CC ...	11199	Khan Acad
22	22	Photosynthesis Reactions (Fle...	Digital platform	Learning conte...	Illustrated...	Learner	English	CC ...	461	CK12
23	23	Chloroplasts	Digital platform	Learning conte...	Illustrated...	Learner	English	CC ...	903	CK12
24	24	Quizzes Photosynthesis and C...	Digital platform Print	Assessment	Illustrated...	Learner Teac	English	CC ...	1120	CK12
25	25	Leaves (Flexbook)	Digital platform Print	Learning conte...	Illustrated...	Learner	English	CC ...	616	CK12
26	27	The Seeds of Life | Ubongo Ki...	TV Digital platform	Learning conte...	Video (TV)	Learner	English	CC ...	132215	UBongo
27	28	Photosynthesis Song _ Singal...	TV Digital platform	Learning conte...	Video (TV)	Learner	English	CC ...	25789	UBongo
28	29	103 Introduction to Photosynt...	Digital platform	Learning conte...	Illustrated...	Learner	English	CC BY	85	Lumen Lea
29	30	104 An Overview of Photosynt...	Digital platform	Learning conte...	Illustrated...	Learner	English	CC BY	1228	Lumen Lea
30	31	105 Light Energy -- Biology fo...	Digital platform	Learning conte...	Illustrated...	Learner	English	CC BY	475	Lumen Lea
31	32	106 The Light-Dependent Rea...	Digital platform	Learning conte...	Illustrated...	Learner	English	CC BY	425	Lumen Lea

[8] Available at airtable.com/shrQFzXRvqSAhQKWW

Figure 12. *Kenya's curriculum with linked resources in the Regional Learning Hub's database view.*



3. Recommendations

The process of creating this proof of concept and the challenges encountered have led us to make a number of recommendations. These are discussed below.

3.1. Involve governments where appropriate

Government representatives expressed the need to be involved in designing an RLH, especially when the RLH offers content aligned with national curricula. A collaboration would, however, require involvement from different agencies, provinces, or bodies that currently do not always work together effectively. By definition, developing an RLH has the potential to become exceptionally politically complex if at least one, if not more, education stakeholders from each country within a region are involved in designing the RLH.

Instead of working with governments from the onset, involving them in improving the MVP incrementally into a usable product may be a more effective approach. This co-design approach sees the current MVP as a starting point for development, not a final product, and requires quick iterations and frequent and structural inputs from the intended audience(s). It would also include allowing governments to manage what is their remit: the work of aligning the content with respective curricula and focussing on a subtopic-based alignment. This brings us to the next recommendation.

3.2. Provide subtopic-aligned, rather than skill-aligned, content

The alignment of content with each country's curricula was challenging in several ways. By contrast, content alignment with a robust, international curriculum framework may have several advantages. It will lower the necessary effort to build and sustain a hub like the RLH, it will give governments agency and autonomy in selecting and adapting relevant content from a larger pool and it will respect their mandate in selecting content in line with curriculum needs, increasing the likelihood of uptake.

A slightly broader, subtopic-aligned RLH combined with close, exploratory involvement of governments and the provision of instructional content on selecting, adapting, and aligning content seems a promising next step.

3.3. Manage expectations and usage scenarios

During the development of the proof of concept, we did not always succeed in precisely defining to governments what the RLH's ambition was, what it was trying to achieve and what roles governments would play. Managing expectations and creating and testing usage scenarios is necessary to make the RLH a success.

Such expectations would include an understanding that curated content should be assessed differently from content created or commissioned by governments. It also requires governments to build capacity to reuse content that can very easily be adapted to match their needs.

Further, collaborating with different ministries of education on possible usage scenarios and a theory of change will help make the concept of an RLH more robust and focussed for all stakeholders.

3.4. Find more content or create capacity to build it

There is a dearth of content. Except for digital learning content for biology, content designed for the local context, for other modalities and for other purposes was lacking.

There are several possible ways of addressing this need.

- Unearthing existing content created in the past decades but which is not properly stored or saved through close collaboration with content creators.
- Collaboration with large content providers can be intensified to increase discovery, access, and reuse of their content.
- Building capacity among target countries to curate and create content.
- Purchasing and (openly) licensing existing proprietary content.
- Having large donors create content to fill gaps.

Each of these options requires effort and time and a combination of these approaches will be needed to increase the amount of available content. The last two approaches are most costly and should be considered only once a solid pathway to scale and implementation has been established.

3.5. Create and foster a culture of open licensing

Content created through programmes and projects paid for by donors or taxpayers usually is proprietary and cannot be reused by third parties or even other governmental bodies. Once content is proprietary, obtaining permission for reuse or changing the licence rarely happens. Instead, donors and NGOs could create and foster a culture of open licensing.

Different countries have precedents for policies on this and require all content paid for by public means to be public. However, these policies are not always fully implemented. A policy that requires that any content created within a project to be openly licensed does not carry an opportunity cost but has the benefit of greatly increasing the potential audience of that content. Such a policy should include removing a non-commercial clause. This clause prevents social entrepreneurs or local NGOs, who must charge for their efforts, from using otherwise openly licensed content.

3.6. Work with countries that have expressed a need

Not all countries perceive a need for the RLH. Countries with good digital infrastructure and more robust economies report having enough digital learning resources on offer already, while some under-resourced countries believe that their infrastructure is insufficient to facilitate any remote teaching modality.

However, through informal channels, we have understood that some countries are interested in what the RLH has to offer. These are regions without access to the substantial amount of digital resources that countries like Kenya and South Africa have, but with sufficient infrastructure and governmental readiness to adopt and collaborate on the RLH. Focussing and working with these countries may be an effective way to create a usable RLH that serves the needs of these countries.

3.7. Plan for the RLH to be sustainable

The RLH was envisaged as a platform that would eventually be owned by the governments for which it was designed. However, many large, professional, governmental, private, and non-governmental organisations fail at maintaining a repository of their own content. Content cannot be found, is not named or tagged in meaningful ways, or does not allow for reuse. A loose collaboration of several governments with different views along with departments within each government who need to be involved cannot

reasonably be expected to perform better in delivering a repository than professional organisations.

For the RLH to remain usable, it needs long-term and clear ownership. Multilateral players could have this ownership and turn a mature version of the RLH into a long-term offering. At this moment, however, we are still some way from a mature and sustainable RLH.

4. Conclusion

The process of creating the Regional Learning Hub's proof of concept challenged some of our assumptions and suggests that some modifications to our approach are needed.

It is clear that there are not enough Open Educational Resources for the modalities and purposes that were intended. Satisfying the expressed need for locally relevant, appropriate, and contextual content seemed largely beyond our reach.

Besides the lack of content, interviewed government officials seemed insistent that actual curriculum alignment is their remit. Providing a fully curriculum-aligned set of content may overstep our boundaries and be counterproductive. An approach of aligning content with subtopics, rather than with skills or curriculum standards, may require less effort and pose less of a threat. Whether the perceived threat indeed exists or is a result of miscommunication about what the RLH is actually aiming to achieve remains to be seen. Engaging with governments on the minimal viable product created for the proof of concept may provide clarity.

Such an engagement may yield further benefits. It will help to clarify expectations on what curated content is, and what it is not. It will clarify the need for capacity on work such as selecting and adapting curated content offered through the RLH, and it will identify the extent to which the RLH should contain guidance and instruction for education developers. This engagement could further include advocacy for open licensing. Most countries in the region retain copyright on any publicly created digital or other learning resources, severely limiting the potential reach of these resources. Advocacy for open licensing should be extended to other organisations. When multilateral organisations commission content, requiring it to be openly licensed ought to be the norm in contracts. There are good examples of such policies that can be followed.

The process, recommendations, and conclusions of the RLH's proof of concept will help inform next steps and support the development of a robust content repository for education stakeholders in sub-Saharan Africa.

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