

Developing a Proof of Concept for a Regional Learning Hub for Eastern and Southern Africa Part 4: Content curation

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Notes

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Abbreviations and acronyms

CC	Creative Commons
CC BY	Creative Commons with Attribution
CC NC	Creative Commons Non-Commercial
CC ND	Creative Commons Non-Derivative
CC SA	Creative Commons Share Alike
DEC	Development Experience Clearinghouse
ESARO	UNICEF Eastern and Southern Africa Regional Office
IAI	Interactive Audio Instruction
INEE	Inter-agency Network for Education in Emergencies
IRI	Interactive Radio Instruction
IVR	Interactive Voice Response
KEC	Kenya Education Cloud
KICD	Kenyan Institute for Curriculum Development
OER	Open Educational Resources
RLH	Regional Learning Hub
SLO	Student Learning Outcome
SMS	Short Message Service
UNHCR	United Nations High Commissioner for Refugees
UNESCO	United Nations Educational, Scientific and Cultural Organization

1. Background and purpose

In 2021 the UNICEF Eastern and Southern Africa Regional Office (ESARO), UNESCO, UNHCR, the Inter-agency Network for Education in Emergencies (INEE) and EdTech Hub (henceforth referred to as ‘the partners’) began collaborating to develop a Regional Learning Hub (RLH).

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 respective curricula and that is 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 in their regions.

The proof of concept of the RLH is a learning exercise that delivers two short content modules with curriculum-aligned content. It also describes the processes used to deliver this and documents any observations on challenges and opportunities that are relevant to bring the RLH to scale. The proof of concept focuses on four countries: Kenya, South Africa, South Sudan, and Somalia, and on two small content modules (topics from Primary Level 2nd Grade Literacy and Secondary Level Biology). However, the ultimate aim of the RLH is to be useful for a large variety of countries and for a wide variety of grades and subjects.

Development of the proof of concept entailed five distinct activities that have all been thoroughly documented and which include recommendations for the next step in the development of the RLH (Final Report). The five reports documenting these activities are:

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

This document describes the observations made during content curation. Based on the requisite skills identified in the taxonomy (activity three) and on needs expressed in the user research (activity two) this document describes the process of finding, selecting, and mapping content.

[Section 2](#) describes our methodology and approach; [Section 3](#) presents our observations. This section forms the bulk of this document, and meticulously describes the challenges that emerged throughout the aforementioned processes. Notable takeaways are identified in black call-out boxes. These results then feed into the recommendations in [Section 4](#).

This document is accompanied by an instance¹ of the [Learning Passport](#)² and a sample of a database, currently in [Airtable](#),³ containing views for all resources and for the different countries.

¹ An instance refers to a new implementation of an existing platform. In the case of Learning Passport, there are many instances, for example for Zimbabwe, Somalia's region of Puntland, and the Regional Learning Hub.

² Available at hub.learningpassport.org

³ Available at airtable.com/shrQFzXRvqSAhQKWW/tblpGOaG1XXh5v14a

2. Methodology

This methodology section describes our approach to curating content for the two modules of the proof of concept. Our approach included different steps, which are presented in Figure 1 as separate and successive for the sake of clarity. In practice, there was overlap and some going back and forth between these steps.

Figure 1. Steps in the curation process.



2.1. Defining content criteria

We tried to find out if usable content selection criteria existed, whether they overlapped and if these were useful. We planned to define content criteria based on existing criteria and our partners' needs.

2.2. Identifying content

Including shareable content that has a Creative Commons (CC) licence⁴ in whatever form necessary is a requirement of the RLH. With this hard requirement in mind, we tried to find content repositories of consistent quality, which were appropriate for the region.

2.3. Sourcing content for different target audiences, languages, modalities, and purposes

We made a particular effort to identify content that targets both teachers and learners; to identify content in Somali or Swahili; and to identify content that covers TV, radio and feature phones (SMS/IVR) besides digital platforms. Ideally, this would yield 12 different content items per skill, plus source materials for each, as shown in Table 2. Source files are relevant in case adjustments need to be made. For an HTML5 file, the learning resource is usually the source material and can easily be edited. In the case of a PDF file, the source files are necessary to make changes to terminology, units, images, or other content.

⁴ Available at creativecommons.org

2.4. Preparing content

Identified content needed to be made available for reuse in other platforms, including the Learning Passport. We looked for content items that could be used on their own and that did not contain references to other pieces of content. What is more, the content needs to be in a format that can be downloaded and uploaded very easily by education stakeholders with limited capacity, for example in ZIP files and without hyperlinks to external content.

2.5. Mapping content

Content items were then mapped to relevant skills. We expected content items and skills to have many-to-one and one-to-many relationships; that is, we expected some content items to cover multiple skills and some skills to map to multiple content items.

2.6. Publishing content

The content was then uploaded into the Learning Passport, which contains a public-facing user-friendly interface, and an AirTable database, which allows the content to be downloaded and includes relevant tagging.

3. Results

This section describes the results of our efforts to curate content. These results are descriptive, err on the side of verbosity, and are intended to serve as reference material. The results feed into the recommendations made in [Section 4](#).

3.1. Defining content criteria

In this subsection, we describe our experience of attempting to identify and subsequently define criteria for the identification and curation of content. Initially, for this proof of concept, we planned to create a set of criteria against which to select content and define what ‘high-quality, context-appropriate’ materials are. However, reviewing the existing sets of content criteria, we identified a number of problems and challenges with existing criteria that led us to abandon this approach. This subsection provides a detailed discussion of these problems and challenges.

The user research conducted as part of the proof of concept project confirmed our assumptions that content must be relevant for the local context, aligned to local customs, in understandable accents and reflecting experiences and settings with which learners can identify. Besides these wishes, we assessed four sets of existing criteria. [Annex 2](#) contains a detailed description of the domains and the criteria in the three sets:

- *The Standards for competency-based digital course materials published by the [Kenya Institute of Curriculum Development \(KICD\)](#) (2018).*
- *A Guide for handling potential reputational risks to UNICEF from teaching and learning materials* ([Belot](#), no date).
- A concise list of OER Evaluation Criteria published by [Affordable Learning Georgia](#) (no date).
- Criteria that can be used to assess the quality of content for a specific locality, identified by [Groeneveld et al.](#) (2020).

The different sets of criteria are substantial, with respectively 65, 119, 18, and 10 criteria given. Most of these criteria could cause a content curator to reject content if the content does not meet them. For example, an item that includes a mother cooking may conflict with UNICEF’s criterion to not show stereotypical gender roles, or a text item instructing a teacher how to conduct an engaging class may be rejected for not being in an engaging format. Many of our counterparts confirmed verbally that they observe that much, if not

most, seemingly appropriate curated content is rejected by ministries of education.

The challenges that we found with defining and using existing criteria fall into different categories:

1. **Criteria are too constraining.** The set of criteria defined in [Annex 2](#) is comprehensive, meaning that any content that passes all criteria is of the highest quality. However, if a content item is only adopted if it meets, for example, all 119 criteria in the UNICEF guide, then large amounts of resources that would be helpful for learning are unlikely to be approved. This means it would become difficult to identify content that comprehensively covers all skills and learning objectives.
2. **Criteria for creating, not curating content.** In some cases, criteria have been designed for the creation of content, either by a particular institution or by third parties but not for the curation of content. When content is created, the commissioning body has full control over the requirements; however, applying these criteria to curated content may lead to the rejection of otherwise acceptable content.
3. **Criteria developed for textbooks.** Some curriculum bodies have applied criteria for textbooks to digital content. However, these criteria rarely apply well to digital content, leading to the rejection of otherwise acceptable content.
4. **Vague definitions of criteria.** Criteria are sometimes vaguely defined. For example, 'engaging' can be a requirement of content. Content, such as an interactive and dynamic HTML-5 item, can be engaging by itself but content in a textual format can also instruct a teacher on how to conduct an engaging lesson. Such vague definitions lead to the final problem.
5. **No inter-rater reliability on criteria.** Constraining criteria, repurposed criteria, inappropriate and vague criteria lead to inconsistencies between content curators in rejecting or accepting content. In other words, the problems above make it difficult to predict which resources will be acceptable, and which will not.

This document proposes a number of approaches to make content curation criteria more effective. Some of these are relevant for the proof of concept, can be used once the RLH goes to scale, or can be discussed with approving bodies in different regions. They are listed below.

1. **Limit the criteria to the essential.** Have a concise set of essential criteria that define necessary properties of the content and remove non-essential criteria.
2. **Distinguish between ‘must-have’ and ‘nice-to-have’ properties.** Failing to have ‘must-have’ properties is a reason for rejection, but ‘nice-to-have’ properties should be used to prefer one acceptable resource over another, not to reject resources.
3. **Adopt a so-called ‘satisficing’ approach in order to satisfy minimum requirements.** With this approach, criteria can be used to score content, but the ultimate question is whether the resource is better than no resource and whether or not it is considered acceptable by the stakeholder.
4. **Manage expectations of curriculum bodies.** When curriculum bodies commission content or create content in-house, they have full control over the content. However, curated content rarely meets the precise specifications of such content. Instead, curated content should be assessed through standards defined for curated content.
5. **Testing selection criteria.** Once the RLH goes to scale and larger amounts of resources are offered, selection criteria can be assessed and reformulated based on an analysis of inter-rater reliability and user feedback from learners, teachers, and other stakeholders.

For the proof of concept, we decided to adopt a permissive approach and ultimately asked only the questions listed below in Takeaway 1.

Takeaway 1. *Less is more: fewer content criteria may prove more useful.*

The different sets of criteria — and the amount of criteria per set — proved to be an impediment rather than a help in selecting content. For this reason, we limited the criteria to two questions:

1. Can the content help the learner learn?
2. Is there anything in the content that disqualifies it?

3.2. Identifying content

In the project, we sought to identify as many sources of Open Educational Resources (OER) that could be potentially relevant. Content with any Creative Commons⁵ licence, an MIT licence⁶ or any BSD licence⁷ would define it as sufficiently openly licensed. All of these licences allow for immediate






⁵ Available at creativecommons.org

⁶ Available at choosealicense.com/licenses/mit

⁷ Available at opensource.org/licenses/BSD-3-Clause

distribution and reuse of content. In most cases, attribution is required (“CC BY”) and commercial usage is not allowed (“CC NC”). In a few cases, the content cannot be adjusted (“CC ND”). Table 1 provides an overview of these licences.

Table 1. *Different types of open licensing that allow the reuse of content.*

Licence / Badge	Explanation of licence
CC0 	Creative Commons Public Domain Dedication. This content can be reused, changed or sold without attribution.
CC BY 	This licence requires attribution. Content can be reused, but a reference to the content creator must be included, either in the content item or in the frame. Often, content repositories indicate how to make the attribution.
CC BY-SA 	SA stands for ‘Share-Alike’. The licence requires attribution (as CC BY), but adds the condition that you must retain the same licence; that is to say, you have to give users of your content the same rights (CC BY-SA) under which you received the content in the first place (i.e., also CC BY-SA).
CC BY-NC 	NC stands for ‘Non-Commercial’. The licence requires attribution (as CC BY), but adds the condition that you cannot use the content for making profit.
CC BY-ND 	ND stands for ‘No Derivatives’. The licence requires attribution (as CC BY), but you cannot make adaptations. For example, you can still include an image in another document, but you have to include it without making modifications.
MIT Licence⁸	The MIT licence is comparable with the CC0 licence: content can be reused, changed and sold, and does not require attribution.
BSD-3⁹	The BSD-3 clause allows any reuse but requires users to republish the copyright notice and to not use the original creators’ names to imply endorsement of the reused product.

Further, we looked for sources of content for the modalities of television, radio, and feature phones, in line with both the RLH’s purpose and the need that interviewees expressed in this year’s [user research](#) and in stakeholder interviews conducted in 2021.¹⁰

To identify repositories or sources that contain OER for the RLH’s two content modules, including the different modalities and the different purposes, we adopted a combination of approaches:

⁸ Available opensource.org/licenses/MIT

⁹ Available at opensource.org/licenses/BSD-3-Clause

¹⁰ Click [here](#) to view the research.

- Identify possible repositories with the team.
- Crowd-source identification of repositories through requests for help.
- Consult large organisations that commission and create content.

Repositories were identified and recorded in a separate spreadsheet [here](#). This sheet included comments on licensing, the applicability of the content for the two content modules and whether the repository contained original content. [Annex 1](#) includes a short discussion about the selection of these repositories. When we realised the major content repositories would not be sufficient for all content needs, especially for different modalities and purposes, we expanded our search. We did so by making a public request for assistance via LinkedIn, and through a Google Docs file and form that allowed users to share their content suggestions. However, this request did not yield any new repositories or content.

During our search, we identified that a number of content repositories were aggregates of other repositories. For example, Global Digital Library¹¹ contains books from other sources, such as the African Storybook.¹² In most cases, such aggregates have been removed from the list; a few, which contained helpful functionality, were kept, for example, Kolibri,¹³ which allows downloads of content, and the Global Digital Library, which also contains original content.

3.2.1. Curating content directly through organisations

A final approach was made directly to organisations that commission or create content. However, this did not yield new content either.

RTI¹⁴ is a large, international, non-profit organisation that has created content around the world with a focus on foundational literacy and numeracy, often funded by USAID. However, RTI does not maintain a complete repository of content created, nor does the repository contain licensing information. On RTI's SharEd website,¹⁵ the actual learning content aimed at learners and teachers is only a sample. In the case of RTI's Tusome project, for example, this means that while the Grade 2 Swahili Learner's book is available,¹⁶ the teacher's book is not.¹⁷ USAID typically commissions the content that RTI creates and, in principle, keeps a repository of that content on their Development Experience

¹¹ Available at digitallibrary.io

¹² Available at africanstorybook.org

¹³ Available at kolibri.org

¹⁴ Available at rti.org

¹⁵ Available at shared.rti.org

¹⁶ Available at shared.rti.org/content/tusome-class-2-pupil-book-tusome-early-literacy-programme

¹⁷ Available at shared.rti.org/content/tusome-english-teacher%E2%80%99s-guide-class-2-tusome-early-literacy-programme-kenya

Clearinghouse (DEC)¹⁸ platform. However, compliance is limited and the usability of the platform is insufficient to effectively find resources. Finally, not all of RTI's content is openly licensed. The copyright for the content created as part of the Tusome project, for example, has reportedly been transferred to the government of Kenya. This means that Tusome content cannot be offered in an RLH.

Viamo¹⁹ is a global social enterprise specialising in Interactive Voice Response (IVR) and SMS content delivered through feature phones. Much of the content Viamo creates is commissioned by multilateral organisations, such as UNICEF. However, contacts at Viamo were not able to identify a repository of content that Viamo has created over the years, let alone be able to inform us about the extent to which this content is openly licensed.

Different non-governmental organisations (NGOs) have been contacted to inquire about the licensing of their content. In spite of the content often being commissioned by multilateral organisations, open licensing of content is not provided for in contracts and most NGOs or not-for-profit organisations are given copyright to the content they develop. Examples of such organisations are **War Child Holland**, which publishes phonics-based content for their *Can't Wait to Learn* programme,²⁰ **Aflatoun**²¹ and **Leap Learning**.²²

3.2.2. Quality of content repositories

In many cases, online repositories provided insufficient information to effectively use or map the content. However, our contacts among content providers often shared information on curriculum mapping. For example, **Ubongo**²³ leadership proved very helpful in providing granular sheets with mapping information, identifying which videos aligned with student learning outcomes (SLOs), grades, and subjects in Tanzania, Kenya, Uganda, and Nigeria. While Ubongo's content covers only some of the skills in the specific content modules in the proof of concept, Ubongo's content is relevant for other grades, levels, and subjects as the RLH goes to scale.

There were several examples where content was available, but either incomplete or not tagged. **Rising Academy's Rising on Air**'s online content was both incomplete and contained little information on what the audio files contained.²⁴ Rising Academy's leadership has been very helpful and tried to make sheets available describing the content of the sessions, references to

¹⁸ Available at dec.usaid.gov

¹⁹ Available at viamo.io

²⁰ Available at warchildholland.org/intervention-cwtl

²¹ Available at aflatoun.org

²² Available at leaplearning.com

²³ Available at ubongo.org

²⁴ Available at risingacademies.com/on-air-lower-primary-literacy-1

books used in the lessons, and to provide us with missing content. However, this was not accomplished within the duration of this project. Likewise, The **Global Digital Library's Radio** website²⁵ contains a large collection of Interactive Radio Instruction (IRI) and Interactive Audio Instruction (IAI) resources, amounting to roughly 1,000 hours of content. However, the episodes on the website are only identifiable by number and contain little to no information on what the episodes contain. Efforts to find out the topics of South Sudan's early grade literacy content have not yielded results, in spite of contacting and getting helpful responses from different organisations involved and from different evaluators on the project. There are 240 hours of radio content relevant for South Sudan's Primary 2 Literacy — which is Grade 2 — some of which have been added to the RLH. However, they could only be added 'as-is' and without any clarifying information.

In some cases, it is not clear whether we can use content. **Profuturo's** website contains both openly licensed and proprietary materials. However, the search options do not offer filters on licences. Besides, licensing information seems unreliable, with content²⁶ described as CC in the description, but proprietary in the licence information. Profuturo informed us that the example we provided in the footnote is openly licensed, but the ambiguity of the licence statement and the inability to search or filter for openly licensed content make Profuturo's repository an impractical source of content.

An interesting, final case is UNICEF's **Accessible Textbooks for All** programme. The aim of the programme is to build capacity among governments to make textbooks accessible for learners with visual and hearing impairments. These adapted textbooks are openly licensed according to the Marrakesh Treaty,²⁷ to which most countries are signatories. Yet the programme only publishes accessible textbooks through governmental platforms²⁸ and discourages sharing these resources through other platforms. We did not take into consideration learners with special needs during the development of the proof of concept, and this observation may have repercussions for scale.

3.2.3. Takeaways from available repositories

The above underlines the responsibility that multilateral and bilateral actors have in making content available. Content commissioned by donors gets lost for any of the following three reasons:

²⁵ Available at gdlradio.org

²⁶ For example, see

resources.profuturo.education/en/resource/calculo-mental/03f1d161-6298-4148-ac20-1379ed9e1bf8

²⁷ Available at wipo.int/treaties/en/ip/marrakesh

²⁸ For example, see lms.kec.ac.ke/course/index.php?categoryid=344

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

Much of the content created by organisations such as RTI, Viamo, or War Child Holland is commissioned by UNICEF, UNHCR, USAID and others, but is not made available for general use beyond the funded projects. There are two clear lessons going forward for these funders.

First, on contracting the content creator, include open licensing in the terms of reference, including allowing commercial partners to reuse the content. The last suggestion is counterintuitive, but when learners are willing to pay for a platform offering content that is also available for free, this platform apparently adds value to the content or to the user. Interestingly, many countries, including the USA and the UK, now have laws that determine that content created with public funds should be openly licensed. Unfortunately, these laws are not always implemented in contracts signed with programme managers.

Second, all created content should be tagged, organised, and saved to properly organised and accessible databases. Currently, content is created by different organisations during projects but is lost once the project ends.

Learning Passport provides an illustrative example. Launched by UNICEF, Learning Passport sites do not contain the option to share information on licensing and do not contain informative content descriptions,²⁹ metadata on curriculum mapping, or other relevant tagging that makes reuse possible. Moreover, some Learning Passport implementations are not accessible from other regions.³⁰

Finally, our observations do not bode well for the prospect of transferring the ownership of a content aggregate such as the RLH to country governments. Given that high-capacity international multilateral organisations, such as USAID and UNICEF, have not succeeded in successfully tracking and indexing educational content created in the past, we need to think in terms of introducing effective mechanisms to sustain an RLH once ministries of education take ownership. One option could be for UNICEF to consider making the RLH a long-term service, managed, maintained, and sustained by UNICEF.

²⁹ For example, see puntland.learningpassport.unicef.org

³⁰ For example, see mopsezw.learningpassport.unicef.org

Takeaway 2. *Very few organisations manage to maintain their learning content well.*

Very few high-capacity and well-funded organisations manage to organise and maintain a functional learning content repository,

Transferring ownership of an RLH to several ministries of education will not result in the creation of a sustainable and well-managed repository.

3.3. Sourcing content for different target audiences, languages, modalities, and purposes

Core to our approach has been the curation of content for other modalities besides digital content: television, radio, and feature phones. User research confirmed our assumption that ministries of education are seeking content that is suitable for learning platforms and for low-tech or existing technologies, such as TV, radio, and feature phones.

In addition to content for learners and for teachers, we also tried to find content for different purposes, such as workbooks, lesson plans, activities, and assessments. In an ideal situation, per content module, we identified roughly 12 content types, plus source files (Table 2) as desirable.

Table 2. *Types of content that would ideally be available.*

	Low-tech				Digital platform	Source files (per type)
	TV	Radio	Text (phone)	Audio (phone / IVR)	Various	
Workbook (student)					X	X
Learning content	X	X	X	X	X	X
Activity					X	X
Assessment			X	X	X	X
Lesson plan (teacher)			X		X	X

Table 3 provides an overview of the types of content that we were looking for.

Table 3. *Types of content.*

Modality	Description
Low-tech content: TV and radio	Suitable for broadcasting on TV or radio. Countries may have allocated part of a public channel for educational purposes and scheduled programming consistent with the national curriculum, often in horizontal blocks: Grade 2 content from 8.00 am–9.00 am, Grade 3 content from 9.00am–10.00 am, and so on.
Low-tech content: Feature phone	Feature phones — phones without smartphone capabilities — can be used for text content and audio content. Text content ³¹ can range from simple content delivery to more interactive guidance, adaptive content, or nudging to stay on topic. Within the RLH, we focus on content delivery, in the form of learning content and assessment. Besides text content, users can access audio content through feature phones, for example through an Interactive Voice Response System (IVR). Feature phone content has the benefit of potentially reaching more disadvantaged learners. However, such offerings require a well-thought-out implementation well beyond offering content. Such an implementation falls outside the scope of this project.
High-tech content	The term ‘high-tech content’ is loosely used for any content that requires a smart device, such as a tablet, smartphone or computer, to access it. Content in the low-tech category can often be made available for use on a smart device, but not the other way around.

3.3.1. A note on the difference between video content for TV and for devices

Consumption of content through television can be different from individual learning video consumption, for example on a smartphone. Television content fits in programmes, is broadcast at predictable times and has a slower pace since it cannot be rewound, repeated, or paused. TV programmes do not offer the option of toggling subtitles in different languages. Video content that is used on digital devices has limits on duration and file size. For example, some items from Kenya’s TV content that have been placed on the Kenya Education Cloud (KEC) are 900 MB in size ([↑Groeneveld et al., 2021](#)) — too heavy to download for many users.

³¹ [↑Jordan and Mitchell \(2020\)](#) provide an in-depth discussion on the evidence of SMS in education.

Some video content may be appropriate for television and as digital content. However, in all cases, video content should be assessed on its usability on the different platforms.

3.3.2. The ideal amount of content per content module

On the RLH, an ideal mix of content would serve all modalities, purposes, and targets. Source files aside, this would amount to 12 different types of content per skill (see [Table 2](#)). In our two small sets of content modules, we have identified 11 skills for photosynthesis and 18 skills for literacy. If we were to find and include items for all skills and all modalities, this would amount to $(18+11) \times 12 = 348$ content items. In practice, this ambition level was beyond our scope. We curated 236 content items for the proof of concept. However, many of the resources we were able to find only cover a small selection of the types of content we needed, as [Table 4](#) and [Table 5](#) below show.

Takeaway 3. *There is not enough openly licensed content to substantially cover the curricula in all modalities.*

There is a dearth of content. There is an insufficient amount of openly licensed content to cover early grades literacy for every modality, purpose, target group, or language. For secondary science, there seems to be a sufficient amount of openly licensed learning content for digital platforms, but not for all modalities, purposes, or target groups.

3.3.3. Grade 2 Literacy content: language comprehension / listening comprehension

For Grade 2 Literacy for the skill of 'listening comprehension', besides the different modalities and formats, we were looking for content in three languages (Swahili, English, and Somali). We found a limited amount of content for literacy.

Educational TV and radio content is broadcast in many countries, but this content is typically proprietary and cannot be disseminated or reused by other stakeholders. A notable exception is Ubongo's TV content, the licence of which was changed to CC in 2020. We discovered some openly licensed radio content for South Sudan, but this content was not tagged, named, or organised in a meaningful way. Rising on Air's radio content, designed for Sierra Leone but possibly applicable to other contexts as well, was incomplete. Ubongo reported that they have feature phone content as well, but this content could not be sourced during the project.

We found many digital reading books in the three languages. However, content for teachers on how to analyse text, and for teachers and caregivers on how to guide reading is scarce, as are digital resources to assess progress in literacy. Source content was often available for the reading books, which are available in Epub format and PDF, and can easily be adapted when adaptation is permitted. [Table 4](#) and [Table 5](#) illustrate the availability of content for Grade 2 listening comprehension and ‘photosynthesis’ respectively. The three colours used in the tables denote:

- ■ No availability. No usable content was found
- ■ Limited availability. Some usable content was found but was insufficient to cover the skill for this modality and purpose.
- ■ Good availability. Sufficient content was found to cover this skill for this modality and purpose.
- ■ Content was not considered relevant for this skill / purpose / modality combination. For example, no workbook for TV broadcasts was considered relevant.

Table 4. Availability of content types for Grade 2 Literacy: listening comprehension.

	Low-tech				Digital platform	Source files (per type)
	TV	Radio	Text (phone)	Audio (phone / IVR)	Various	
Workbook (student)						
Learning content						
Activity						
Assessment						
Lesson plan (teacher)						

3.3.4. Secondary Level Biology content: photosynthesis

Finding content on biology, in particular on ‘photosynthesis’ threw up different challenges. We found a TV-ready video that touches upon photosynthesis but no other content for television, phone, or radio. The topic itself is probably instrumental: illustrations are needed and the target audience is secondary level, where learners are more comfortable with written texts compared to primary grades.

A wide variety of digital resources is available. CK12's content in HTML5, Khan Academy's videos, Openstax's Epubs and teacher materials, and Siyavula's HTML5 and Epubs all cover the topic 'photosynthesis' extensively. Whenever HTML5 or Epubs are provided, adaptations can be made quite easily. Khan Academy also has a number of resources that have been translated into Swahili. In the case of Openstax, it proved challenging to obtain a teacher account and not all resources that Openstax offers could be accessed during the project.

Table 5. *Availability of content types for secondary level biology: photosynthesis.*

	Low-tech				Digital platform	Source files (per type)
	TV	Radio	Text (phone)	Audio (phone / IVR)	Various	
Workbook (student)						
Learning content						
Activity						
Assessment						
Lesson plan (teacher)						

Takeaway 4. *Not all content is suitable for all modalities.*

Some content, such as that for secondary science, seems ill-suited for dissemination through text-only or audio modalities — graphics and illustrations require visual media.

3.4. Preparing content

The RLH does not prescribe the platform countries should use but aims to present content that can easily be imported into any platform. For this reason, efforts have been made to make content available for download and use on any platform, from file systems to stakeholders' own LMSs. This means that content can be used on its own and does not contain references to other pieces of content. For the proof of concept, we have made content available in formats that can easily be copied, downloaded, uploaded and shared by education stakeholders with limited capacity. Although challenging to achieve, this is a model we would want to follow if the RLH goes to scale.

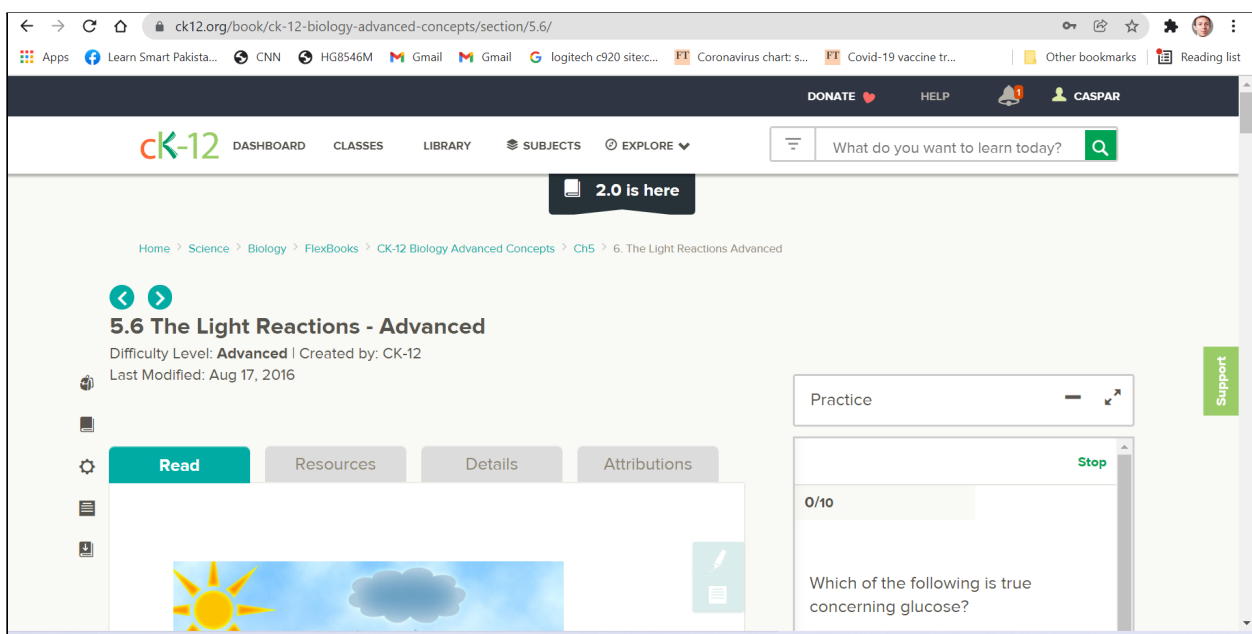
Takeaway 5. *Preparing content for reuse requires workarounds or collaboration.*

Preparing content for reuse through other platforms and offline use requires workarounds, which sometimes do not work or require collaboration with the large content providers to present their content in a reusable format.

Some content, such as Khan Academy's content, has been downloaded and made available as MP4 files. Epub files could also be downloaded. However, HTML-5 pages, such as CK-12's interactive PLIX content,³² need to be made available in a ZIP file containing all relevant files. Saving the webpage does not work, since these typically contain links that do not work in an offline environment and may contain references to content that is not relevant for a specific curriculum and which does not work when used offline. The workaround we used during this project was to add the content to Kolibri Studio.³³ Kolibri Studio allows downloading most content and using it offline or uploading it to any other platform. However, questions and assessments could not be downloaded and made available in this way.

Figure 2 provides an example of content on the CK12 website. The content contains links, menus, and other features that do not work if the content is used offline.

Figure 2. *Content on the CK12 website.*



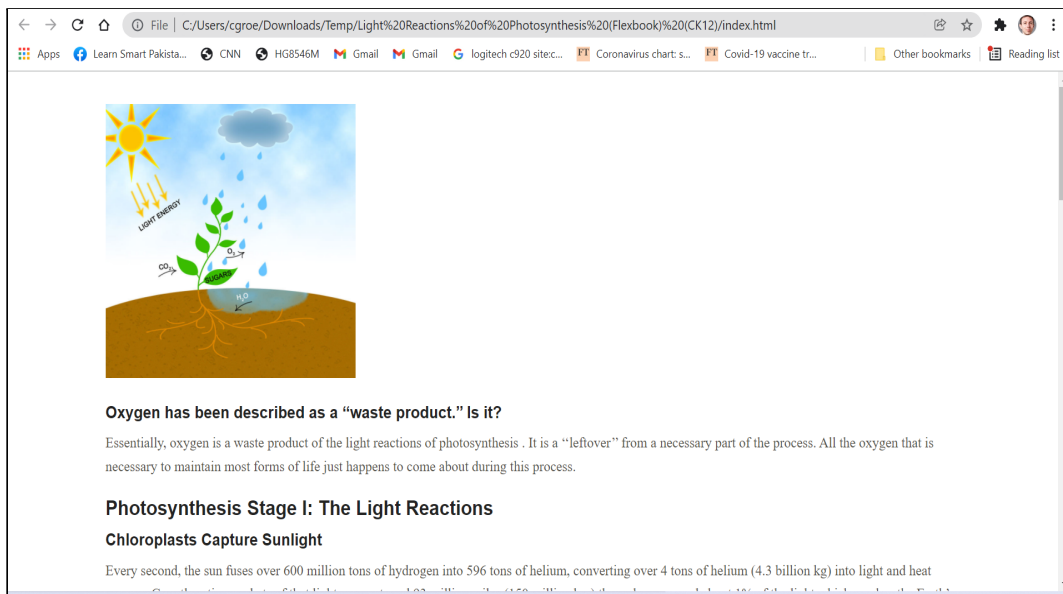
³² For example

ck12.org/assessment/tools/geometry-tool/plix.html?eld=SCI.BIO.143,SCI.BIO.144&questionId=576446439616aa1e9ea39aaa&conceptCollectionHandle=biology--:chloroplast

³³ Available at studio.learningequality.org

Figure 3 below, shows the same content, saved through Kolibri Studio as a ZIP file with the relevant HTML and other files. This file can be used and uploaded to any LMS. It retains most of the formatting and the images, but any links or menus are removed.

Figure 3. Content from the CK12 website made available as an offline package and part of an uploadable zip file via Kolibri Studio.



3.4.1. Source files and adaptability

Besides curating content, we made an effort to obtain source files. For video and PDFs, source files make adaptation fast and easy and allow for publishing in a different, responsive format that can be used on smartphones and tablets.

There were only very few cases where source content was available. However, content in HTML5 format, and this includes Epubs, can easily be adapted.

Takeaway 6. *Source files are rarely available.*

Source files of openly licensed content items are rarely available. Adapting video files or PDFs is labour-intensive and does not always yield good results.

3.5. Mapping content

The project set out to map appropriate content to different curricula. This would have required finding content that is relevant, covers the curricula, is at the right level, and is neither more simple nor more complex than what is taught in classrooms. The process of this mapping activity is discussed in detail in our report on creating a [skills taxonomy](#).

Our ambition to map content closely to different curricula may prove to be unrealistic. During the mapping process, we found content that contains specific terminology and learning points. For the topic of photosynthesis, content may contain concepts such as the 'chemiosmotic gradient', references to parts of plants such as the 'thylakoid lumen', or use one of many synonymous terms such as 'the Krebs cycle', 'the citric acid cycle (CAC)', or 'the tricarboxylic acid cycle (TCA cycle)'. It is not possible for an external party to fully understand which concepts are likely to be taught, to what degree, which terminologies are used in different classes, or which terminologies are acceptable.

A further challenge we experienced relates to the relationships between resources and skills. Content items and skills have many-to-one and one-to-many relationships. This means that some content items were supposed to cover multiple skills and some skills were supposed to map to multiple content items. Such relationships make the work of mapping less intuitive and more fuzzy.

An alternative would be to consider an approach whereby we include any content that is mostly appropriate and we leave it to the implementing stakeholders to make a final selection. Making a selection may require stakeholders to undertake some adjustments to content. There are two advantages to such an approach. First, it would be consistent with the conclusions from the user research. Governments expressed strong opinions about wanting to make decisions about which items would be appropriate for their curricula and which would not. Second, using this approach to populate and maintain the RLH would require much less effort than undertaking a granular mapping exercise.

Takeaway 7. *Instead of mapping to a specific curriculum, map to a generic curriculum.*

Mapping to a country-specific curriculum requires a high level of effort. It also encroaches on the remit of national curriculum boards. Instead, mapping content to a generic, overarching curriculum requires less effort and does not threaten the remit and autonomy of ministries of education.

4. Recommendations

Our observations during the process led to a number of recommendations and conclusions across the four areas of mapping content, defining content criteria, licensing and organising repositories, and commissioning work. We make at least one, if not multiple recommendations for each area of activity. These recommendations are made with the proximate delivery of a usable and sustainable RLH in mind but are also relevant for future work on content.

4.1. Recommendations for mapping content

Create a broad, topic-based taxonomy, not a granular, skill-based taxonomy

The granularity of content, the specificity of terminology and what is actually being taught, and the fact that some content items cover either one, many, or most skills within a topic make precise mapping a challenging task. This, combined with the assertion by many governments that precise content mapping and alignment with their curricula is their remit, mean that efforts that are seen as encroaching on government remits may not be appreciated and may even be counterproductive.

Content for learners with special needs adds further complexity

The exercise in creating a proof of concept did not yield sufficient content for early grades literacy, for different modalities, and for different audiences. The proof of concept did not focus on adapting content with special needs, but it is clear that for content to be useful for learners with special needs, adaptation of any curated content is necessary. However, this will add to complexity, effort, and time required.

4.2. Recommendations for content criteria

Have a permissive set of selection criteria for curated content

Using complex sets of criteria to assess whether content is applicable and appropriate have led to the rejection of much excellent and usable content. Many of the sets of criteria we used were designed for other uses and have been repurposed. We recommend using fewer criteria distinguishing between 'must-have' and 'nice-to-have' criteria, and asking the essential question —

Does the content item help learners learn? Managing expectations from ministries of education on how to treat, adapt, and use curated content is essential.

4.3. Recommendations for licensing

Include open licensing in content commissioning

Content is often funded by donors but copyright is either retained by content creators or transferred to governments. In practice, this content is not reused or reusable. Requests to content providers typically involve negotiating temporary usage within a specific region and for a specific implementation. These negotiations take time, take specific expertise, and require a high level of effort, all of which are often hard to come by in under-resourced environments and especially during disruptions such as the Covid-19 pandemic.

Negotiate with governments to advocate for openly licensed materials

Some countries have laws that determine that any content created with taxpayer money should be openly licensed. While these laws are not always implemented, they provide a model that can be followed. Two arguments can be made to advocate a different approach: a principled one and a practical one. The principled argument proposes that if the public funds content, the public should own it and should not be charged to access that content. The practical argument is that there are few, if any, cases, where governments generate revenue through selling their content. There seems to be no opportunity cost when public content is hosted on other platforms.

Allow commercial use of CC licences

Much openly licensed content has a non-commercial clause (NC): the content cannot be used commercially. This condition makes intuitive sense, but there are three reasons why the NC clause can be an impediment to usage. First, implementing partners often charge governments, schools, or other users for their implementation. After all, implementation requires resources. Implementing partners are, at best, in a legal grey zone when they use CC NC content. Second, when a commercial provider charges a fee for access to a platform that contains content that is also offered for free by the government and learners prefer that platform over the free platform, this, in the eyes of some users, seems to add value to the platform with a paywall. This perception of value may lie in the presentation of the content, the presence of extra content to fully cover the curriculum or other services such as assessment or

tracking of learning. Third, there is no opportunity cost in allowing commercial use of openly licensed content.

4.4. Recommendations for organising repositories and commissioning work

Do not transfer ownership of the RLH to governments and ministries of education

Very few high-capacity and well-funded organisations manage to organise and maintain a functional learning content repository. Transferring ownership of an RLH to several ministries of education will not result in creating a sustainable and well-managed repository. Instead, the multilateral stakeholders should consider the creation of the RLH as a long-term provision of service and be prepared to allocate funds to maintain it rather than see it as a temporary project.

Work more intensively with large content repositories

Large content repositories — such as Ubongo, CK12, Siyavula, Khan Academy, Openstax, and USAID — have the capacity, means, and know-how on making their content available through modalities other than their own platforms. There are three reasons for working in collaboration with these repositories. First, this collaboration is necessary to create standalone items that can be used in different implementations and through offline dissemination. Second, large repositories often possess more content, and more information on the place of that content in a curriculum, than is available through their visitor websites.

Third, some large repositories have expressed an interest in mapping their content against a generic curriculum framework.

Organise content in a central repository

The results of the content curation process have brought to light a number of problems in the search for content. There are three related recommendations that all concern the sustained storage of content. The RLH could be such a repository. However, this approach requires time, effort, and buy-in from a range of major stakeholders.

1. **Add content to a database.** Content and source files should be maintained in a database. Currently, many multilateral partners have no record of which content has been commissioned in the past, nor where

that content is. A global database is probably not feasible, but each donor ought to take responsibility for their content.

2. **Retain copies of source files when commissioning content.** Content in certain formats can easily be adapted, for example, content in Word documents, HTML5 files, or Epubs. Videos, PDFs, or audio files cannot be easily adapted. Whenever content is commissioned, allowing the RLH to retain copies of the source files could be a requirement for the content creator. Whoever commissions content has a responsibility to request the right to retain copies of the relevant source files.
3. **Create standards for tagging and maintaining metadata on content standards.** When content is commissioned, ensure there is a standard way to tag content, including information on licensing, curriculum mapping, authoring, links to the source files, format, purpose, target audience, etc. [Annex 3](#) contains a list of such metadata.

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Annex 1. Review of select content repositories

For the proof of concept, 41 potential content sources or repositories were assessed for the applicability of content for the two content modules used for the proof of concept, bearing in mind the requirements of the proof of concept, such as modality, target audience, and purpose.

Table 2 above, provides an illustration of all the types of content that we could obtain in an ideal situation. Digital content can have different formats, such as video, audio, HTML5 illustrated text, or PDF and have different purposes. The sheer volume of desirable content per individual skill indicates that our ambition may be unrealistic.

We reviewed a number of content repositories for their usefulness to the proof of concept of the RLH. The reviews contain a field where we indicate the subjects included in the proof of concept for the RLH: early grades literacy and biology. The list below is not exhaustive. We have retained a file with a complete list of all the repositories reviewed.

Provider name	Siyavula
URL	siyavulaeducation.com
Licence	CC BY
Target region	South Africa; sub-Saharan Africa
Subjects	Biology
Target audience	Learners
Modality	Print, digital platforms
Adaptation possible	Siyavula offers digital textbooks in both HTML5 and Epub formats. Both formats allow for easy adaptation.
Comments	Siyavula offers HTML content, videos, and Epubs. For the proof of concept, the Epub and HTML content were useful. The Epubs contained dead links and contained so much information that adaptation of the Epubs seems necessary in any case. The HTML5 pages deal with individual skills and can easily be adapted, but in many cases do not need adaptation.

Provider name CK-12**URL** ck12.org**Licence** CC BY NC**Target region** US and global**Subjects** Biology**Target audience** Learners**Modality** Digital platforms**Adaptation possible** HTML5 files can be easily adapted**Comments** CK12 offers user-made content as well as content created by CK12. Content from their Flexbooks and interactive HTML5 content (PLIX) is particularly useful for secondary level science.**Provider name** GDL Radio**URL** gdlradio.org**Licence** CC**Target region** Low and middle-income countries**Subjects** Early grades literacy**Target audience** Learners**Modality** Radio**Adaptation possible** No**Comments** The extensive library contains 240 hours of radio lessons targeting South Sudanese early grades literacy learners. However, all content is saved as “Episode X”; no further information could be found in spite of following up with the mid-term and end-term evaluators of the project who delivered the content.

Provider name	Ubongo
URL	ubongokids.com
Licence	CC (unclear which variety)
Target region	English- and Swahili-speaking countries in sub-Saharan Africa, including Uganda, Tanzania, Kenya, and Nigeria)
Subjects	Early grades literacy
Target audience	Learners
Modality	TV and video on digital platforms
Adaptation possible	Difficult
Comments	Ubongo has a wide offering of content on literacy, numeracy, and other primary skills for TV. Further, Ubongo have been able to share curriculum mapping information for different countries and provide content in both Swahili and English.

Provider name	Storyweaver
URL	storyweaver.org.in
Licence	CC BY
Target region	India and global, including Swahili and English texts
Subjects	Early grades literacy
Target audience	Learners
Modality	Digital platforms and print
Adaptation possible	Easy
Comments	This repository contains functionality to create a translation of the stories, besides offering the content in both Epub and PDF

Provider name **Khan Academy**

URL	khanacademy.com
Licence	CC BY NC SA
Target region	US and global
Subjects	Biology
Target audience	Learners
Modality	Digital platforms
Adaptation possible	Difficult
Comments	Khan Academy supports the translation of its videos to other languages and contains a Swahili-language website. It contains mostly videos but also some assessments.

Provider name Openstax

URL	openstax.org
Licence	CC BY
Target region	US and global
Subjects	Biology
Target audience	Learners and teachers
Modality	Print and digital
Adaptation possible	Easy
Comments	A US-oriented platform with both learner and teacher materials. Getting access to teacher materials requires some negotiation and patience.

Provider name Lumen Learning**URL** lumenlearning.com**Licence** CC BY**Target region** US and global**Subjects** Biology**Target audience** Learners, teachers, and educational institutions**Modality** Digital platform**Adaptation possible** Easy**Comments** The platform aims at integration with LMSs, but the actual content is available and openly licensed.**Provider name** Rising Academies**URL** risingacademies.com**Licence** CC BY NC**Target region** Africa and India**Subjects** Literacy**Target audience** Learners, teachers, and caregivers**Modality** Radio**Adaptation possible** Medium**Comments** The content is partially available, but during this project, content that had not been uploaded to the website could not be located. Content, however, includes both the radio episode and the script, allowing for quick re-recording. The programmes sometimes contain discussions on openly licensed books.

Provider name	African Storybook
URL	africanstorybook.org
Licence	CC BY NC
Target region	Africa
Subjects	Literacy
Target audience	Learners, teachers, caregivers
Modality	Print and digital platforms
Adaptation possible	Easy
Comments	The African Storybook contains books in many languages, which can be downloaded either as Epub or PDF.

Annex 2. Content criteria

While the proof of concept intended to formulate selection criteria based on an aggregate of existing criteria, this plan was abandoned after we made an inventory of some sets of criteria. This Annex contains descriptions of four sets of content selection criteria that were consulted and compared during the content curation process.

General content criteria

↑Groeneveld et al. (2020) identify several criteria that can be used to assess the quality of content for a specific locality. Table 6 contains an adaptation of those criteria.

Table 6. *Criteria to define and identify high-quality content.*

Content properties	
General quality	Content should be carefully created, factually correct, and use correct grammar. It should include an introduction, have a clear structure and a summary.
Format of content	The content source should contain textual content, video content, audio or interactive content, depending on the skill.
Length or duration	A typical text should be the right length. The duration of a video should be long enough to calmly explain all learning points. The length or duration needed should take into account how the content is used: at home, in class, or both.
Format of video	The format of the videos should be suitable for needs. A recorded lecture comes closest to classroom teaching. While it is easiest to produce, it is less engaging than an animated video. A talking head on top of an animation is difficult to modify when the language or pace requires change.
Consistency of style	Content should be as consistent in style as possible to prevent a disjointed learning experience. Relying on a few repositories for most content helps create a consistent style of content.
Locally appropriate	The content should be available in clear and straightforward language that can be understood by the target audience. For primary levels, content items should be in the local language. Content items should have an appropriate pace and cover all relevant learning points: not consistently more or fewer.
Students can relate	The protagonists in the videos and the worlds presented in stories should be relatable.

Culturally appropriate

The content should take the local situation and cultural and religious norms or taboos into account. For example, payments are made in local or familiar currencies; there are no bare arms or legs if that goes against modesty norms; pork or beef is not eaten if that goes against dietary norms.

Technical properties

General quality

Audio should be clear and crisp. Colours in videos should be clear and have appropriate contrast. On-screen text must also be legible on cheap smartphones or when projected in a dimly lit room.

Obsolete formats

The content objects are in a format that is relevant for current technology. For example, objects in Flash format are obsolete. Instead of PDF text formats, HTML5 can be preferable since it is responsive on smartphones.

UNICEF guides on reputational risk and gender bias

UNICEF uses a guide for handling potential reputational risks to UNICEF from teaching and learning materials ([↑Belot, no date](#)). The guide emphasises that any content that either bears UNICEF's logo or branding, or that can be found on a UNICEF maintained repository, can be seen as being approved by UNICEF. Their comprehensive guide contains multiple criteria on five aspects (listed below), with a total of 119 criteria. The guide seems appropriate for large projects where UNICEF commissions content to be created. For the curation of content for the RLH, the complexity of the guide with its combined 119 criteria seems impractical especially when different content sources are used. The number of criteria is very high and the focus of the guide is on reputational risk, rather than usability for learning.

1. Branding of UNICEF (8 criteria)
2. Appropriateness of images
This includes 11 criteria on risks for children in pictures, or health messages (such as smoking or drinking); 7 criteria on gender bias; and 5 criteria on appropriate crediting.
3. Quality considerations
These include 6 criteria on clear use of colours; 1 on learning domains ("knowledge, skills and values"); 3 criteria on transferability of skills; 6 on implementation; 7 on quality of text and absence of hatred.
4. Values and principles
The 41 criteria include examples such as awareness of HIV/AIDS, inclusion of peaceful resolution of conflicts, and hygiene and menstrual health.

5. Remote teaching materials

This specific form contains 24 criteria taken from the previous four forms.

Besides the reputational risk guide, UNICEF has published a concise Tool for assessing the gender responsiveness of content for digital learning platforms ([UNICEF, 2021](#)). This tool is concise and scores content on gender roles and recommends excluding any gender-biased content. For example, if useful and effective content is found that shows a woman cooking and a man working, this content should be rejected.

Kenya's standards for the CBC

Kenya's KICD has published standards for competency-based digital course materials ([Kenya Institute of Curriculum Development, 2018](#)). The standards were developed to inform third party content creators developing resources for the new competency-based curriculum. The standards contain 10 domains, covering 65 dimensions in total.

1. Conformity to the curriculum (11 dimensions)
2. Accuracy and currency of the content in the material (7 dimensions)
3. Language use (2 dimensions)
4. Promotion of positive values and attitudes
5. Integration of pertinent and contemporary issues
6. Assessment (4 dimensions)
7. Multimedia elements (13 dimensions)
8. Technical design (19 dimensions)
9. User guide (5 dimensions)
10. Cloud content attributes (2 dimensions)

Sources have informed us that these domains are also used to assess curated content, and that curated content typically is rejected for not meeting or including all dimensions in the standards.

Georgia's Affordable Learning Criteria

The University System of Georgia has a short, more practical list to assess the quality of OER and has been specifically designed to evaluate OER ([↑Affordable Learning Georgia, no date](#)). The criteria are a mix of 'must-have' criteria, such as factual accuracy, and 'nice-to-have' criteria, such as accessibility or the presence of supplemental resources. The list identifies six criteria that include 18 considerations

- Clarity, comprehensibility, and readability
- Content accuracy and technical accuracy
- Adaptability and modularity
- Appropriateness
- Accessibility
- Supplementary resources

Annex 3. Tags and metadata

Structured use of predefined tags and metadata are necessary for finding content items and for filtering by properties. For the RLH, we have used the tags listed in Table 7. Note that any value must be taken from a predefined list to avoid variations in spelling (“Kiswahili” or “Swahili”, “HTML5” or “HTML-5”, (“Samantha Smith” or “Sam Smith” as author, etc.). In most cases, tags can have multiple values.

Table 7. *Tags and values used in the Regional Learning Hub.*

Tag	Content
Item name	The filename. Free field, but should be informative. So, “Light and dark reactions”, not “Skill 5”.
Modality	The modality for which the content item is appropriate: Digital platform, feature phone, TV, radio, or print.
Function	The function or purpose of the content item. Assessment, Learning content, Activity, Workbook, Lesson plan
Format	The format of the content. Audio (Radio), Audio (Feature phone / IVR), Audio (Platforms), Video (TV), Video (Platforms), Text (Feature phone), Illustrated text (HTML5), Illustrated text (Epub), Interactive (HTML5), Presentation deck, Upload file (CSV)
Audience	Learner, Teacher, Caregiver
Language	Ensure this list is taken from a predefined list to avoid duplicates and maintain data hygiene (e.g., decide on either Swahili or Kiswahili).
CC	Information on the copyright per item: CC, CC BY, CC NC, CC BY NC, CC BY ND, etc.
Filesize	#
Producer	Siyavula, CK12, etc.
Author	
Requires / allows adaptation	Yes/No Some files clearly need adaptation to be useful, but adaptation is more practical with Epub, Docx, HTML5 than with PDF, MP3, MP4
Source link	A URL referring to the origin of the content item
File	The actual file in reusable format, for example, HTML5 files are typically packaged in a ZIP file with the HTML file and the folders containing CSS and images.
Grade information	This can be a range for proficiency-based content or for content that fits at different points in the curriculum
Subject	English, Biology, Physics, etc.
Topic / chapter	
Curriculum standard	If the curriculum contains a logical organisation, curriculum standard numbering and organisation can be provided here. See, for example, this Common Core example .