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# The use of virtual learning environments and learning management systems during the COVID-19 pandemic

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### About this document


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## 1. Introduction

Since the onset of the COVID-19 pandemic, education planners have focused on high-tech remote learning approaches to ensure educational continuity and mitigate

learning loss. This technical note aims to inform the use and development of virtual learning environments (VLE) in educational responses to the current health crisis. The terms "virtual learning environment" and "learning management system" (LMS) are used interchangeably. We will use the term "virtual learning environment" throughout this technical note.

## 2. What purposes do virtual learning environments serve?

Platforms that offer VLEs provide facilitators with tools and resources to support education delivery. Facilitators (including teachers) can design VLEs to serve multiple purposes and functions. During the immediate crisis, VLEs can provide out-of-school students with an alternative platform to access quality educational content and to pursue national learning objectives. Education planners should note, however, that many students in low- and middle-income countries may not benefit from VLEs due to poor connectivity and a lack of technological hardware.

Programme implementers need to think about what purpose a VLE will serve in their specific context.[1] VLEs can give learners access to educational resources, connect students with teachers and facilitate remote lessons. While these outcomes are desirable, implementers do not necessarily need a VLE to achieve these results. If a country does not currently have a national VLE, this may not be the time to start developing a new platform.

Similarly to equating classroom attendance with learning in traditional schools, implementers should not conflate the provision of EdTech with distance learning. In practice, the educational impact of VLEs depends on pedagogy, content and the student's context. Recent data from Senegal, for instance, indicates that less than 1% of learners have used online courses to pursue education since the beginning of the health crisis. This case does not mean that VLEs cannot generate positive educational outcomes. Instead, the example shows that implementers need to carefully design VLEs for students to benefit. In low- and middle-income countries, implementers need to consider factors such as how marginalised children will access VLEs, how content relates to the curriculum and how to support student engagement. This intervention should form part of a multi-modal education response that aims to reach as many learners as possible.

Prior to creating a VLE, implementers need to examine the associated risks. Online learning can put children at a greater risk of cyberbullying, sexual exploitation, loss of personal data and exposure to harmful content. Moreover, the development of a VLE can take time and resources away from other interventions.

[1] In this technical note, we use "implementers" as a general term that refers to all stakeholders involved in the development of a VLE. These stakeholders include policymakers, educators, curriculum planners, policy advisers and more.

## 3. Virtual learning environment typologies

**When developing a virtual learning environment, implementers should select a typology that offers a context-appropriate range of functions.**

This section outlines six VLE typologies to provide implementers with a more nuanced understanding of their available options. The author developed this classification from an analysis of a current World Bank resource list that offers an overview of more than 100 VLEs. These definitions represent idealised typologies. In practice, platforms may exhibit characteristics from several different categories.

*Figure 1. Virtual learning environment typologies*

| # | Typology | Definition | Examples |
|---|---|---|---|
| **1** | Basic content repository | A knowledge management system with content that users can filter by age, subject, language and more. | 1) OER Commons<br>2) Global Digital Library<br>3) African Storybook Library |
| **2** | Scaffolded content repository | A collection of resources with a structure that guides students toward specific learning goals. Students can monitor their progress through quizzes and virtual exercises. | 1) STEMbyME<br>2) Curriki<br>3) Rumie |
| **3** | Scaffolded curriculum-aligned content repository | This platform exhibits the same characteristics as scaffolded content repositories, but aligns some or all resources with national curricula. | 1) CK-12<br>2) Khan Academy<br>3) Longhorn (Kenya) |
| **4** | Asynchronous learning platform | A learning platform with structured content and tools to communicate with others asynchronously.[2] | 1) Moodle<br>2) Canvas (both asynchronous and synchronous) |

[2]Asynchronous communication tools allow two or more people to communicate without being "present" at the same moment. For example, a student could send a message that their teacher will receive when they log into their account.

| | | | |
|---|---|---|---|
| **5** | Synchronous learning platform | The same as the above except with tools aimed at communicating with others in real time (e.g. live chat). | 1) Google Classroom<br>2) Edmodo<br>3) JAAGO (Bangladesh) |
| **6** | Offline (a-)synchronous platforms | A learning platform designed to serve a number of standalone functions. For example, students could use an application as a content library, an asynchronous learning platform or a synchronous learning platform. | 1) Kolibri (see Appendix 1)<br>2) Rachel Plus<br>3) Open Learning Exchange |

## 4. Considerations for selecting a virtual learning environment

This section outlines a number of criteria that implementers should consider when choosing or developing a VLE. Key considerations for selecting a virtual learning environment include:

- Repurposing existing platforms where possible
- Clearly defining educational and technical criteria before selecting a VLE
- Applying this criteria to choose a context-appropriate VLE

### 4.1. Homegrown solutions: to build or not to build?

Programme implementers should adapt existing VLEs to their needs rather than building their own platforms from scratch. Section 5 exhibits how even a small number of options offer features that can support learning in a wide variety of contexts.

Implementers can repurpose VLEs to reduce the time and cost of software and content development. Many systems allow implementers to use readily available curriculum-aligned materials, incorporate supplementary resources and upload their own content.

In short, existing platforms can present a feasible and cost-effective distance learning option that will not reduce the quality of educational programming.

### 4.2. Criteria for selecting a suitable virtual learning environment

Implementers should consider the following educational and technical criteria when choosing a VLE.

| Educational criteria for choosing a VLE | |
|---|---|
| Area | Questions |
| Content selection | What age groups will the platform target in the short- and medium-term? |
| | What content do you require for each subject and age group? |
| | What language(s) do you intend to use to deliver content? |
| | What type of content do students require (e.g. textbooks, videos)? |
| | Do you already have a range of digitised content and activities with accompanying assessment criteria? |
| | Are there gaps in content coverage? Can you immediately address these gaps? |
| | Do you have content that can be used on multiple modalities (e.g. radio, television and online)? |
| | How similar is your national curriculum to that of other countries? |
| Pedagogical readiness | What is the availability of teachers during the crisis (e.g. childcare, food)? |
| | To what extent are teachers digitally literate? |
| | Do teachers have knowledge of distance learning pedagogies? |
| | Do you plan to use the platform to support teacher professional development? |
| | Do you have facilitators or coaches to support teachers? |

| Technological criteria for choosing a VLE | |
|---|---|
| Area | Questions |
| Technological readiness | To what extent are students and parents digitally literate? What extra support will users need to operate the system? |
| | What hardware is available to students? |
| | What technological affordances can students access? |
| | Which students have the means to access the internet? What is the cost of data? |
| | What bandwidth is available to students? What content formats can this bandwidth range support? |
| | How does access to hardware, internet and bandwidth differ across geographies and within households? |
| Policy infrastructure | Does your country have an e-learning policy in place? |
| | How does the development of a VLE fit into your country's education reform plans? |
| | Does your government have any existing partnerships with any EdTech providers or technology companies? |

## 5. Comparison of virtual learning environments

The following table considers the advantages and disadvantages of a number of existing VLEs that are available either for free or on a freemium basis.[3] This spreadsheet provides a detailed comparison of these platforms, including information on available languages and subjects.

*Figure 2. Summary of different virtual learning environments*

| Name and typology | Advantages | Disadvantages |
|---|---|---|
| OER Commons<br>(Basic content repository) | 1) Wide variety of curriculum-aligned and exploratory materials from reputable providers in multiple formats<br>2) Easy to use the search function to find materials relevant to your needs<br>3) A readily available and low-cost solution that learners can use without the need for high bandwidth or advanced hardware<br>4) Education providers do not need digitally literate teachers with knowledge of distance learning pedagogies | 1) A limited selection of content that relates to the curricula, languages and contexts of learners in low- and middle-income countries<br>2) Increased burden on caregivers to offer support with learning exercises and guidance on the selection of content<br>3) Few opportunities to track student attendance, engagement and achievement |
| Rumie<br>(Scaffolded content repository) | 1) Tried and tested with learners in low-resource, low-connectivity settings (e.g. Afghanistan, Syria)<br>2) High-quality and engaging exploratory content from reputable providers (e.g. Ubongo and Sesame Street)<br>3) A readily available, low-cost and tech-agnostic solution that does not require high bandwidth<br>4) Education providers do not need digitally literate teachers with knowledge of distance learning pedagogies | 1) A very limited range of curriculum-aligned content<br>2) Difficult to browse and identify resources from specific providers without prior knowledge of the location of their materials<br>3) Highly dependent on the student's capacity to self-regulate and self-motivate<br>4) Increased burden on caregivers to offer guidance on the selection of content and support with learning exercises<br>5) Few opportunities to track student attendance, engagement and achievement |

[3] A freemium pricing plan allows all users to access basic features for free while charging subscribers to access additional content and services.

| | | |
|---|---|---|
| CK-12<br>(Scaffolded content repository) | 1) CK-12 offers readily available, low-cost digital textbooks that can host written content, audio materials, videos, simulations, interactive activities and progress trackers<br><br>2) Provides students with a structured learning pathway as well as clear directions on how to pace their studies<br><br>3) Users can download and distribute CK-12's interactive digital textbooks (or Flexbooks) offline<br><br>4) Curriculum developers have the capacity to use, edit and repurpose existing CK-12 materials<br><br>5) Supports a flexible response to COVID-19, allowing schools to use CK-12's existing content in the short-term before tailoring these resources to their needs in the medium- to long-term | 1) A lack of content that relates to the curriculum, languages and context of learners in LMICs<br><br>2) CK-12's existing resources predominantly focus on STEM subjects<br><br>3) Increased burden on caregivers to guide children to select appropriate textbooks, especially in areas where education providers offer limited advice<br><br>4) The platform cannot host direct teacher-student communication channels (e.g. discussion boards, live chat) |
| Khan Academy<br><br>(Scaffolded curriculum-aligned content repository) | 1) Learners of any age can access a range of tried-and-tested materials that reflect general principles of effective pedagogy<br><br>2) A readily available, low-cost solution that provides students with a structured learning pathway<br><br>3) Clear in-class directions can support students with self-regulation and pacing their learning<br><br>4) Education providers do not need digitally literate teachers with knowledge of distance learning pedagogies<br><br>5) The provision of personalised feedback and the Khan Academy learning points system enable students to identify strengths and areas for improvement | 1) Demands relatively advanced hardware and reasonably high bandwidth to access educational videos<br><br>2) The heavy use of videos can amplify the challenge of understanding content in an unfamiliar language or dialect<br><br>3) No offline functionality (although students can access content on Kolibri)<br><br>4) Increased burden on caregivers to offer guidance on the selection of classes, especially in areas where education providers offer limited advice |

| | | |
|---|---|---|
| Kolibri<br>(Offline (a)synchronous platform, see appendix 1) | 1) A readily available, low-cost solution that has been tried and tested in LMICs (e.g., DRC, Tanzania)<br><br>2) A wide range of high-quality curriculum-aligned materials from other providers (e.g., Khan Academy, CK-12)<br><br>3) Once one device has downloaded content, this handset can share materials with students in low- or no-connectivity areas via local offline networks and USB drives<br><br>4) Students can access learning materials without enrolling in a specific class<br><br>5) The platform can support classes and content in a number of different languages<br><br>6) Administrators can create classes with their own resources or rely on the Kolibri open repository if they have no digitised content<br><br>7) Education providers do not need digitally literate teachers with knowledge of distance learning pedagogies<br><br>8) Ministries can use the Kolibri Studio tool to develop channels with curriculum-aligned content for users in their country<br><br>9) Supports a flexible response to COVID-19, allowing schools to use publicly available content in the short-term and integrate curriculum-aligned content in the medium- to long-term | 1) Similarly to other repositories, publicly available content covers a limited range of languages<br><br>2) The system is designed for formal learning and therefore demands a high level of planning to curate content, design exercises and organise lesson schedule<br><br>3) Increased burden on caregivers to guide children to select appropriate content where education providers have not created curriculum-aligned channels<br><br>4) Originally designed for in-classroom use rather than remote learning |
| Moodle<br>(Asynchronous learning platform) | 1) Less requirements for high bandwidth and advanced affordances than synchronous platforms<br><br>2) Teachers can develop, adapt and update curriculum-aligned content to meet the changing needs of individual students | 1) Dependent on the availability of digitally literate teachers with knowledge of distance learning pedagogies<br><br>2) The need to build course pages can lead to differences in the quality of resources, activities and class structure |

| | | |
|---|---|---|
| Moodle (continued) | 3) Wide range of available plug-ins to support teachers with structuring materials, designing activities, assessing work and providing feedback<br><br>4) Reasonable teacher presence can enable students to better pace their learning and provide a greater sense of educational continuity<br><br>5) Students can access downloaded quizzes, discussion boards and assignments offline<br><br>6) Administrators can easily track student attendance, engagement and performance<br><br>7) The platform can support classes and content in over 100 different languages | 3) Demands a high level of planning to curate content, design exercises and organise lesson schedules<br><br>4) Class codes create a barrier to accessing online content, offering disproportionate benefits to already advantaged students at schools with better resources<br><br>5) Limited offline functionality (e.g. users cannot share content with other students via local networks) |
| Google Classrooms<br>(Synchronous learning platform) | 1) The integration of multiple Google applications provides students with a one-stop-shop platform for all of their learning needs<br><br>2) Many teachers and students may already have a basic understanding of how Google functions<br><br>3) Teachers can structure courses to meet national education standards and to suit the individual needs of learners<br><br>4) High teacher presence can support student motivation and provide a greater sense of educational continuity<br><br>5) The option to automatically send parents email updates on their children's progress can encourage caregivers to support home-based learning<br><br>6) Administrators can easily track student attendance, engagement and performance<br><br>7) The platform can support classes and content in over 140 different languages | 1) Requires high bandwidth, high affordances and the payment of potentially high associated costs<br><br>2) Virtual classroom passwords create a barrier to accessing online content, offering disproportionate benefits to already advantaged students at schools with better resources<br><br>3) Dependent on the availability of digitally literate teachers with prior knowledge of distance learning pedagogies<br><br>4) Demands a high level of planning to curate content, develop activities and organise lesson schedules |

| | | |
|---|---|---|
| Edmodo<br>(Synchronous learning platform) | 1) Educators can tailor content to the curriculum, learning objectives and contexts of students in low- and middle-income countries<br><br>2) Opportunity to offer adaptive learning pathways and personalised feedback to pupils<br><br>3) High teacher presence can support student motivation and provide a greater sense of educational continuity<br><br>4) Administrators can easily track student attendance, engagement and performance | 1) Requires high bandwidth, high affordances and the payment of potentially high associated costs<br><br>2) Virtual classroom passwords create a barrier to accessing online content, offering disproportionate benefits to already advantaged students at schools with better resources<br><br>3) Dependent on the availability of digitally literate teachers with prior knowledge of distance learning pedagogies<br><br>4) Demands a high level of planning to curate content, develop activities and organise lesson schedules<br><br>5) The platform can only host classes and content in a narrow range of languages<br><br>6) Higher cost than competitors |

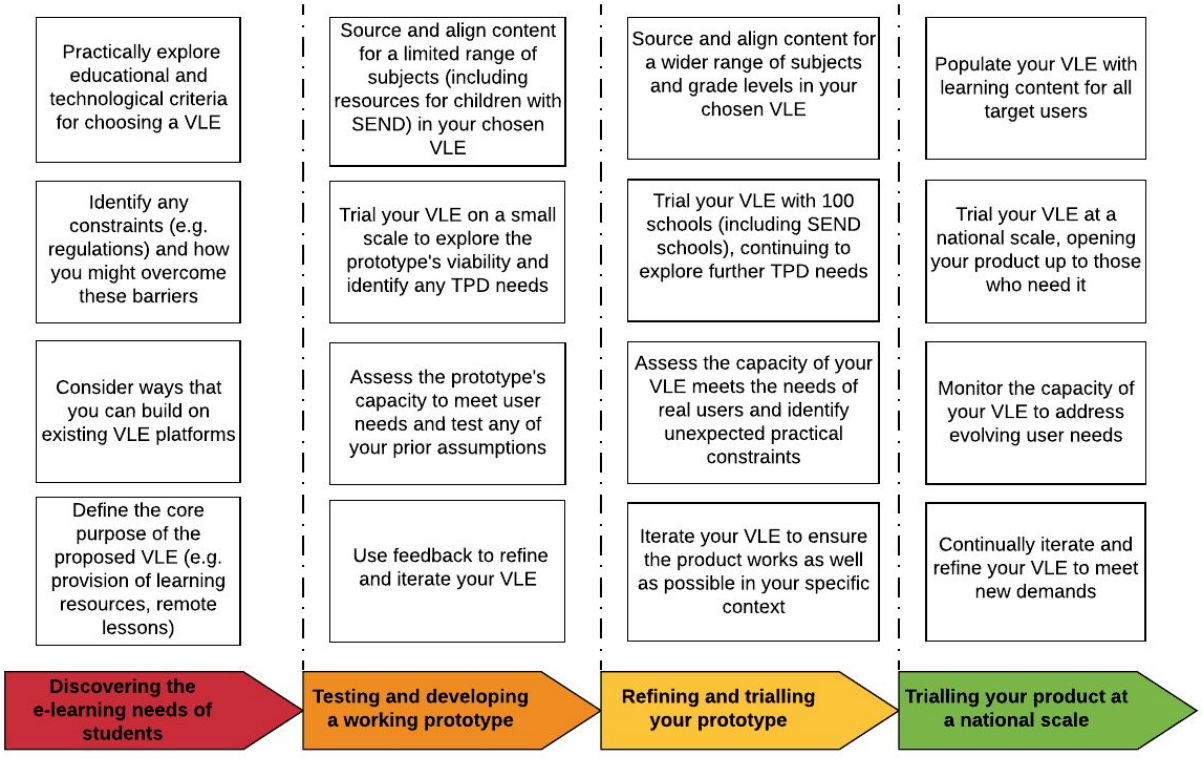
## 6. Selecting an appropriate virtual learning environment

When selecting a virtual learning environment, implementers should consider the above criteria (Section 4) and the above comparison of VLEs (Section 5).

If education providers do not currently have a VLE in operation, we strongly recommend against creating a new platform in a rush. In many low- and middle-income countries, marginalised communities will not have immediate access to VLEs due to poor connectivity. Implementers should consider alternative modes of delivery such as radio, television and non-smart phone to reach disadvantaged populations during the current pandemic.

Meanwhile, implementers should make a well-considered plan to establish a VLE over the next 12 to 18 months. This plan should follow established procedures for delivering new services.[4] In this process, programme implementers should consider their country's educational and technological readiness alongside each other to select an appropriate VLE. Educational readiness refers to the extent to which implementers have access to curriculum-aligned content and digitally literate teachers with knowledge of distance learning pedagogies. Technological readiness refers to the extent to which students have access to suitable technological infrastructure. The following diagram outlines a sequence of steps that implementers should take when developing a VLE.

*Figure 3. A four-part approach to developing a VLE*




[4] The UK Government Digital Service manual provides an example of such procedures.

For school-based use, VLEs with offline functionality such as Kolibri offer significant advantages. This type of VLE can prove more reliable for teachers and students at the point of use as it eliminates the need for connectivity. Implementers should approach synchronous learning platforms with great caution. Even very high-income countries still find these systems challenging to roll out. In this context, asynchronous offline learning platforms are preferable.

Beyond choosing a virtual learning environment, implementers need to consider how to procure curriculum-aligned content. Materials should cover large parts of the curriculum to enable teachers to make practical use of these resources. In general, implementers should draw on scaffolded curriculum-aligned content repositories where possible.

For out-of-school use, implementers need to examine which populations can actually use a VLE. Implementers should give preference to VLEs that can function on basic smartphones and non-smart phones. Moreover, implementers should explore the option of zero-rating online learning resources. However, disadvantaged populations are more likely to benefit from distance learning strategies that employ radio, television and print media.

## 7. Links and references

A full list of references can be found in the EdTech Hub evidence library.

Hares, S., & Mundy, K. (2020). Equity-Focused Approaches to Learning Loss during COVID-19. https://www.cgdev.org/blog/equity-focused-approaches-learning-loss-during-covid-19

Huang, R., Tlili, A., Yang, J., Wang, H., Zhang, M., Gao, B., Lu, H., Chang, T.-W., Cheng, Q., Yin, X., & Cheng, W. (2020). *Handbook on Facilitating Flexible Learning During Educational Disruption*. https://iite.unesco.org/wp-content/uploads/2020/03/Handbook-on-Facilitating-Flexible-Learning-in-COVID-19-Outbreak-SLIBNU_V2.0_20200324.pdf

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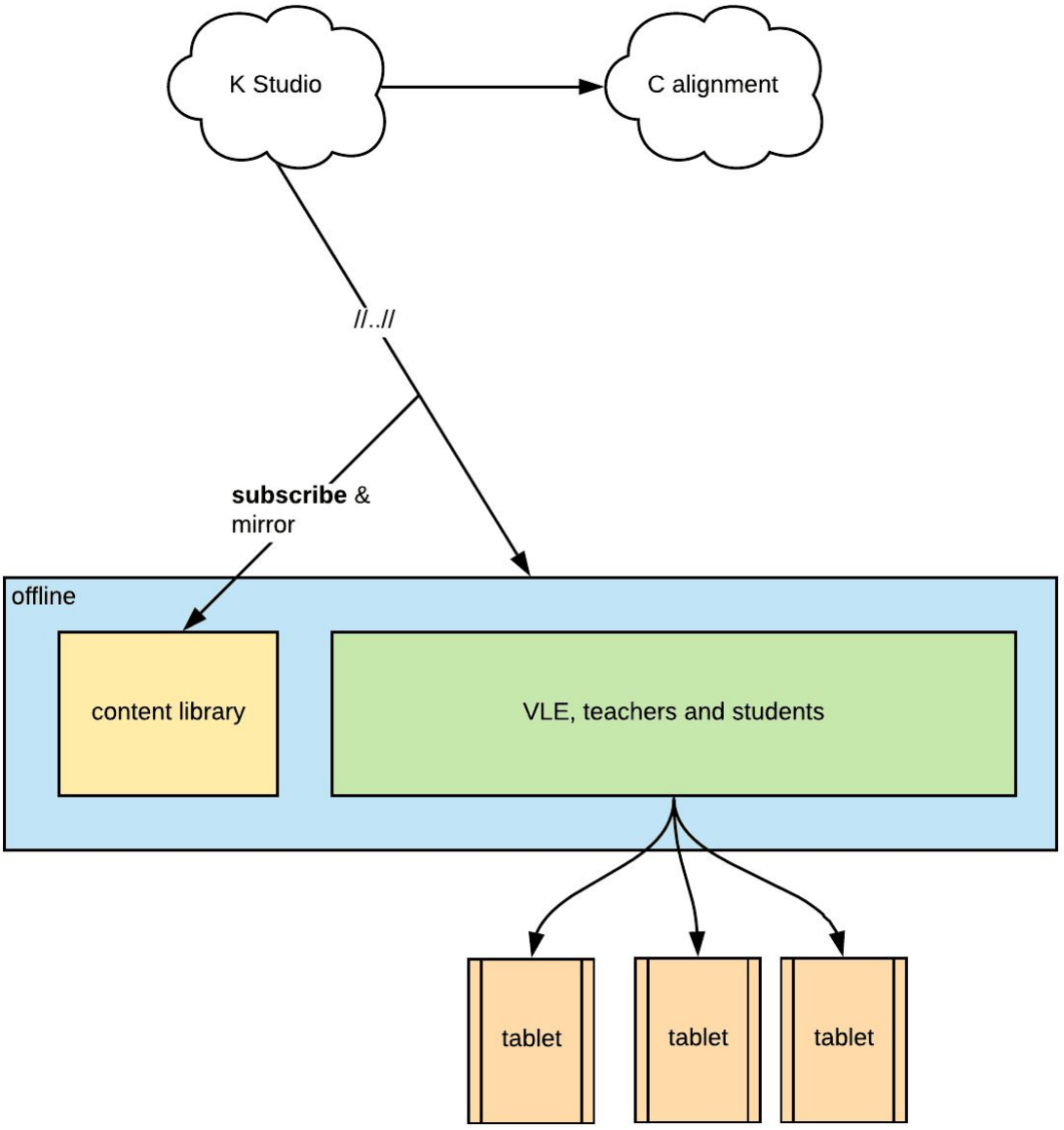
UNICEF et al. (2020). *COVID-19 and Its Implications for Protecting Children Online.* https://inee.org/system/files/resources/COVID-19%20and%20Its%20Implications%20for%20Protecting%20Children%20Online.pdf

World Bank. (2020). *Remote Learning, Distance Education and Online Learning During the COVID19 Pandemic: A Resource List by the World Bank's Edtech Team*.. http://elibrary.worldbank.org/doi/book/10.1596/33499

## Appendix 1. The architecture of the Kolibri platform

This diagram shows the different functions of the Kolibri learning platform.




Educators can use the Kolibri Studio tool to curate content into “channels” that align with local curriculum standards.

In the Kolibri application, school administrators can develop lessons with content from national curriculum channels or Kolibri’s open content library. Teachers can enrol students in lessons which host selected resources and learning exercises. Alternatively, students can independently subscribe to channels on Kolibri’s content repository.

## Appendix 2. Examples of national virtual learning environments

| Country | VLE name | Website |
|---|---|---|
| Bangladesh | Konnect Student Portal | https://konnect.edu.bd/my-school |
| Democratic Republic of Congo | Vodaeduc | https://vodaeduc.vodacom.cd/en/learn/#/topics |
| India | DIKSHA | https://diksha.gov.in |
| Indonesia | TV Edukasi | https://tve.kemdikbud.go.id |
| Iraq | NEWTON e-learning platform | www.newtoniq.tech/home/live |
| Jordan | Darsak e-learning portal | https://darsak.gov.jo/ |
| Kenya | Kenya Education Cloud | https://kec.ac.ke |
| Kyrgyzstan | Ibilim | https://www.ibilim.kg/kyr/index.html |
| Nigeria | West African Examinations Council e-learning platform | https://waeconline.org/e-learning |
| Rwanda | Rwanda Education Board e-learning platform | www.elearning.reb.rw |
| Syria | Syrian Educational Platform | http://www.sep.edu.sy/ |
| Turkey | Eğitim Bilişim Ağı | https://www.eba.gov.tr |
| Uganda | Ugandan Kolibri platform | http://e-learning.education.go.ug/en/learn/#/topics |