Evaluated in February 2021
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1. What Does This Report Contain?

The section, 'Overview of the Product', provides a brief description of the product and its key features to give the context for the evaluation. The two sections following that present the findings from the evaluation. The Executive Summary provides the overall rating and offers implications in terms of benefits and limitations for teachers and learners. The Detailed Review section provides an in-depth evaluation of the product, categorized under three dimensions (or constructs) – Content Quality, Pedagogical Alignment, and Technology & Design. For each dimension, the product is reviewed on the criteria along with explanations for the rating, and grouped into clusters. Specific examples have been provided in this report to support and elaborate on the evaluation ratings.

The terms, 'Exemplary', 'Valuable', and 'Potential to Improve', used in the report refer to the rating scale for evaluating the product.

- 'Exemplary' indicates that the product has been designed as per recommended learning theories and research-based evidence.
- 'Valuable' indicates limited adherence of the product’s design to the recommended learning theories and research-based evidence.
- 'Potential to Improve' indicates unsatisfactory or lack of adherence of the product's design to the learning theories and research-based evidence.

2. Overview of the Product

Khan Academy offers instructional videos, practice exercises, and a personalized learning dashboard for learners to study at their own pace in school or at home. The platform also has teacher tools and a coach dashboard that empower teachers to identify the learning requirements of each student, based on which they can tailor remediation for each student. The product contains elements of personalization and adaptivity for learners.
3. Executive Summary

**Khan Academy | Mathematics | Grades 3-5**

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<th>Pedagogical Alignment</th>
<th>Technology and Design</th>
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<tbody>
<tr>
<td>Valuable</td>
<td>Exemplary</td>
<td>Exemplary</td>
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**Potential benefits of this product**

- Teachers and learners can be assured of the correctness of the content.
- Learners will likely be able to learn independently as much as possible.
- Practice questions have exemplary feedback quality, scaffolding in terms of hints, and remedial content. These provide learners an effective platform to practice various concepts.
- The course challenge offered at the beginning provides an excellent chance for learners to identify strengths and weaknesses. Learners can effectively plan the topics where they wish to spend more time.
- Learners will likely stay motivated to continue their learning journeys due to the various features of the product.
- The product has a high potential to be used by teachers effectively to identify the learning needs of different students and support them appropriately.
- The product is excellent at following universal design principles. It addresses the needs of diverse learners and hence makes it inclusive for a variety of learners.

**Potential limitations of this product**

- Students in an Indian context, especially from backgrounds where they may not be exposed to English in their day-to-day lives, might find it difficult to relate the accent and tone of the videos.
- The lack of sufficient real-life context and scenarios might deprive learners of the logical connections of mathematics to their everyday lives if they use this product as their only learning platform.
- The lack of opportunity for experimentation, interactive activities, or mathematical tools for problem-solving makes the product less effective in helping learners make meaning of the content and explore various possibilities independently. This might lead to a good fluency in procedural mathematical skills while missing out on deeper connections and conceptual understanding.
Khan Academy (Grades 3-5): Summary of Review Ratings by Criteria

Content Quality: Valuable 😊

**C1 Content accuracy**
All content is accurate and explained clearly.

**C2 Correctness and clarity in assessment**
All assessment questions in practice tests or associated activities and their solutions are correct and unambiguous.

**C3 Language comprehensibility**
The intended learners will likely understand the language with some effort due to the foreign accent.

**C4 Mathematics skill coverage**
The overall Mathematical skills and mindset required for grades 3-5 (recommended by NEP 2020 and NCF) are covered across various topics in the grade range.

**C5 Curriculum alignment**
The content is broadly aligned to NCERT and logically sequenced. However, some specific concepts are missing in some topics in the relevant grade.

**C6 Inclusivity in representation of learners**
There is no attempt to include diverse learners in terms of gender, caste, look, socio-economic class, etc.

Pedagogical Alignment: Exemplary 😊

**P1 Constructivist approach**
The content videos help the learners to make meaning of the concepts and make thinking visible. However, there are insufficient opportunities to apply the concepts.

**P2 Addressing learning gaps / alternate conceptions**
Potential learning gaps are identified by not completely in some learning units.

**P3 Content in context**
Real-life context is missing across most topics in the product.

**P4 Learner scaffolding**
The product included sufficient scaffolds like hints to help the learner form the correct mental model of the concept.

**P5 Cognitive engagement**
Important elements are highlighted well, and the tone is conversational.

**P6 Motivational Features**
The product includes motivational features (Both Intrinsic and Extrinsic) that are well integrated & will encourage learners to explore the content further.
P8 Learning objective – assessment alignment
The learning objective and cognitive levels of the assessments are aligned to the content as well as the national curriculum.

P9 Pedagogy – assessment method alignment
Some aspects of the pedagogy recommended by the NEP - Scenario and Activity-based teaching - are present in the videos but are insufficient in the assessments.

P10 Cognitive levels covered
Questions involving higher-order thinking skills are insufficient in some learning units.

P11 Feedback Quality
Detailed explanations are present for assessment questions, and there is an opportunity to revisit the related content.

P13 Adaptivity
The mastery levels of a learner are decided based on a test. The learner is suggested topics that might need more focus.

P14 Teacher Support
There is extensive support for teachers to manage the learning paths of various students.

Technology and Design: Exemplary 🎉

T1 Interface design: Enable intuitive use
The interface is intuitive to use, all elements are clearly visible and actions are mapped to their expected response.

T2 Interface design: Assess consequences of an action
The interface provides an appropriate response to the learner’s action.

T3 Learner navigation & pace
The interface provides complete control to learners over their learning path.

T4 Universal design
Features of universal design are present to ensure a low entry barrier to diverse learners.

T5 Analytics for learners’ progress
The dashboard provides easily interpretable progress of the learners to both teachers and learners.

T6 Tools to support problem-solving
No mathematical tools are present except a scribble pad.

T7 Meaningful interactivity
Basic interactivity features are present, but concept-specific interactivity features are insufficient in some learning units.

T8 Content type – Technology alignment
The images or visualizations used are aligned to the content type.
4. Detailed Review

4.1 Content Quality 😊

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4.1 Content Quality

Content Quality measures the accuracy and content / skill coverage for the grade targeted and the specific domain. This dimension focuses on content accuracy and clarity, alignment to national standards, and inclusivity in content representations.

4.1.1 Content Accuracy and Clarity

Content Accuracy (C1) is rated Exemplary: The content is a combination of short videos and some practice assessment questions. No inaccuracy has been observed in any of the videos. All the concepts are explained accurately in all topics. The example problems solved in some of the videos also have correct and complete explanations.

Illustrative example (Fractions, Grade 4):
While explaining the concept of halves, it is made clear that the two parts should be equal.

Illustrative example (Area, Grade 5):
The calculation of area and the derivation of the formula for the area of a rectangle is shown accurately and completely with the help of concrete examples.

Correctness and clarity in assessment (C2) is rated Exemplary. The assessment questions are unambiguous and clearly state the expected way to respond for the learner. The solutions are correct, complete, and broken down into multiple smaller steps.
**Illustrative example (Fractions, Grade 5):**

The learner is asked to identify the correct images showing $\frac{1}{3}$. Clear images support the question, and a step-by-step solution follows after the learner attempts the question.

**Question:**
- Which images show $\frac{1}{3}$ shaded?
- Choose 2 answers:
  - [ ] INCORRECT
  - [ ] CORRECT (SELECTED)
  - [ ] CORRECT (SELECTED)
  - [ ] INCORRECT

**Solution:**
1. Each whole is divided into 3 equal parts.
2. Each slice is equal to 1 out of 3 pieces, or $\frac{1}{3}$.
3. We want the fraction shaded to be $\frac{1}{3}$, so
4. The following images show $\frac{1}{3}$ shaded:

**Language Comprehensibility (C3) is rated Valuable:** The sentences are short and simple. The vocabulary used is also easy, except in rare instances. But the language and tone used in the videos are too casual, with a flavor of American slang and a foreign accent. This might require some effort to understand and potentially be challenging for the intended learners to relate.

**4.1.2 Alignment to National Standards**

<table>
<thead>
<tr>
<th>Mathematics Skill coverage (C4)</th>
<th>Curriculum alignment (C5)</th>
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**Mathematics skill coverage (C4) is rated Exemplary:** The overall Mathematical skills and mindset required for grades 3-5 (recommended by NEP 2020 and NCF), such as developing a liking towards Math, seeing a connection of mathematical thinking to their daily lives, identifying patterns arithmetic fluency, data handling, and estimation are covered to across various topics in the grade range.
In this example, the skills of estimation and connection of Math to daily lives come across clearly. The video helps the learner get an intuitive sense of volume units by comparing the volume held in different containers.

**Curriculum alignment (C5) is rated Valuable:** It is observed that all topics and sub-topics covered were aligned with the content present in NCERT textbooks for Grade 3-5 and logically sequenced.

However, some important concepts as per the curriculum are missing in some of the topics.

**Illustrative example:**

- Mass, Grade 3: While the estimation of mass is well covered, the idea of comparison of mass is missing.
- Perimeter, Grade 4: Some aspects like estimating the perimeter of irregular and curved shapes is missing. Also, the application of perimeter is missing.

**4.1.3 Inclusivity in Content Representation**

**Inclusivity in the representation of learners (C6)**

**Inclusivity in the representation of learners (C6) is rated Potential to Improve:** Other than a distribution of gender names in illustrative examples, there is no evidence of a systematic effort to consider the representation of learners belonging to different religions or socio-economic groups. Even the names used are not suited to an Indian context.

**Illustrative example:**

Most of the names used are also not commonly Indian. Names like Beth, Jeff, Brian, Mrs. Jones are used in all the questions of a learning unit. Examples of foods included pie, cheese and pepperoni, which might not be very familiar to a vast majority of the Indian audience. Settings like Barn, Pasture and Coral are used, which might be again a little unrelatable.
This likely lack of relevance specifically for an Indian learner is commonly seen throughout the product.

### 4.2 Pedagogical Alignment

Pedagogical Alignment focuses on Adaptivity, learner-centered pedagogy, enhancing learner experience, assessment of learning, and teacher support. It measures the extent of alignment of the pedagogical strategies with national educational policies, Learning Sciences theories and design principles to create a meaningful learning experience.

#### 4.2.1 Learner-Centred Approach

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<tr>
<th>Constructivist approach (P1)</th>
<th>Addressing learning gaps / alternate conceptions (P2)</th>
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Constructivist approach in pedagogy design (P1) is rated Valuable: The product and content design go beyond a mere transmission of information. A positive aspect of the videos is the willingness of the presenter to try out multiple possibilities and be comfortable with some of the ideas not working out. This makes the thinking visible for the learner.

**Illustrative example:**
- Multi-digit division, Grade 5: For example, in the video, when dividing 9815/65, he tries (whether 65*4 or 65*5 would go into it at one point).
- Fractions, Grade 5: Some aspect of trying out multiple possibilities is observed, like creating the same fraction in multiple ways.

However, important aspects of a constructivist pedagogy are missing. For example, the videos contain instances where the learner is prompted to pause and think about the situation or scenario before moving ahead. Still, the pauses are not structured enough about what exactly the learner should try to think about. Also, there is no explicit instruction to pause the video. The presenter says it casually, "Maybe just pause and think about it," and then immediately moves on. Also, an opportunity for experimentation in the product is missing.

**Illustrative example:**
- Mass, Grade 3: There is no experimentation or visualization with weighing balance (or other tools) or scenarios of weight comparisons in any content piece. It's missing how he imagined or judged one object to be lighter or heavier than the other. Some examples are shown (like feather, rock, person), but the scenarios are insufficient.
Connection to prior knowledge and opportunities for problem-solving and applying the concepts are not sufficient. Sometimes, the videos directly talk about the procedure of solving problems rather than building an understanding of the concept.

**Illustrative example:**

- Perimeter, Grade 4: The video directly starts by explaining how to find the perimeter of different shapes while missing any connection to prior knowledge or a general understanding of the related concepts or the context.

**Addressing learning gaps / alternate conceptions (P2) is rated Valuable:** There is variation observed in how potential learning gaps have been addressed across the topics. In topics where learners are unlikely to have major alternate conceptions, explanations are comprehensive, and no instances are observed, which might induce misconceptions.

However, in many topics, possible learning gaps are identified but not addressed effectively.

**Illustrative example:**

- Fractions, Grade 3: It is clearly identified that parts need to be equal when comparing fractions. However, it is not addressed sufficiently. There is nothing to help the child imagine if the parts are equal or not. An animation or overlapping images of parts could have helped.
- Perimeter, Grade 3: Different scenarios are explained well, for example, perimeters of regular shapes and irregular shapes. However, some frequently reported learning gaps are missing. For example, What happens when a piece (say, a corner) is removed from a square? Does the perimeter increase/decrease?
- Area, Grade 4: The idea that the same areas can be obtained with multiple shapes is missing. Also, the effect of different actions (like rotating, changing the orientation, stretching, painting) on the area of a shape.

There are also instances where important known alternate conceptions have been overlooked.

**Illustrative example:**

- Mass, Grade 3: It is known that learners have alternate conceptions in this topic. For example: bigger does not mean heavier, or more objects don't mean heavier, or comparison between solid and hollow objects, or between filled and empty containers. These have not been addressed.
- A few concepts that are not necessarily needed at this grade level are in fact addressed, like the idea of mass vs. weight.
4.2.2. Enhancing learner experience

<table>
<thead>
<tr>
<th>Content in context (P3)</th>
<th>Learner scaffolding (P4)</th>
<th>Cognitive Engagement (P5)</th>
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</tbody>
</table>

**Content in Context (P3) is rated Potential to Improve:** The learning units do not have enough context. No real-world context is provided in units like Area and Perimeter, even though the topics provide sufficient possibility to introduce this.

**Illustrative example:**

Fractions of Shape in Grade 4 does not have any context present other than dividing the shape. The product could consider including examples such as those from NCERT, which use storytelling to discuss the concept of fractions. A notable example is that of the clever monkey who unequally divides a chapatti between two cats.

Some topics such as Grade 5 Fraction (word problems) do utilize relevant and meaningful scenarios like dividing a pizza, or Grade 3 Volume which includes examples involving a swimming pool and water bottles. However such instances are sparingly available. Overall real-life context is missing across the product even when required.

**Learner Scaffolding (P4) is rated Exemplary:** The product design implements scaffolds primarily in the practice assessments where the learner is asked to "watch a video" or "use a hint." This takes them to remedial content to revise the topic under consideration. These scaffolds are optional. The learner can always ignore them and proceed to solve the problem herself.

In the respective learning units, the concepts are designed to build confidence in a child by allowing him to try out, make mistakes and see what is working. All practice assessments can be retaken multiple times.

**Illustrative example:**

The hints are handy and help the learner think about the problem in a stepwise format without directly revealing the answer.

**Example Question:** What is 14 divided by 7?
**Hint:** If we split 14 circles into 7 equal rows, how many circles are in each row?

As a follow-up, a visual is also shown (see right), which will help a struggling learner further.
There is a good level progression in both videos and practice sets, helping the learner take on more difficulty, such as finding the perimeter with all sides given to finding the perimeter with missing sides.

Cognitive Engagement (P5) is rated Exemplary: The highlight of Khan Academy videos is the highly conversational, personalized and friendly voiceovers. Images in the instructional videos, questions, hints and explanations are well signaled. The instructor often uses different color pens to highlight important parts. Tests in practice questions are highlighted and enhanced with graphic support to help visualize the concept, thereby enhancing learners' overall cognitive engagement.

The problems are visualized graphically. Each side of a shape is given a different color, and the lengths are marked with the same color as that of the side.

Motivational Features (P6) is rated Exemplary. The product includes both intrinsic and extrinsic motivational features that are well integrated and have the potential to prompt learners to further explore the content. Extrinsic motivational features include Energy points, Scording Stars, Mastery points, different kinds of Badges and Avatars. Based on a student’s performance and the mastery points gained, different proficiency levels are attained, i.e., Familiar (50/100), Proficient (80/100) and Mastered (100/100). As the learner starts a new topic, they can take course challenges and based on the performance, topic-wise mastery points are added. Along with the extrinsic motivational features, the product does an exemplary job at intrinsically motivating the learner.

• In the instructional videos, the instructor often says things like - “...this is even easier than the other question. Lots of fun!!” This helps to motivate the learner as they watch the video.
• In the practice section, the system provides nudges such as "You got it," Two more to go!" or "Keep on practicing!" “You got it; keep up the great persistence" "Nice work! Five questions done, keep going".
• As soon as the student starts a practice session, the system prompts, "Okay, Show us what you can do!" - such challenging statements intrinsically motivate the learner and help the learner. If the learner gets a question right, such statements appear as they get a star accompanied by an achievement sound on answering correctly.
Logical chunking and connectedness (P7) is rated Exemplary: Videos are segmented at the sub-topic level and are available as individual units. The duration of the videos is less than 5 minutes in most cases. Assessments are clearly mapped to each sub-topic.

The product has the "Learn" (video content) and "Practice" sections placed side by side. This gives the learner freedom to work on the practice questions at any time (before, immediately after, or at the end of watching all videos).

### 4.2.3 Assessment of Learning

|-----------------------------------------------|------------------------------------------|--------------------------------|-----------------------|

Learning objective – assessment alignment (P8) is rated Exemplary. The questions in each topic and concept are very well aligned with the learning objective. The cognitive levels covered in the video are also aligned with the practice questions. Learners can attempt the practice questions multiple times, and a different set of questions is presented each time which are similar in difficulty level. The unit assessment of a particular set of topics also has a logical coverage from each topic.

**Illustrative example (Grade 3, Smart Charts):**

The content covers reading and creating pictographs and line charts. The assessments are aligned with the same objective. One set of practice questions is about reading and interpreting the given charts. Another set of questions lets learners interactively create pictographs. Two example questions are shown below.

**Example 1: Reading a pictograph**

A class counted how many banks were in all the nearby cities.

- Silver Dust
- Richmond
- Goldie
- Dottenville

= 1 bank

**Number of banks**

Richmond has more banks than Dottenville.

**Example 2: Drawing a pictograph**

Create a picture graph of this data.

**Number of eggs**

<table>
<thead>
<tr>
<th>Student</th>
<th>Number of eggs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Omar</td>
<td>6</td>
</tr>
<tr>
<td>Anna</td>
<td>3</td>
</tr>
<tr>
<td>Manon</td>
<td>2</td>
</tr>
<tr>
<td>Yanis</td>
<td>4</td>
</tr>
</tbody>
</table>

**Pedagogy-assessment method alignment (P9) is rated Valuable:** According to NEP, 2020 - the pedagogical strategy recommended for Primary School (Grades 3-5) is Activity and Scenario-based teaching - Giving real-life relatable examples. (Making connections with daily life), Teaching with Activities and Observation, and understanding the connections between the logical functioning of their everyday lives to that of mathematical thinking.
Connections of the concepts to everyday life are observed in some topics like Arithmetic, Fractions. Other topics like Mass and Volume have it to some extent, primarily due to the use of everyday objects in the examples. The videos and questions in topics like Perimeter and Area lack enough connection to everyday life. Also, there is very little evidence of activity or scenario-based teaching or assessment problems.

**Cognitive levels covered (P10) is rated Valuable:** Higher Order Thinking Skills are present in some topics like Picture Graphs, Grade 3; Fractions, Grade 5. Some topics like arithmetic operations have HOTS in the form of word problems.

**Illustrative example (Fractions, Grade 5):**

- Juanita cut her cheese into four equal pieces. She gave two pieces to her brother. What fraction of the cheese did Juanita give to her brother?
- In another example, learners are required to visualize different ways in which \( \frac{1}{4} \) could be made, as shown below.

![Illustration of fraction problems]

However, they are not sufficiently addressed in the assessment questions in approximately half the learning units sampled. Problems requiring application of the concept, analyzing a situation, or imagining or creating something are not sufficient, sometimes even in the learning where there is a clear need.

**Illustrative example:**

- Perimeter, Grade 4: Skills like apply and estimate are missing. For example, problems involving finding perimeters in a real-life context are missing and can be included. Create level problems like imagining different possibilities of shapes with a given perimeter are also missing.
- Skip Counting, Grade 3: Most questions are at a calculation level, even though the video discusses application of the concept.
- The topics of Mass and Volume also do not have any application level problems.
Feedback Quality (P11) is rated Exemplary: Most of the learning units have clear explanations with proper reasoning for the correct response. The solutions are broken down into clear and distinct steps, which will likely help the learner understand and identify specific difficulties or learning gaps. Proper images and signaling in the solutions help further with the understanding.

Illustrative example:
Fractions, Grade 5: While dividing a whole into fractions, appropriate colors are used for coloring different parts of the whole, with identical colors used for the matching fraction in text.

Appropriate remedial content is provided and linked to every question. Apart from the detailed explanation with reasoning and remedial content, there is sometimes also an opportunity to help the child to make deeper connections to the content.

Illustrative example:
Multi-digit Division, Grade 5. Solutions contain a prompt at the end, “How can I check my work?” This helps the learner connect the idea of division with multiplication and helps them build a self-evaluation mindset.

4.2.4. Adaptivity

Adaptivity (P13) is rated Valuable: The product adapts based only on the learner's performance. There is no learner profile mapping or learner interactions with the content. The product shows content adaptivity to a limited extent, where it adapts according to the learner’s performance. There is no evidence of adaptivity based on learner profile or interaction. The product does take some basic information like grade and focus topics from the student and does basic adaptation by showing relevant content for that grade. An option of a diagnostic test, "Course Challenge" is available, although this is dependent on the learner. Based on these results, the content or assessment questions do not change. The scores of the diagnostic level allow the learner to see an increase in mastery points for specific topics and sub-topics.

Based on the results from the practice exercises and unit tests, the product nudges the learner to revisit certain topics by recommending videos to watch. Practice questions, videos or the user interface don’t change based on individual learners and their responses. There is no evidence of adaptivity based on the learner's interaction with the system. For example, there is no check or prompt if questions are answered at an unreasonable pace. There aren’t any user interaction patterns (like always entering a particular option) which the system tries to identify and adapt accordingly. Hence, although there's some evidence of adaptivity in the product, it's still limited mainly to learners' performance in assessments.
4.2.5. Teacher Support

Teacher Support (P14) is rated Exemplary: The product offers ample support for the teacher. It allows teachers to make choices that influence the students' learning path by creating a course mastery goal. For example, the teacher can set a goal for students to reach 90% mastery in a course by a specific date. Teachers can create their classroom and add students to it. Teachers can assign lessons and quizzes to the whole class as well as to individual students. Through this, the teacher can either encourage in-class practice of the content or treat them as homework. The teacher gets to see student responses to each question and assess areas of strength and weakness.

4.3 Technology and Design

Technology & Design measures how well the technological affordances integrate with the pedagogy and content to promote a meaningful learning experience for all learners. This dimension focuses on user interface design and affordances that facilitate learning.

4.3.1 User Interface Design

Interface design: Enable intuitive use (T1) is rated Exemplary. The interface is very intuitive to use, and the learning units and summary section are neatly segregated. Button labels are clear and visible and in-progress videos are represented appropriately. All units have a uniform structure and consistent controls. The video interface is similar to YouTube and likely familiar to a diverse audience.

Button labels are informative and action-oriented, like "Check," "Let’s Go," "Start," and provide user feedback on what to expect.

Illustrative example:

<table>
<thead>
<tr>
<th>Learn</th>
<th>Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intro to fractions</td>
<td>Up next for you: Cut shapes into equal parts</td>
</tr>
<tr>
<td>Cutting shapes into equal parts</td>
<td>Got 5 of 7 questions to level up!</td>
</tr>
</tbody>
</table>

Start
Interface design: Assess consequences of an action (T2) is rated Exemplary: The overall interface is well designed. Thus young learners are very unlikely to make errors or take unintended action. The learning experience is smooth as the assessment interface restarts at the point learners exited it previously.

The learners are also made clear about the consequences of an action.

For example, when the learner chooses a hint, it is made clear that the question would not be counted towards their progress. Based on this prompt, the learners can decide if they want to continue using the hint.

Learner Navigation and pace (T3) is rated Exemplary: The product does an outstanding job of providing adequate and complete control for a learner in her learning path. The learner can navigate at her own pace, skip assessment questions if required, move backward and forward through the video units and across chapters and units.

Universal Design (T4) is rated Exemplary: Khan Academy India is one of the few products that rate Exemplary in Universal design (T4). The product follows many WCAG recommendations, including providing video subtitles, visual content to supplement audio, and helping users navigate and find content easily. The accessibility options available in the user settings to hide visually dependent content, reduce motion, and remove color from videos are huge positives.
### 4.3.2 Affordances that Facilitate Learning

<table>
<thead>
<tr>
<th>Analytics for learners’ progress (T5)</th>
<th>Tools to support problem-solving (T6)</th>
<th>Meaningful Interactivity (T7)</th>
<th>Content type – Technology alignment (T8)</th>
</tr>
</thead>
</table>

**Analytics for learners’ progress (T5) is rated Exemplary:** The learner can view all the activities she has undertaken, her proficiency level and if it has changed, the ratio of correct to total problems in practice assessments, and the time spent on each activity. A separate tab to track assignments is also provided. On the other hand, the teacher can see the exact learning journey of each child (the topics done, questions attempted, the responses) and can also assign particular topics or questions to specific students.

**Tools to support Problem-solving (T6) is rated Potential to Improve:** No instances of tools to support topic-specific problem-solving were observed. There is just a scribble pad that is provided to the learner when they solve questions. Learners can pick a color and use it to do any scribble work in the blank space.

**Meaningful Interactivity (T7) is rated Valuable:** Some features provided by the product are meaningful for the learner to learn the content. Basic interactivity to submit the responses like radio buttons/multiple option select is available and appropriate. The input boxes to fill in the missing numbers in the skip counting are appropriate.

However, interactivity features like drag and drop in some learning units are missing where they are needed. For example, in several chapters like Fraction of shapes, drag and drop can be used to overlay shapes. It is recommended that the product include such interactivity in the overall unit so that learners can create fractions using given smaller

**Content type – Technology alignment (T8) is rated Valuable:** The visualizations used in the form of images or the drawings used during teaching are appropriate as per the content. Animations would be helpful in some specific topics.

**Illustrative examples:**

- In skip counting, an animation video or the explanation video needs to show the process of skipping, maybe by showing jumping on a number line.

- In the topic of Volume, proper visualizations of exchange of volume between containers are needed. Video animation is recommended over images, for example, showing the filling of the 3L vase using 1L bottles in the practice questions.
Appendix

How does the EdTech Tulna evaluation work?

FRAMEWORKS

EdTech Tulna frameworks define a set of standards for quality design of EdTech products. A rigorous and research backed process is established and applied for the creation of various nuanced frameworks. These frameworks are use-case specific to enable transparent and precise, high stakes decision making. The process includes considering existing research literature, feedback from the ground on multiple stakeholder needs and an appreciation for the quality of solutions currently supplied in the ecosystem.

The frameworks are categorized along the three dimensions of Content Quality, Pedagogical Alignment, and Technology & Design to capture a holistic view of the quality of the product design. The frameworks are also made available at varying levels of depth for varying stakeholder needs and range from supporting governments and institutions in making high stakes, rank based, adoption decisions, to providing a brief overview of the key criteria to be considered while designing a product.

TOOLS

Each Tulna framework is accompanied by a toolkit that is specifically designed to guide experts to evaluate EdTech products. These toolkits are customized to the type of EdTech solution, grades, subjects, to drive meaningful and nuanced evaluations. The tools are informed by research as well as iterative empirical study and tested for inter-rater reliability and validity. A typical toolkit consists of rubrics and reviewer guidelines to enable evaluators to interpret the framework and conduct unbiased evaluations. Each criterion within the framework is rated along a three-point rating scale - ‘Exemplary’, ‘Valuable’, and ‘Potential to Improve’ - indicating the level of alignment with expectations laid out in the framework. Toolkits include supporting materials - videos, templates, and example illustrations - to guide experts while conducting evaluations.

PROCESS

Each product goes through a rigorous review process that takes approximately 160 hours for four grade ranges K-2, 3-5, 6-8, and 9-10. Each review team is designed to be independent and neutral. A typical expert review team consists of 3-4 members who are subject matter experts, instructional designers, user-interaction experts, user-experience design experts, and professionals with experience in teaching and implementing EdTech in field settings. Each review team has an anchor of at least one experienced evaluator.

Each member of the expert review team undertakes a two-week long intensive training on understanding the frameworks and the subsequent application of its toolkits to conduct evaluations. For each product, the review team applies a systematic sampling strategy and decides the representative learning units that will be reviewed. The team collectively reviews a subset of the learning units to check for convergence and establish inter-rater reliability. Team members then individually review the remaining learning units. The team finally meets to synthesize key points and takeaways of each review and elaborates their reviews into an in-depth report, which is overseen by the experienced evaluator.

The role of the product company is limited to an initial demo which supports the review team to deepen their appreciation of the intended use of the product, and its scope. The product company is then provided the final reviews and their unedited responses are published alongside the expert evaluations on the Tulna evaluation center.