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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

Schoolnet is a Digital Classroom (DCR) learning solution with a curriculum mapped to the Central Board of Secondary Education (CBSE). The product consists of short animated videos, practice worksheets and assessment questions for each learning unit and supporting hardware. The product is available for the Grades Nursery-10 for different subjects including languages, Mathematics, EVS. This report evaluates Mathematics for Grades K-2 (Upper-KG, 1 and 2). Teachers can use this product in their classroom for various topics as part of the curriculum.
3. Executive Summary

Schoolnet | Mathematics | Grades K-2

- Content Quality: Exemplary
- Pedagogical Alignment: Valuable
- Technology and Design: Valuable

Potential benefits of this product

- The content is accurate and contains factually correct information, explanations and examples.
- The product is aligned to the national standards and the learning units are aligned to the curriculum under NCERT.
- The content and activities support the development of the math skills recommended by the NEP (2020) for the intended learners.
- Through their conversational presentation style and appropriate highlighting, the videos and animations are likely to promote learners’ cognitive engagement.
- The videos are logically chunked into small interconnected units, which will enhance the learning experience of the intended learners.

Potential limitations of this product

- Some content videos do not have associated assessment questions, and some questions are ambiguous, which could pose a barrier to learning.
- The feedback quality in the assessment is lacking, as it provides only binary feedback (Correct / Wrong) and the correct answer but does not provide any explanation or steps to obtain the correct answer.
- There are no opportunities of collaboration for the learners in the assessments or practice questions.
- The content videos do not have associated text captions, which act as a barrier to learners with diverse needs.
Schoolnet (Grades K-2): Summary of Review Ratings by Criteria

Content Quality: **Exemplary**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1 Content accuracy</td>
<td>😊</td>
</tr>
<tr>
<td>The content is accurate and contains correct facts and explanations.</td>
<td></td>
</tr>
<tr>
<td>C2 Correctness and clarity in assessment</td>
<td>😃</td>
</tr>
<tr>
<td>The assessment questions are correct, but at times they could lead to ambiguity.</td>
<td></td>
</tr>
<tr>
<td>C3 Language comprehensibility</td>
<td>👍</td>
</tr>
<tr>
<td>The language used, accent and vocabulary are easy to be followed by the intended learners.</td>
<td></td>
</tr>
<tr>
<td>C4 Mathematics skill coverage</td>
<td>😊</td>
</tr>
<tr>
<td>The content covers the mathematical skills recommended by national standards for the grade range.</td>
<td></td>
</tr>
<tr>
<td>C5 Curriculum alignment</td>
<td>😊</td>
</tr>
<tr>
<td>The content is aligned with the NCERT curriculum.</td>
<td></td>
</tr>
<tr>
<td>C6 Inclusivity in representation of learners</td>
<td>😊</td>
</tr>
<tr>
<td>The content makes an attempt to represent various sections of society across religion, gender, skin-colour, socio-economic groups, but is not consistent.</td>
<td></td>
</tr>
</tbody>
</table>

Pedagogical Alignment: **Valuable**

<table>
<thead>
<tr>
<th>Pedagogical Elements</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1 Constructivist approach</td>
<td>😊</td>
</tr>
<tr>
<td>The videos move beyond transmission of information and help the learners to build their understanding of the concept but miss certain essential characteristics of constructivism.</td>
<td></td>
</tr>
<tr>
<td>P2 Addressing learning gaps/ alternate conceptions</td>
<td>😊</td>
</tr>
<tr>
<td>Possible alternate concepts are identified and effectively redressed to help the learners correctly understand each topic.</td>
<td></td>
</tr>
<tr>
<td>P3 Content in context</td>
<td>😊</td>
</tr>
<tr>
<td>Relevant and sufficient real-life context is included which will help the learners to relate to and care about the topic.</td>
<td></td>
</tr>
<tr>
<td>P4 Learner scaffolding</td>
<td>😞</td>
</tr>
<tr>
<td>The product fails to provide sufficient scaffolds to learners to help them take up problems with more difficulty.</td>
<td></td>
</tr>
<tr>
<td>P5 Cognitive engagement</td>
<td>😊</td>
</tr>
<tr>
<td>The content uses a conversational teaching style and is well supported by visual and verbal cues making learning highly engaging.</td>
<td></td>
</tr>
<tr>
<td>P6 Motivational features</td>
<td>😊</td>
</tr>
<tr>
<td>The content provides motivation to the learners to explore the content further.</td>
<td></td>
</tr>
<tr>
<td>P7 Logical chunking and connectedness</td>
<td>😊</td>
</tr>
<tr>
<td>The videos are small and are logically chunked to enhance understanding, but some of the topics do not contain their respective assessment questions.</td>
<td></td>
</tr>
</tbody>
</table>
## Technology and Design: Valuable

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>T1 Interface design: Enable intuitive use</strong></td>
<td>😊</td>
</tr>
<tr>
<td>The platform is easy to use and the elements are clearly visible.</td>
<td></td>
</tr>
<tr>
<td><strong>T2 Interface design: Assess consequences of an action</strong></td>
<td>😊</td>
</tr>
<tr>
<td>The content provides appropriate feedback on the action of the learners but does not facilitate error handling or reversal of actions.</td>
<td></td>
</tr>
<tr>
<td><strong>T3 Learner navigation &amp; pace</strong></td>
<td>😊</td>
</tr>
<tr>
<td>Learners can move between learning units at any pace, but they can navigate the videos only at a predetermined pace.</td>
<td></td>
</tr>
<tr>
<td><strong>T4 Universal design</strong></td>
<td>😊</td>
</tr>
<tr>
<td>Some of the essential features of universal design, like captions at all places, are not present which would make it difficult to be used by diverse learners.</td>
<td></td>
</tr>
<tr>
<td><strong>T5 Analytics for learners’ progress</strong></td>
<td>😊</td>
</tr>
<tr>
<td>The product provides an analysis of time spent by the learners on each of the videos but falls short of identifying areas in which the learners would require additional support.</td>
<td></td>
</tr>
<tr>
<td><strong>T6 Tools to support problem solving</strong></td>
<td>😊</td>
</tr>
<tr>
<td>There were no tools for solving mathematical problems.</td>
<td></td>
</tr>
<tr>
<td><strong>T7 Meaningful interactivity</strong></td>
<td>😊</td>
</tr>
<tr>
<td>Necessary interactivity features are included in the content that would be meaningful for learning of the content.</td>
<td></td>
</tr>
<tr>
<td><strong>T8 Content type - Technology alignment</strong></td>
<td>😊</td>
</tr>
<tr>
<td>There is a perfect match between the visualisation type present in the learning units and the content type.</td>
<td></td>
</tr>
</tbody>
</table>

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**Executive Summary**

**Summary of Review Ratings by Criteria**

- **P8 Learning objective – assessment alignment**: Some of the learning units have assessment questions that are aligned at the corresponding cognitive levels.
- **P9 Pedagogy – assessment method alignment**: The pedagogical strategies used in the content and assessment are aligned to the recommendations under NEP 2020.
- **P10 Cognitive levels covered**: The content presentation style is conversational and important topics are highlighted to enhance learning experience.
- **P11 Feedback quality**: The assessment questions inform the learners what the correct response is, but neither provides explanation nor directs the learners to revisit the relevant video.
- **P12 Opportunities for collaboration**: There was no prompt for the learners to collaborate on questions, assessments or activities.
- **P14A Teacher support for in class orchestration**: Teacher support is provided for how to use the product but not on how to effectively execute the learning unit in the classroom to enhance the learning experience.
- **P14B Teacher support to generate out-of-class activities**: The teachers can create their own assessment questions to enhance learning experience.
4. Detailed Review

4.1 Content Quality

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Inclusivity in Content Representation .................................................. 10

4.2 Pedagogical Alignment

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Enhancing Learner Experience .............................................................. 14
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4.3 Technology & Design

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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

<table>
<thead>
<tr>
<th>Content Accuracy (C1)</th>
<th>Correctness and clarity in assessment (C2)</th>
<th>Language comprehensibility (C3)</th>
</tr>
</thead>
</table>

Content Accuracy (C1) is rated Exemplary: The reviewers observed that the content is accurate and the videos explain the concepts clearly. The videos and practice questions did not have any inaccuracies that could lead to learner misconceptions.

Illustrative example: Topic: Subtraction Grade 1

The content prompts learners to identify the missing number by providing a real-life context. The example provided states that the coach requires a team of ten members, of which seven are present. It then poses a question on how many more members would be required to complete the team. A method is illustrated through which the learners are able to come to a solution of three.

Illustrative example: Topic: Patterns in shapes and numbers, Grade 2

The content videos help the learners to identify patterns using shapes and numbers. Several examples are provided to help the learners to identify the process. The learners are introduced to the process of skip-counting backward and forward by introducing them to the number line.

Correctness and clarity in assessment (C2) is rated Valuable: The practice and assessment questions were factually correct but the reviewers observed ambiguity in the questions in certain learning units. The questions or the instructions did not clearly inform the learner on what to think about and what is expected as a response.

Illustrative example: Topic: Weight, Grade 2

There is no question associated with the set of instructions provided. The set of instructions remains ambiguous and they do not inform the learners what is expected from them.
Illustrative example: Topic: Patterns in shapes and number, Grade 2

There is no explicit question associated with the set of instructions provided. It seems like the learners are supposed to complete the pattern, but it can be difficult to understand for the intended learners of Grade 2.

Language Comprehensibility (C3) is rated Exemplary: Across most topics the language used is easily understandable by the learners of Grades K-2 from Indian schools. Simple, short and easy to understand sentences are used. The reviewers found that the accent used was neutral in the sampled learning units. The vocabulary used is familiar.

It was observed that a few learning units (<5% of the sampled units) have a foreign accent, which might require some effort from the learners to understand, but is unlikely to impact the overall learning experience significantly.

4.1.2 Alignment to National Standards

<table>
<thead>
<tr>
<th>Mathematics Skill coverage (C4)</th>
<th>Curriculum alignment (C5)</th>
</tr>
</thead>
</table>
Mathematics skill coverage (C4) and Curriculum alignment (C5) are rated Exemplary: The reviewers found that, broadly, all the topics and sub-topics covered were aligned with the content present in NCERT textbooks for Grade K-2. Within each chapter, all the different aspects of the topic were covered comprehensively with the videos as well as other learning activities.

Illustrative examples: Topic: Patterns in shapes and numbers, Grade: 2
The learners identify shapes and symmetries in content videos, practice questions and assessments. Thus, the learning unit addresses the skill of ‘identifying shapes and symmetry’ as recommended by NCF 2005.

Illustrative examples: Topic: Numbers from 51-100, Grade: 1
The video exposes the learners to understand how to count different quantities, by providing examples of loaves of bread and cupcakes. A learner learns number sequence and develops the skill of counting and relating it to quantity.

The overall Mathematics mindset and skills required for Grade K-2 (recommended by NEP 2020 and NCF 2005) like developing connection between word games and counting, between counting and quantity, identifying shapes and symmetries, comparison and classification across one dimension at a time were covered across various topics. The content was sequenced logically across the grade ranges in alignment with the national curriculum.

4.1.3 Inclusivity in Content Representation

Inclusivity in the representation of learners (C6) is rated Valuable: The reviewers observed some evidence of inclusivity in representation from diverse sections of the society in terms of gender, religion and appearance. The gender representation was fair, mostly indicated by the characters seen in the content videos. Some of the learning units showed characters with mixed skin-colour or religion, but such representation was very less. The content was posed in the urban context most of the time, as evident from the set-up in the children’s park, or inside the house.
Illustrative examples:

- Diverse Indian names like Bhalu, Golu, Amit, Rishi, Riya, Pratik were used.
- Heavy representation of fair-skinned individuals are seen.
- A child wearing a turban was shown in one learning unit, which would indicate inclusion of different religions, but that is the extent to which it was seen.

Illustrative example: Topic: Subtraction, Grade: 1

- Representation of gender and religion can be seen in this video, but it is a one-off instance. The characters represented here are mainly fair-skinned.

Despite the above mentioned examples, the reviewers found that such attention to inclusivity was given in only a few learning units, while others lacked any systemic representation, especially with respect to including individuals with different abilities.
4.2 Pedagogical Alignment

Pedagogical Alignment focuses on 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

| Constructivist approach (P1) | Addressing learning gaps (P2) | Opportunities for collaboration (P12) |

Constructivist approach in pedagogy design (P1) is rated Valuable: The product helps the learners construct understanding of the concepts by providing examples. There were interactive activities and questions as well in some of the learning units, to support the learning in an interactive way.

Illustrative example: Topic: Shapes and Space, Grade 1

The learning unit provides the learners to interact and practice their concept of positions like ‘inside’, ‘on’, ‘below’, ‘under’.

However, this was not consistently observed across all the learning units. Moreover, important features such as the presence of reflection-spot questions were missing.
Addressing learning gaps/ alternate conceptions (P2) is rated Exemplary: The common learning gaps were identified as well as addressed very well in all the topics wherever there is a possibility. This was done either through presenting multiple ways to think about a concept or specifically addressing certain points.

Illustrative example: Topic: Volume, Grade 2

The learning unit exposed the learners to the idea that just because two vessels are the same in height, does not mean that they will have the same volume, or be able to hold the same amount of water.

Illustrative example: Topic: Measuring Length, Grade 1

A possible learning gap was identified in this learning unit while explaining the concept of approximate length. Two boys covered the same distance, but arrived at different measures of distance based on their footspans. The video goes on to explain how footspans are non-standard units of measurements and can vary from individual to individual.

Opportunities for collaboration (P12) is rated Potential to Improve. The reviewers did not find evidence for activities which could encourage collaboration among the learners. There were no in-built activities in the product which the learners could collaborate on, or questions or activities that could be performed in groups. There were also no prompt questions observed in the videos which suggest the learners to discuss the response or engage with fellow learners in any way.
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>
<th>Motivational Features (P6)</th>
<th>Logical Chunking and connectedness (P7)</th>
</tr>
</thead>
</table>

**Content in context (P3) is rated Exemplary:** The topics present the learners with the essential concepts, and are embedded in relevant and sufficient real-world context. This would aid in better understanding of the topic. Mathematical problems are placed in various contexts and scenarios which are relatable to the learner. Different objects from the surroundings or the daily activities which the learner likely performs or observes around them were present sufficiently.

**Illustrative example: Topic: Patterns in shapes and numbers, Grade 2**

A game of hopscotch was shown in the video to explain skip-counting to the learners. The video shows three children, Vijay, Anju and Puja deciding what game to play in the park. Thereafter, the concept of skip-counting by two was gradually introduced by making the characters play the game. Thus, sufficient real-life examples were provided.

**Illustrative example: Topic: Measurement, Grade 1**

Learners were introduced to the concept of standard and non-standard methods of measurement through a real-life example. The video showed three children, Pratik, Sahil and Amit, debating on which tree was closer to the chair. Following this discussion, they discussed that they could only arrive at a conclusion if they measured the distance between the chair and each of the trees. Then the video went on to introduce various methods to arrive at the solution.
Learner Scaffolding (P4) is rated Potential to Improve: The reviewers did not observe sufficient hints or summary maps that could provide the learners with additional support to take on questions or topics of greater difficulty. This was seen across learning units in the grade range covered.

Cognitive Engagement (P5) is rated Exemplary: The reviewers observed appropriate highlighting and use of different colours, borders and animated arrows which are likely to engage the learners. The tone was conversational in all of the learning units. Some of the learning units consisted of a dialogue between the characters seen in the videos. Different voices were used for representing age, gender, and even for different animals, which would be very interesting for children in Grades K-2.

**Illustrative example:** Topic: Activities and time for an activity, Grade 1

The learning unit used appropriate highlighting to enhance the learning experience of the learners. Clocks were used in places which would help the learners note the time taken to fill the basket.

**Illustrative example:** Topic: Patterns in shapes and numbers, Grade 2

The tone is very conversational throughout. The existing patterns were highlighted to help the learners identify the pattern that would be present in the missing cells.
Motivational Features (P6) is rated Exemplary: The reviewers observe the presence of encouraging responses such as “Very Good” or “Excellent” if a learner provides the correct answer. In some of the learning units, upon making a mistake, there was a prompt for the learners to try again to arrive at the correct answers. Such prompts are likely to help the learners to explore the videos or assessments.

Illustrative example: Topic: Shapes and space, Grade 1
The learners are motivated with “Very Good” on entering the correct answer.

Illustrative example: Topic: Patterns in shapes and numbers, Grade 2
The assessment questions allow the learners to try again if an incorrect answer is provided.

Logical chunking and connectedness (P7) is rated Valuable: All the learning units were structured adequately to aid in a meaningful learning experience. They were chunked into small videos. The videos are sometimes followed by a set of practice questions and assessment questions, but it was not consistently observed across all the learning units.
Learning objective – assessment alignment (P8) is rated Valuable: The videos, formative quizzes, activities and games are somewhat aligned to the stated learning objectives in each of the learning units. The cognitive levels in the practice activities were somewhat aligned with the content discussed in the videos. This criterion is rated Valuable because the assessments did not cover all of the major topics that were introduced to the learners.

Illustrative example: Topic: Addition, subtraction, Grade 2

The video introduced the learners to the concept of addition and subtraction. The assessment questions test their understanding of the same.

Illustrative example: Topic: Subtraction, Grade 1

The video prompted the learners to identify the missing numbers by providing an example. There were seven members in a sports team, but the coach needed ten members. They learnt how to find the remaining number of team members by counting ahead till ten. However, the assessment asked the learners to solve questions at a much higher level with more number of digits, which would not be applicable for the intended age of the learners. The figure below shows an example with three digits.

Illustrative example: Topic: Patterns in shapes and numbers, Grade 2

The learners were exposed to patterns in shapes and numbers, but were only tested for patterns in shapes. They were exposed to skip counting in the videos, which were not covered in the assessments.
Pedagogy-assessment method alignment (P9) is rated Exemplary: The reviewers observed that sufficient attention was provided in ensuring that the pedagogical strategies recommended for grades K-2 were covered in the learning units and their corresponding assessments.

Illustrative example: Topic: Shapes and Space, Grade 1

Learning through play, which is one of the suggested methods for Grades K-2 was observed as the learners were asked to drag and drop the objects present on the screen.

Cognitive levels covered (P10) is rated Exemplary: The questions are present at various cognitive levels as required, ranging from understanding and identifying, to application and estimation. There is good coverage of Higher Order Thinking Skills (HOTS) questions in a lot of topics, going much beyond just recalling or identifying. The maximum HOTs are at an application level. Most topics have problems where learners need to apply the concept, solve problems and make connections between different ideas. Many scenario word problems were present which help the learners to apply the concepts.

Illustrative example: Topic: Volume, Grade 2

The learners were introduced to the concept of volume and were assessed on the following questions, where they had to move beyond recall or identify. They had to apply the concept of multiplication to answer these questions.
Feedback Quality (P11) is rated Potential to Improve: Correct responses were provided in the assessments, but they neither provided steps to arrive at the correct answers, nor did they redirect the learners to the appropriate videos. The assessment questions have only a binary response (about correct or wrong) provided, and a learner is prompted to try again if required.

Upon doing a question incorrect two times, the correct response was provided in most activities but without any explanations. There were no suggestions to revisit the related content if a learner answers several questions incorrectly.

4.3.4 Teacher Support

Teacher support for in class orchestration (P14A) is rated Valuable: The product provides a navigation guide to the user which can support the user to pick the videos, assessments or activities based on their respective needs. It is also intuitive to select grades, subjects and the learning units that need to be used. However, the product did not have any features to support teachers in lesson planning or using the learning material built in the product.

Teacher support to generate out-of-class activities (P14B) is rated Exemplary: The reviewers found that the teacher has a lot of flexibility in the creation of assessments and activities for the students, which can be multiple choice questions or subjective assessments. A teacher can link resources, take down notes, which can help the teacher in aiding learning of the students. This option was present in all of the learning units observed.

Illustrative examples: Topic: Shapes and Space, Grade 1
4.3 Technology and Design

Technology & Design measures how well the technological affordances and the user interface design integrate with the pedagogy and context to promote a meaningful learning experience for all learners. The criteria in this dimension focus on user interface design and affordances that facilitate learning.

4.3.1 User Interface Design

| Interface design (T1 and T2) | Learner navigation and pace (T3) | Universal design (T4) |

Interface design: Enable intuitive use (T1) is rated Exemplary: The reviewers found the overall interface to be very intuitive to use. All important buttons and links to various activities were clearly visible. There was consistency in the way actionable elements are used and highlighted across the product. There was a clear mapping between control and effect, and expected responses were observed with user actions, like button clicks, play and pause or sound buttons. The functionality of the buttons were clear.

Illustrative examples

- The different buttons like ‘done’, ‘try again’, were highlighted in the activities giving a clear indication of an action to be taken.
- Different types of learning content like teacher’s kit (orange), different videos in the learning unit (purple), assessments and worksheets (blue) were placed separately at the bottom of each video.
- The buttons that could be used to move to the next video were highlighted in green, at the end of each video (notice the bottom bar) with the caption ‘click on the next button to proceed’, as is evident in the image below.

Illustrative example: Topic: Patterns, Grade 2
Interface design: Assess consequences of an action (T2) is rated Valuable: The reviewer observed that the learners were provided feedback on performing certain actions, but such feedback is not observed at all fronts. For instance, when the learner tries to close a learning unit, there is a prompt to provide feedback before leaving. However, if by mistake a learner closes the assessment window, there is no feedback provided which can help in error handling. The learner loses all the answers that were already provided and need to begin once again from the start. Furthermore, in case a learner selects to watch another video, in the middle of a video, there is no prompt to ask the learners whether they want to shift to the next video or continue watching the previous one.

Illustrative example: Topic: Addition and Subtraction, Grade 2

The assessment questions require the learners to match the two columns by dragging and dropping the option. However, once an option is filled, there is no scope to reverse it. The learner has to make an error, and then restart the assessment to fill it correctly.

Since everything was very intuitive to use, all the actionable elements led to the expected response, and there was very little likelihood of any major unrecoverable error for a learner to make. However, due to the lack of presence of error handling, this criterion is rated as Valuable.

Learner Navigation and pace (T3) is rated Valuable: The reviewers observed that it is quite easy to navigate across the videos in each of the learning units. It can be done with single clicks, using buttons at the bottom of the video.
It is very easy and intuitive to navigate between different content pieces across different chapters or various activities within a chapter. There were no restrictions placed on the learning path which a learner could follow. The learner can attempt the various activities and assessments at their own pace. However, the learners do not have any option of pacing up or slowing down videos. The videos can only be played at a predetermined speed.

**Universal Design (T4) is rated Valuable:** The reviewers observed certain features of Universal design to be present in the product. For instance, sufficient time is given to the users to read and understand the content. The content appears and can be used in predictable ways. It is easy to see and hear the content as well. The assessment questions included voice-overs at times, but there were several instances where the instruction was read out, but the corresponding caption was missing. However, many important features of Universal design according to the WCAG design principles, including captions for the video content, were found to be missing. This can pose a barrier to learners with diverse needs.

### 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 Valuable:** The product has a dashboard which is very informative as well as actionable. The teacher can get valuable information about the class progress in multiple views and is potentially helpful in planning and managing the class.
Illustrative features: Dashboard

The teacher can get information about the time spent by each child on different lessons, by specific subtopics.

However, there are certain limitations about the dashboards. There is no information on the assessment questions attempted by the learners, number of attempts or the scores in each of the attempts. Hence, although the dashboard is easy to use and interpret, it does not help in identifying areas where the learner would need additional support.

Tools to support Problem-solving (T6) is rated Potential to Improve: Mathematical tools that could be used by the teacher or the learner are not present. A possible tool that could have helped learners to practice the concept of length could be a ruler, or a measuring tape. It was shown in the content, but such was not available for the learners to use by themselves. Reviewers noted the presence of a Paint Tool, but it is not directly useful for the learning units and the grade range.

Meaningful Interactivity (T7) is rated Exemplary: The product has all the appropriate interactivity features which are meaningful for learning. The reviewers did not observe any superfluous interactivity features. Different features like drag and drop, click to select, were used wherever they aid in better understanding of the concept.

Illustrative example: Topic: Subtraction, Grade 1

Learners are able to click the numbers that they would like to put in the respective blank space, and the numbers are filled with the click.
Detailed Review: Technology and Design

Content type - Technology alignment (T8) is rated Exemplary: The visualizations used in the product map suitably to the content type. This was seen consistently across the learning units in this grade range. An example is provided below.

Illustrative example: Topic: Patterns in Shapes and Numbers, Grade 2

Learners have to drag and drop the appropriate objects to complete the pattern. The instructions indicate that the learners have to look at the patterns that can be seen in Column A and then they have to drag the options to Column B.

Illustrative example: Topic: Shapes and Space, Grade 1

The learners are exposed to the concept of relative position of the birds and the nest. At the outset, there were two birds and the learners were exposed to the concept of “Near” and “Far”. After that, a different bird flew in, and then the learners were exposed to the terms “Nearest” and “Farthest”.
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.