EVALUATION REPORT

iPREP DIGITAL CLASS
MATHEMATICS
GRADES 3-5

Evaluated in
July 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

iPrep Digital Class is a digital classroom learning solution with a curriculum mapped to the CBSE board. The product contains animated videos and practice questions for each learning unit, along with DIY project videos for some topics. Teachers can use the content to supplement their teaching in the classroom, or assign different videos or practice tests to students. The English version of the product has been evaluated in this report.
3. Executive Summary

iPrep Digital Class | Mathematics | Grades 3-5

<table>
<thead>
<tr>
<th>Content Quality</th>
<th>Pedagogical Alignment</th>
<th>Technology and Design</th>
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</thead>
<tbody>
<tr>
<td>Exemplary</td>
<td>Valuable</td>
<td>Valuable</td>
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</table>

Potential benefits of this product

- Students, teachers and parents can be assured of the correctness of the content and all the learning activities.
- Schools can be assured of the alignment of the content with the national curriculum, and can use it for core teaching purposes.
- The product will help learners make connections between Mathematics and the real world, as the content uses a wide variety of concrete real world examples.
- Learners are likely to stay engaged during the learning process due to the use of personalization and excellent highlighting in the product.
- Learners can be assigned content to watch and learn independently. They would be able to understand due to the simple vocabulary and easy language used.
- The adoption and learning curve for the teachers and students would be likely smooth due to the intuitive nature of the interface.
- A clear mapping between the content videos and the practice tests helps learners to test their understanding of the concepts.
Potential limitations of this product

The effectiveness of the learning experience may be negatively impacted in the following ways:

- Due to insufficient explicit scaffolds, hints or detailed explanations in many practice tests, the struggling learners might get stuck while working independently.
- The lack of any Interactivity features and mathematical problem solving tools might make it difficult for learners to have a clear understanding of certain concepts, as well as effective development of problem solving skills.
- The lack of group activities or prompts might lead to low encouragement from the teacher for collaboration among the learners.
- The lack of some key Universal Design features might make the product unsuitable for some learners.
### Executive Summary

**Summary of Review Ratings by Criteria**

#### Content Quality: Exemplary

**C1. Content accuracy**
The content is accurate and concepts are explained clearly.

**C2. Correctness and clarity in assessment**
Most of the assessment questions and solutions are correct but ambiguity or incompleteness was observed in some of the questions.

**C3. Language comprehensibility**
The language used is likely to be easily understandable by the learners of Grade 3 to 5.

**C4. Mathematics skill coverage**
Skills recommended by NCF 2005 and NEP 2020 for Grades 1-2 are covered.

**C5. Curriculum alignment**
The content is aligned to the NCERT curriculum

**C6. Inclusivity in the representation of learners**
An attempt has been made to represent diverse socio-economic backgrounds and genders.

#### Pedagogical Alignment: Valuable

**P1. Constructivist approach**
The content allows the learners to make meaning of the concepts but some of the important features of constructivism are missing.

**P2. Addressing learning gaps/alternate conceptions**
Potential learning gaps or confusions are identified and addressed effectively.

**P3. Content in context**
A relevant and sufficient real-life context is included which will help the learners to relate to and care about the topic.

**P4. Learner scaffolding**
Any kind of support or hints are missing in the practice questions.

**P5. Cognitive engagement**
The content presentation style is conversational and important elements are highlighted well.
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Description</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>P6. Motivational features</td>
<td>The content lacks motivational features that will prompt the learners to explore the content.</td>
<td>😞</td>
</tr>
<tr>
<td>P7. Logical chunking and connectedness</td>
<td>The chapters are chunked logically into smaller videos and practice tests are mapped to the chapters.</td>
<td>😃</td>
</tr>
<tr>
<td>P8. Learning objective- assessment alignment</td>
<td>The assessment questions are aligned to the objective and are at an appropriate cognitive level.</td>
<td>😃</td>
</tr>
<tr>
<td>P9. Pedagogy - assessment method alignment</td>
<td>The product does not follow activity based or scenario based pedagogy in the assessments as suggested by NEP.</td>
<td>😞</td>
</tr>
<tr>
<td>P10. Cognitive levels covered</td>
<td>Questions covering Higher Order thinking skills are present in some of the topics.</td>
<td>😃</td>
</tr>
<tr>
<td>P11. Feedback quality</td>
<td>Many assessment questions only have a binary response without any explanations.</td>
<td>😞</td>
</tr>
<tr>
<td>P12. Opportunities for Collaboration</td>
<td>No opportunities for collaboration or group activities were observed.</td>
<td>😞</td>
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<tr>
<td>P14A. Teacher support for in-class orchestration</td>
<td>There is no support for teachers to plan the lessons or integrate the content in their teaching.</td>
<td>😞</td>
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<tr>
<td>P14B. Teacher support to generate out-of-class activities</td>
<td>A “Coach App” is available which the teachers can use to assign content or tests to the students.</td>
<td>😃</td>
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**Technology and Design: Valuable 😃**

| Interface design: Enable intuitive use | The platform is easy to use and the elements are clearly visible. | 😃 |
| Interface design: Assess consequences of an action | The interface provides an appropriate response to the learner’s action. | 😃 |
| Learner navigation & pace | It is easy for the learners to navigate within and between learning units, but they can watch the videos only at a certain pace. The practice tests also lack flexibility in navigation. | 😃 |
### T4. Universal Design
Essential features of universal design are not present which would make it difficult to be used by diverse learners.

### T5. Analytics for learners’ progress
The dashboard provides an easily interpretable progress of the learners but does not provide sufficient guidance on next steps.

### T6. Tools to support problem-solving
Mathematical tools which would enhance learning experience were not observed.

### T7. Meaningful interactivity
Any interactive features to support the understanding of various concepts were absent.

### T8. Content type - Technology alignment
Appropriate visualizations are used in the videos to aid in meaningful learning.

*Only relevant criteria have been included in the evaluation*
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

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

Content Accuracy (C1) is rated Exemplary. The reviewers observed that all the content is accurate and the videos explain the concepts clearly in more than 95% of the sampled units.

Illustrative example: Learning Unit: Shapes and Angles, Grade 5

Clear definitions were present for rays, lines and line segments with the help of appropriate visuals, making the differentiation very clear for the learners.

Illustrative example: Learning Unit: How Heavy, How Light? Grade 4

The distinction between Mass and Weight has been made clear, and shown that objects with the same mass can have different weights under different gravity.

However, there was some ambiguity observed in the precise definitions of terms which might cause some confusion for the learners.

Illustrative example: Learning Unit: Where to Look From, Grade 3

Definitions of symmetrical and asymmetrical objects are ambiguous. Symmetrical objects are defined as objects, which have the same front, top and side view. But then, in the same video, a leaf is said to be symmetrical due to the presence of a line of symmetry.

Since the occurrence of such instances was rare, and most of the content was completely accurate, the product rates exemplary on this criteria.
Correctness and Clarity in Assessment (C2) is rated Valuable. The assessment questions and solutions are practically correct but there was some ambiguity or incompleteness in some of the practice tests. This was either due to missing images, missing context or improper use of language in the questions.

Illustrative example: Learning Unit: Where to look from, Grade 3

The question is: “Which of these has more than 1 line of symmetry?”. Images are missing in the options which leaves the options very open ended to the learner’s imagination. The answer is given as “A photo frame” without any picture. It is assumed that a photo frame will be a regular rectangle (as the solution suggests).

Illustrative example: Learning Unit: Jugs and Mugs, Grade 3

The question is: “Which of the following has more potential?” with options as bucket/bath tub/pond. The use of the word “potential” in the question as opposed to “capacity” makes it confusing for the learner.

Illustrative example: Learning Unit: Smart Charts, Grade 5

The question is (fill in the blanks): “The vertical line is called _______”. The question misses any context in which to consider the vertical line. However, looking at the options, the learner might get an idea. In the same unit, some true/false questions had 4 options as True/False/Undefined/Undefined. The 2 “undefined” options might cause some confusion for the learner.

Language comprehensibility (C3) is rated Exemplary.

The language used is likely to be easily understandable by the learners of Grade 3 to 5. Simple, short and easy to understand sentences are used. The reviewers found that the accent used was neutral in more than 80% of the sampled learning units. The vocabulary used is familiar. Wherever there are new vocabulary words required for the topic, they are well supported by images or animations which likely help the learners to comprehend the content.

It was observed that less than 20% of the units have a foreign accent, but was not difficult to comprehend and does not impact the learning experience significantly for an Indian learner.
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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</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 3-5. Within each chapter, all the different aspects of the topic were covered comprehensively with the videos as well as other learning activities.

**Illustrative example: Smart Charts, Grade 5**

The chapter covers all different aspects like recording data in a table or using tally marks, organisation of data in using various types of graphs and charts, and reading and interpreting any given data.

The overall Mathematics mindset and skills required for grade 3-5 (recommended by NEP 2020 and NCF) like developing a liking towards Math, seeing a connection of mathematical thinking to their daily lives, identifying patterns, spatial understanding, arithmetic fluency, data handling and estimation 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

<table>
<thead>
<tr>
<th>Inclusivity in the representation of learners (C6)</th>
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</table>

Inclusivity in representation of learners (C6) is rated Valuable. The was a fair representation of different sections of the society observed in the content in terms of gender and socio-economic backgrounds. The scenarios and context presented in the videos are likely to be relatable to most sections of the Indian society in terms of social and economic backgrounds, both urban as well as rural.

**Illustrative examples**

- There are learning units which show kids playing or learning in a classroom with a fair representation of both boys and girls.
- Scenarios like “shifting of furniture from one house to another”, or “kids shopping at a sale” or “Measuring a piece of cloth for a dress” are relatable to different sections of the society.
However, there seems to be no intentional effort made to include people of different religions. The reviewers also observed that there is a significantly higher representation of fair skinned characters across the product. A few learning also casually made use of foreign names and references which could potentially be un-relatable to the Indian learner, if not supported by a teacher. Some gender related biases were also observed.

**Illustrative examples**

- Grade 4: In the learning units “Halves and Quarters” and “Tables and shares”, mostly fair skinned characters were present and names like Jennifer were used.
- Grade 4: In “How heavy, how light”, only male characters were shown in the video involving the shifting of furniture, which might induce some biases in a young learner’s mind.
- Grade 3: In “Long and Short”, an assessment question is: “Estimate the distance between London and Glasgow” which might be completely un-relatable for some learners, especially without any accompanying visual representation of a map or a similar image.
4.2 Pedagogical Alignment

Pedagogical Alignment focuses on learner-centred 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-centered Approach

<table>
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<tr>
<th>Constructivist approach (P1)</th>
<th>Addressing learning gaps / alternate conceptions (P2)</th>
<th>Opportunities for collaboration (P12)</th>
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Constructivist approach in pedagogy design (P1) is rated Valuable. The product goes beyond mere transmission of information and helps learners make sense of the content by using various scenarios and problem statements before explaining the Mathematical concepts and ideas.

**Illustrative example: Play with patterns, Grade 4**

The unit starts with a scenario where the character visits a garden and observes patterns in the flowers. The learner is prompted to think along and notice if they observe something interesting. Another example is a “numbers and letters code” which the character is trying to decode, again prompting the learner to think about what it might mean.

**Illustrative example: Factors and Multiples, Grade 5**

- To explain the concept of factors, 12 pebbles numbered 1-12 are placed on a table. The teacher asks a kid to pick a pebble in whose multiplication tables the number 12 occurs. Multiple kids are asked to do the same. The numbers which they finally get would turn up to be the factors of 12.

- In another activity to understand common multiples, characters are climbing a staircase by skipping different numbers of steps. For example, The 1st person skips 2 steps and the 2nd person skips 3 steps. The stair where they finally meet is the common multiple of 2 and 3.
There is also a section present for ‘Stem Projects’ in the product which has videos demonstrating some hands-on-activities for learners to try out for various topics. These activities are present for around 40% of the topics in the grade range. They can aid in helping the learners build intuitive understanding of various ideas.

**Illustrative example: Jugs and Mugs, Grade 3**

The dimensions of an empty frooti-drink tetra-pack are measured, it’s cut open and filled with water in a measuring cylinder, helping learners to visualize the conversion of units of volume. Further, the tetra pack is converted into a portable glass, and then into a funnel. Learners are encouraged to try out the activity and make these things.

However, some crucial elements of a constructivist approach were found to be either missing or ineffective. For example, there was little scope of experimentation or activity based learning in the product. Some mathematical properties were also stated as facts without a clear reasoning and explanation. The reflection spots and in-video thinking questions were present in some of the learning units but were ineffective. There wasn’t a sufficient prompt for the learners to pause and think about the questions. In some cases, the question was left unanswered or without any discussion. In many learning units, the practice questions involving problem solving are also not sufficient to help learners construct understanding of the concept.

**Illustrative example: How many times, Grade 3.**

Some multiplication properties are told just as mere facts without explaining the reasoning. For example, why 3x7 is the same as 7x3, or why multiplying by 10 means adding a 0, or why multiplying by 0 is 0.

Also, the multiplication algorithm is stated as a procedure, without explaining the reasoning.

**Illustrative example: Halves and Quarters, Grade 4**

Simple thinking questions like “I ate one out of 4. How much cake is left?” are present. But there is no prompt or a pause for the learner to think, hence making the potential reflection spots ineffective.
Addressing learning gaps/ alternate conceptions (P2) is rated Exemplary. The common learning gaps were identified as well as addressed in more than 80% the topics wherever there is a possibility. This was done either through presenting different scenarios, multiple ways to think about a concept or addressing specific points.

Illustrative example: Topic: Where to look from, Grade 3

It is shown visually and made clear that a line dividing a shape in half might not necessarily be the line of symmetry. For example, the diagonal of a rectangle is not a line of symmetry.

Illustrative example: Topic: Factors and Multiples, Grade 5

Many simple points like the following are addressed effectively:
- There can be infinite multiples of a number
- Numbers cannot be divided by 0
- Clear connection between multiplication & division, and factors & multiples

Illustrative example: Topic: Play with Patterns, Grade 4

Patterns are explained from different perspectives.
- Repeating series of numbers of images
- Patterns not repeating directly -- for example, sum of numbers on the sides of a triangle in magic triangles is always the same.
- Triangular number pattern - the number above is the sum of 2 numbers below.
- Identifying patterns in secret messages and deciphering coded messages.

Opportunities for collaboration (P12) is rated Potential to Improve. The reviewers did not find any evidence for suggested activities which could encourage collaboration among the learners. 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. There were no in-built activities in the product which the learners could collaborate on, or perform in groups.

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>
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**Content in Context (P3) is rated Exemplary.** All the topics have relevant and sufficient real world context which aids 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: Long and Short, Grade 3**

The chapter starts with a historical example discussing why it was a problem to measure using feet, palm or forearm, and hence establishing the need for standard units for measurement. A lot of real world examples are used showing the use of different tools and units of measurement - measuring cloth with a metric scale, cupboard or walking stick with a measuring tape and small objects like a book or a small box with a normal scale.

**Illustrative example: Topic: Halves and Quarters, Grade 4**

The topic is set in a context where the characters are dividing a cake into smaller pieces and discussing what part of the cake each person gets.

**Illustrative example: Topic: Factors and Multiples, Grade 5**

Many real life examples are used.

- The characters buy boxes of sweets and stationery. They represent the total objects as multiples of the number of boxes.
- Counting cars on a road or flowers in a garden as multiples of smaller numbers.

**Learner Scaffolding (P4) is rated Potential to Improve.** The product lacks any scaffolds or support for the learners which could either help them come out of a stuck situation or take on challenges of higher difficulty in a progressive manner. The assessment questions do not provide any hints or prompts to a learner who might be stuck or struggling to figure out the correct response or make sense of the question. The questions also lack any supporting visual where required.

However, the product attempts to adapt the level of questions based on the user’s performance, but it is not very effective. This is due to the fact that the learner gets stuck in a loop of very few questions (sometimes around only 3 questions), if they answer incorrectly.

Most of the assessments also lack step by step solutions which could potentially serve as scaffolds helping the learner understand the concept better and solve further questions.
Cognitive Engagement (P5) is rated Exemplary. The signalling in the product was exemplary. Appropriate text highlighting and use of different colors, borders, boxes and animated arrows was made to engage the learners and bring their attention to the important aspects. The videos were very bright and colorful making it a visually appealing experience for the learners. The tone was conversational and inviting for the learners in most of the learning units.

Illustrative example: Smart Charts, Grade 3

Different text background colors are used to record different categories of objects in a dataset in a table. Respective colors are used for the objects in the bar graph and pie chart.

Illustrative example: Fields and Fences, Grade 4

Different elements of the content are highlighted in various ways.

- The dimensions of the figures are shown with a dark blue highlight.
- Formulas are written in a larger and bold text.
- Shapes are filled and edges are filled with different colors
- While calculating the perimeter, the numbers showing the length of different sides are highlighted one by one.

Illustrative examples: (Personalization)

Many conversational phrases like the following are consistently used which invite the learner to engage with the content.

- “Do you think this funny drawing is correct?”
- “What do you think? Can you tell which jug holds more water”?
- “Let’s summarize what we just learnt”

Motivational Features (P6) is rated Potential to Improve. There were not enough motivational features observed in the assessments or the content videos, which would motivate the learner to explore the content further. There were no opportunities observed for a higher skill level learner to progress to higher difficulty by means of unlocking challenging questions or higher difficulty levels. The product also lacks any motivational cues for a struggling learner.

No progress indicators or proficiency levels were available for a learner at an overall product level. However, there is a mastery bar when attempting a practice test, which indicates the mastery in the current practice session based on the learner’s performance. But it is likely ineffective especially for a struggling learner since it was observed that the mastery sometimes drops to 0 from a high number when a learner just answered 1 or 2 questions incorrectly.
Logical Chunking and Connectedness (P7) is rated Exemplary. All the learning units were structured adequately to aid in a meaningful learning experience. The videos did not exceed 7-8 minutes. Many learning units were in fact chunked into smaller pieces of 1-3 minutes with each video explaining a sub-topic. Even for the longer videos, they were internally structured in a logical manner. They started with an example, identified the learning objectives and explained the subtopics in a step by step manner. The practice tests were also mapped exactly to the content videos and the topic names, thus helping the learners to navigate to the relevant practice tests after learning the content.

4.2.3. Assessment of learning

<table>
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<th>Learning objective - assessment alignment (P8)</th>
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<th>Feedback Quality (P11)</th>
</tr>
</thead>
</table>

Learning objective - assessment alignment (P8) is rated Exemplary. The videos and the practice tests were broadly aligned to the stated learning objectives as well as the expected objective as per the National Curriculum for all the topics. However, questions in the practice tests in some learning units went beyond the stated objectives of the curriculum in terms of difficulty level. The learner might face difficulty in such questions in the absence of a teacher.

Illustrative example: Halves and Quarters, Grade 4

The content discusses only the halves and quarters as per the learning objectives, but the assessment has a lot of questions involving other kinds of fractions like two-thirds or one-thousandth.

Pedagogy-assessment method alignment (P9) is rated Potential to Improve. Pedagogical strategy is recommended for each grade group in NEP, 2020. According to NEP, 2020 - the pedagogical strategy recommended for Primary School (Grades 3-5) is Scenario based assessments - Giving real life, relatable examples. (Making connections with daily life), Teaching by using Activities and Observation. The overall pedagogy of assessments does not align with the NEP guidelines. There were some problems in a real world context, but all the practice tests were in a direct question and answer format, with no opportunities for learners to engage in an activity based learning or assessments.
Cognitive levels covered (P10) is rated Valuable. 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 around 50% of learning units, going beyond just recalling or identifying.

**Illustrative example: How many times, Grade 3**

- There are questions which ask learners to think about different multiplication representations of the same numbers. Example: “16 x 10 can also be written as _____”
- Many application level word problems are present at various levels. Example:
  - The cost of a toy is Rs. 12. Kumar wants to buy 8 of these toys for his friends. How much will he have to pay?
  - The cost of 2 shirts is Rs.25. What is the cost of 10 shirts?
  - Maria is preparing omelettes for breakfast. She bought 2 dozen eggs. 4 eggs got spoiled. How many eggs does she have left?

**Illustrative example: Jugs and Mugs, Grade 3**

Many application level word problems are present, connecting multiple ideas of division and conversion of units. For example:

“I have 1 liter of coke which I want to share with 4 friends. How should I divide so that each of us gets an equal amount?”

However, some of the learning units do not contain enough HOTS with most questions being at a recall, or a definition level.

**Illustrative example: Smart Charts, Grade 5**

Most questions are fact based and theoretical, asking the terminology used in different graphs rather than actually having questions or activities to use the understanding of graphs. For example:

- How many axes are there in a bar graph?
- What is the point called where both the axes of a graph meet?
Detailed Review: Pedagogical Alignment

Illustrative example: Shapes and Angles, Grade 5

Most questions are at a “recall” and “identify” level, where the learners need to just identify the types of angles or recall some information about different shapes.

- A square has ___ right angles.
- How many obtuse angles can a triangle have?
- An angle more than 0 and less than 90 degrees is called ____?

Feedback Quality (P11) is rated Potential to Improve. The reviewers observed that most learning units had a binary response or sometimes a one-line explanation. In the case of correct answers, the response was just ‘Correct’ and in the case of incorrect answers, the response was ‘Just missed’. No accompanying images or other visuals were present to explain the answers in any of the learning units.

Illustrative example: Halves and Quarters, Grade 4

Question: "2 balloons burst out of 20. How much is 2/3rd of the remaining?"
Answer: “12 is 2/3 of the remaining balloons.”
Solutions need visual or step-by-step explanations, in such learning units.

There were no opportunities for the learner to revisit the content related to the question, which could help a learner when they are struggling.

4.2.4. Teacher Support

Teacher support for in-class orchestration (P14A) is rated Potential to Improve. The product did not have any features built in the product to support teachers in lesson planning or using the learning material.
Teacher support to generate out-of-class activities (P14B) is rated Valuable. The reviewers found that the support for teachers was present to some extent. The teacher can connect to the learners using a separate “Coach App”, and has the flexibility to assign the already available lessons and practice tests to individuals or groups of students.

However, a teacher cannot create customized worksheets or practice tests for their class. There is no option available to either select particular questions from a question bank for a particular chapter, or to create worksheets by picking questions across various chapters.
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 overall interface was very intuitive to use. Different types of learning content like the videos, assessments and projects were placed separately, with clear icons. Easily operable buttons helped the learners to change the class or navigate to the desired content type.

The important buttons like “Start Practice Tests”, or the button tiles to “play the videos” or “Next video”, were clearly visible and consistent throughout the product. The practice questions were intuitive and easy to answer, with large “option” boxes for MCQs and a clear submit button. The play/ pause and fast forward/ rewind buttons were clearly visible in the videos.

Interface design: Access consequences of an action (T2) is rated Exemplary.

There were sufficient prompts for different user actions wherever required, making the learner aware of the consequences of their action.

For example, If a learner presses the “back” in the middle of the assessment, there is a prompt asking whether the learner wants to close the assessment midway or continue to improve content mastery. If the learner wants to retake a completed test, the prompt informs the learner that the last recorded mastery will be erased should she/ he choose to retake the test and provides the learner an option to go back on the decision. In case the learner chooses to quit midway, the test starts from the previously ended point.
Learner Navigation and pace (T3) is rated Valuable. The product offers complete flexibility to the users to learn at their own pace and sequence. The learners can navigate freely to the desired class, topic or a practice test. Videos can be paused, fast forwarded and quit at any time. There were no restrictions on the amount of time needed to spend on different practice questions.

However, the videos could not be played at varying speeds based on a learner’s preference. Another missing aspect of navigation in the practice tests was the inability to navigate between questions in a particular practice test. Once an answer is selected and submitted, the learner cannot go back and revisit the question after seeing the solution. Also, there was no possibility to skip any questions.

Universal Design (T4) is rated Potential to Improve. The learners had sufficient time to read and understand the content. However, many important features of Universal design according to the WCAG design principles were found to be missing. There were no written captions for the video content. The questions of the assessments could only be read and the answers could be operable through the touch screen input. There was no alternate option like audio instructions, voice-over for questions or audio input.

4.3.2. Affordances that facilitate learning

<table>
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<tr>
<th>Analytics for learner’s progress (T5)</th>
<th>Tool to support problem-solving (T6)</th>
<th>Meaningful interactivity (T7)</th>
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Analytics for learners’ progress (T5) is rated Valuable. The product allows the learners to view progress reports related to video lessons and practice tests. The learners can get information about the amount of time spent watching different content videos, and number of attempts and percentage mastery level in a particular practice test. However, the dashboard does not identify the specific learning objectives in which the learner would need additional support or practice. It also lacks any actionable elements which can prompt the learner to revisit certain content pieces or tests based on the presented information.

There is a separate dashboard for the teacher as well, on the “Coach App”, where the teacher can view similar statistics about mastery levels and the amount of time spent watching the different content pieces.
Tools to support Problem solving (T6) is rated Potential to Improve. Mathematical tools were not present in the topics that were reviewed. For instance, different tools for measuring length were shown in the video but there was no way a learner could interact and use the tools to practice measurement.

Meaningful Interactivity (T7) is rated Potential to Improve. The product only has basic interactivity features like simple buttons or radio buttons which help the learners to select the answers and navigate through the content. There were no other interactivity features observed which could aid in the learning or understanding of various concepts. Some of the possible interactivity features applicable for different learning units include drag-and-drop, drag-and-rotate, text inputs or sliders.

Content type - Technology alignment (T8) is rated Exemplary. The visualizations used in the product map suitably to the content type. Process images or simple animations are used wherever required.

**Illustrative example: Where to Look From, Grade 3**

Animations were used to show the overlapping of image halves to identify whether a particular line is a line of symmetry.

**Illustrative example: Halves and Quarters, Grade 4**

To help learners visualize equivalent fractions, an animation is shown where 2 out of 4 parts of a rectangle are shaded and another rectangle of the same size where 4 out of 8 parts are shaded. A visualization shows how the shaded parts in both the rectangles exactly overlap each other.
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.