EVALUATION REPORT

EdTech Tulna

HEYMATH!
MATHEMATICS GRADES 1-2

Evaluated in June 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

HeyMath! is a digital classroom product developed to support students and teachers. Each learning unit in the product contains a set of animated lessons, interactive videos, games, activities and mathematical tools. Students have access to all the content for their grade and a previous grade. Various types of assessments and practice tests are also present, which can be customized by the teachers and assigned to the students.
3. Executive Summary

HeyMath! | Mathematics | Grades 1-2

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

Potential benefits of this product

- Schools and teachers can be assured of the correctness of the content and all the learning activities and can use the product for in-class teaching as well as assigning independent tests or activities to the students.
- The product has various activities and games which will likely promote learners’ cognitive engagement.
- The product may be used to promote deep conceptual understanding as it helps to address common learning gaps for students while following a constructivist pedagogy.
- The product uses sufficient real life examples and scenarios for learners to relate mathematical concepts to their day to day lives.
- The adoption and learning curve for the teachers and students would be likely smooth due to the intuitive nature of the interface.

Potential limitations of this product

- Due to the lack of enough explicit scaffolds or hints in some activities, some learners might struggle while working independently.
- The lack of group activities or prompts might lead to low participation and collaboration amongst students.
- Learners might find the language in some of the content a little difficult to grasp due to foreign accent being used, and some examples might not be relatable to Indian learners.
# HeyMath! (Grades 1-2): Summary of Review Ratings by Criteria

## Content Quality: Exemplary

<table>
<thead>
<tr>
<th><strong>C1 Content accuracy</strong></th>
<th>All content is accurate and explained clearly.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>C2 Correctness and clarity in assessment</strong></td>
<td>All assessment questions in practice tests or associated activities, and their solutions are correct and unambiguous.</td>
</tr>
<tr>
<td><strong>C3 Language comprehensibility</strong></td>
<td>The language used can be understood by the intended learners with some effort. The accent might be difficult to follow.</td>
</tr>
<tr>
<td><strong>C4 Mathematics skill coverage</strong></td>
<td>Skills recommended by NEP for Primary Stage (Grades 3-5) are covered.</td>
</tr>
<tr>
<td><strong>C5 Curriculum alignment</strong></td>
<td>The content is aligned to NCERT and sequenced logically.</td>
</tr>
<tr>
<td><strong>C6 Inclusivity in representation of learners</strong></td>
<td>An attempt has been made to represent various sections of the society across gender and socio-economic class.</td>
</tr>
</tbody>
</table>

## Pedagogical Alignment: Exemplary

<table>
<thead>
<tr>
<th><strong>P1 Constructivist approach</strong></th>
<th>The product helps the learners construct understanding of the concepts, rather than merely doing information transmission.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P2 Addressing learning gaps/ alternate conceptions</strong></td>
<td>Potential learning gaps in different topics are identified and well addressed.</td>
</tr>
<tr>
<td><strong>P3 Content in context</strong></td>
<td>Most of the learning units have relevant and sufficient real world context which aids in better understanding of the concept.</td>
</tr>
<tr>
<td><strong>P4 Learner scaffolding</strong></td>
<td>Scaffolds are provided to help learners take on higher difficulty but some learning units lack sufficient support for a struggling learner.</td>
</tr>
<tr>
<td><strong>P5 Cognitive engagement</strong></td>
<td>Conversational tone and appropriate highlighting was present in most of the learning units.</td>
</tr>
<tr>
<td><strong>P6 Motivational features</strong></td>
<td>Sufficient motivational features like stars and motivational features are present within practice activities.</td>
</tr>
<tr>
<td><strong>P7 Logical chunking and connectedness</strong></td>
<td>The content in any learning unit is chunked in smaller pieces of appropriate duration, which are well connected to each other.</td>
</tr>
</tbody>
</table>
### Executive Summary

**Summary of Review Ratings by Criteria**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P8 Learning objective – assessment alignment</strong></td>
<td></td>
</tr>
<tr>
<td>The learning objective and cognitive levels of the assessments are aligned to the content as well as the National curriculum.</td>
<td></td>
</tr>
<tr>
<td><strong>P9 Pedagogy – assessment method alignment</strong></td>
<td></td>
</tr>
<tr>
<td>Activity and scenarios based pedagogy is used as recommended by NEP</td>
<td></td>
</tr>
<tr>
<td><strong>P10 Cognitive levels covered</strong></td>
<td></td>
</tr>
<tr>
<td>Questions and activities engaging learners in Higher Order Thinking Skills are sufficiently present.</td>
<td></td>
</tr>
<tr>
<td><strong>P11 Feedback Quality</strong></td>
<td></td>
</tr>
<tr>
<td>Detailed explanations are present for assessment questions, but there is a lack of opportunities to revisit the related content.</td>
<td></td>
</tr>
<tr>
<td><strong>P12 Opportunities for collaboration</strong></td>
<td></td>
</tr>
<tr>
<td>The product lacks any clear opportunities for group activities for the learners.</td>
<td></td>
</tr>
<tr>
<td><strong>P14A Teacher support for in-class orchestration</strong></td>
<td></td>
</tr>
<tr>
<td>Teacher training and sample lesson plans are provided to the partner schools.</td>
<td></td>
</tr>
<tr>
<td><strong>P14B Teacher support to generate out-of-class activities</strong></td>
<td></td>
</tr>
<tr>
<td>Teachers can create customized tests and worksheets as well as assign content and activities to learners.</td>
<td></td>
</tr>
</tbody>
</table>

**Technology and Design: Exemplary**

<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 very intuitive to use and all 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 interface provides appropriate responses to learner’s actions with the interface by informing them about what action has been done and what has been accomplished.</td>
<td></td>
</tr>
<tr>
<td><strong>T3 Learner navigation &amp; pace</strong></td>
<td></td>
</tr>
<tr>
<td>It is easy to navigate between different lessons and activities. The learners can learn at their desired pace and sequence.</td>
<td></td>
</tr>
<tr>
<td><strong>T4 Universal Design</strong></td>
<td></td>
</tr>
<tr>
<td>Some features of universal design are present, which make the product accessible to diverse learners.</td>
<td></td>
</tr>
<tr>
<td><strong>T5 Analytics for learners’ progress</strong></td>
<td></td>
</tr>
<tr>
<td>Teachers and learners both have access to relevant reports on progress and performance.</td>
<td></td>
</tr>
<tr>
<td><strong>T6 Tools to support problem solving</strong></td>
<td></td>
</tr>
<tr>
<td>Effective mathematical tools to aid problem solving are present.</td>
<td></td>
</tr>
<tr>
<td><strong>T7 Meaningful interactivity</strong></td>
<td></td>
</tr>
<tr>
<td>Appropriate features like input boxes, drag and drop, click to select, dropdowns, sliders and checkboxes were used wherever required.</td>
<td></td>
</tr>
<tr>
<td><strong>T8 Content type - Technology alignment</strong></td>
<td></td>
</tr>
<tr>
<td>Suitable Images, videos and animations are used depending on the topic.</td>
<td></td>
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</tbody>
</table>
4. Detailed Review

4.1 Content Quality

Content Accuracy and Clarity .................................................................................................................. 8
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Inclusivity in Content Representation ..................................................................................................... 9

4.2 Pedagogical Alignment

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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>Correctness 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 product consists of a set of content videos followed by activities and quizzes. The concepts and examples covered in the videos are realistic and correctly explained.

Illustrative example: Shapes and patterns : Grade 1

In this unit different shapes such as plane and solid shapes and their rolling or sliding are explained with correct real life examples. Also patterns are explained with shapes.

Illustrative example: Numbers upto 1000 : Grade 2

Numbers upto 1000 are taught in small chunks: By comparing numbers, forming 3-digit numbers using abacus, and by an activity of ordering 3-digit numbers.

Correctness and clarity in assessment (C2) is rated Exemplary. The assessment questions provided in the activity and quiz are also accurate and unambiguous. The responses given are correct, clear, and unambiguous.

Language comprehensibility (C3) is rated Valuable. The reviewers found the language and vocabulary used in the videos and practice questions are simple and the sentences are short and easy to comprehend. But in many videos, the accent is foreign, which might make it difficult for the intended learners to follow. There are some instances like in the ‘Measurement’ and ‘Money’ lesson in Grade 2, where the accent is Indian and this might be more suitable for the intended learner.
Illustrative example: Shapes and patterns : Grade 1

The language used in some of the content and activity videos is easy to understand. But in the video “Rolling and Sliding”, voice over is missing for a conversation which can be difficult to understand by reading for Grade 1 learners.

Overall the accent in the reviewed units is not consistent and in few places voice over is missing so Language Comprehensibility is rated as valuable.

4.1.2. Alignment to National Standards

| Mathematics Skill coverage (C4) | Curriculum alignment (C5) |

Mathematics skill coverage (C4) and curriculum alignment (C5) are rated Exemplary. Reviewers observed that most of the topics and sub-topics covered are aligned with the content present in NCERT textbooks for Grades 1-2. The conceptual understanding of the topics is progressively built through a series of introductory content and questions through activities and quizzes. Math skills required for grades 1-2 (recommended by NEP and NCF) such as additions of numbers up to 20, identifying shapes and patterns, measurements of distance weight, volume and data handling are covered comprehensively.

Illustrative example: Measurement : Grade 1

This unit covers different aspects of measurements like length, weight and volume. The difference between nearer and farther, taller and shorter, ‘taller than’ and ‘wider than’, and informal measurements are covered well.

4.1.3 Inclusivity in Content Representation

Inclusivity in the representation of learners (C6) is rated Valuable. The reviewers observed efforts to include content relatable to diverse learner groups in terms of gender, race, socio-economic class, religion, looks, etc. However, the examples mostly targeted urban and semi-urban areas. Learners from other areas in India may not be able to find connection with real-life examples. There is no specific focus or inclusion of minority groups particular to India, or geographies or activities common to Indian households.
Illustrative example: Addition up to 10: Grade 1

Although there has been the inclusion of characters of different gender and religion, there are also instances of character names like Hopper and Pedro being used, which might not be relatable to many Indian learners.
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-Centered Approach

<table>
<thead>
<tr>
<th>Constructivist approach (P1)</th>
<th>Addressing learning gaps (P2)</th>
<th>Opportunities for collaboration (P12)</th>
</tr>
</thead>
</table>

Constructivist approach in pedagogy design (P1) is rated Exemplary.

The learning units contain sufficient activities relevant to the content that allow learners to construct their understanding in various ways. This includes interactive videos, activities, and games that helped learners apply their knowledge and form a robust mental model of the concept.

Most topics follow a constructivist approach through questions and various activities. The presence of engaging reflection spots allowed learners to apply their prior knowledge. These reflection spots could be solved by learners within a short time, and immediate feedback was available.

**Illustrative example: Money : Grade 2**

This lesson included understanding money and then how to use it and guessing the cost of items. Questions asked to include diverse items ranging from low to high costs such as pencil, chocolate, notebook, teddy bear, wall clock, and a toy car. It helps learners understand the concept of money and how it applies to real life.

**Illustrative example: Topic: Multiplication : Grade 2**

Questions asked as a reflection spot prompted understanding and application using relatable examples. An immediate response was given.
Topics included a well-sequenced set of questions that progressively addressed a concept from multiple angles and at different levels of complexity. Questions were posed in multiple ways to address the understanding of various aspects of the topic, and various opportunities were provided to apply the understanding.

**Illustrative example: Addition and subtraction of bigger numbers : Grade 2**

This topic is covered using different approaches. For example, the addition of 3-digit numbers is explained without carry-over method and with carry-over method. Similarly subtraction has been explained without borrowing and with borrowing.

**Addressing learning gaps/ alternate conceptions (P2) is rated Exemplary.** Common learning gaps have been identified as well as addressed very well in many topics. While explaining new topics or concepts, common misconceptions are often addressed in the videos.

**Illustrative example: Measurements : Comparing weight: Grade 1**

In this content the 'heavy and light’ concept was discussed with a number of examples. Also, a basic misconception of “bigger is heavier” and “smaller is lighter” was addressed using examples from everyday life, for example, balloons though bigger, are lighter than marbles which are smaller.

**Illustrative example: Money : Grade 2**

Common misconceptions about notes and coins are addressed in this unit. Also different ways of forming one particular currency is shown in the pictures below.
Opportunities for collaboration (P12) is rated potential to improve. The reviewers did not find sufficient evidence for activities which could encourage collaboration among the learners. The product contains only a few instances where opportunities for collaborative activities are provided. But even in such activities, the activity does not require students to engage in meaning making with their group members. There are no in-built activities in the product which the learners could collaborate on. There are also no prompt questions observed in the videos which suggest the learners to discuss the response or engage with their fellow learners.

Illustrative example: Measurement : Grade 1

A classroom activity is provided but it does not include interaction or engagement of students in group discussion.
4.2.2. Enhancing learner experience

**Illustrative example: Shapes and patterns : Grade 2**

The activity provided in this unit has opportunities for collaboration between students. The figure below shows that 4 teams are formed and each team has to make a human pattern using other students in the team. Another team has to predict the pattern.

However there are very few activities of the above nature.

**Content in Context (P3) is rated Exemplary.** Most of the topics have some real world context for the learners from Grades 1-2 in terms of the objects used, such as animals, stationery items, toys, fruits, furniture items, leaves, trees, and people which a learner could relate to. Many topics have numerous examples from day to day life.
Illustrative example: Shapes and patterns: Grade 1

The concept of understanding objects placed relative to each other presents multiple examples showing daily use of objects available at home, such as table, cupboard, school bag, shoes, etc. There are cartoon aliens present in few activities which can motivate learners to complete the activity.

Illustrative example: Measurements: Grade 2

Concepts such as length measurements, measuring the length of real life objects such as a house is shown. Real life objects such as lions, humans, salt, chips are used in activity so that students will be able to differentiate between kilograms and grams. Similarly, for millilitre and litre concepts students are asked to predict how much petrol a car can have, how much cough syrup there is in a spoon, how much juice is there in a glass and so on.
Illustrative example: Data handling : Grade 1

In this unit real life objects such as toys with different colors and shapes are used in an activity where learners are asked to segregate data (here toys). Learner engagement is likely to be high in this case due to the use of familiar objects.

Learner Scaffolding (P4) is rated Valuable. Reviewers observed some aspects of scaffolding to be present across the product. While explaining the concept, steps are well broken into small chunks. The lessons and activities progress gradually in helping the learners to take on higher difficulty levels. In terms of the scaffolds within a particular learning activity, there was a lot of variation in terms of support available for a learner. Some learning units had very helpful hints, prompts or breakdown into smaller parts while others did not include it.

Illustrative example: Measurements : Grade 1

Capacity is one of the subtopic/ activities in this unit which asks students to identify which object will hold more volume. Students can cross check their answers by actually filling both the objects with water. This helps students in developing the correct mental model.

Illustrative example: Numbers upto 1000 : Grade 2

Representing a 3-digit number is taught by abacus activity in this chapter. Abacus activity has questions and students can try three times. After they finish their attempts, the “Show answer” tab is activated which shows the correct answer.
Prompts such as “Try again”, “Correct” are present in almost all the activities but hints to come out of the stuck situation are missing in many activities.

Cognitive Engagement (P5) is rated Exemplary. The product has paid careful attention to cognitively engage the learners throughout their learning journey. This is done through effective usage of both verbal and visual cues. Cognitive engagement is exemplary for two main reasons:

1. Personalization using informal conversational style: The instructor always uses an informal tone, content is taught through storytelling that allows for the learner to be engaged and get drawn. Also multiple times, learners are asked to pause and reflect and try out the questions themselves, and inclusion of words such as "You are ..", “Let us...” which makes it relatable and personal for the learner.

2. Effective use of signaling and highlighting: Graphics used are of different colors and boxes are present for highlighting, use of arrows or other appropriate representations draws the learner to focus on the key elements. This level of signaling allows for the learner to always be looking at the right material, and not get confused. This has been done incredibly well throughout the grade range.

Illustrative example: Multiplication (Multiplying by 5 and 10): Grade 1

Students are asked to count the total number of hands. Highlighting kids and their hands will help learners to be attentive and actively engaged during the class.
Motivational features (P6) is rated Exemplary. The product does a great job of targeting learner motivation and helping them stay engaged throughout the learning process. This is done through multiple features and methods. If learners give a correct answer then they will be awarded with or given stars, smileys, and also uses of motivational words such as excellent, good, great work, etc is done. Activities include rewards as a learner clears different levels.

Illustrative example: Numbers upto 20 : Grade 1

The frog king challenge activity has multiple levels. When the learner clears each level he/she earns silver coins, ruby, sapphire, gold, and the top most level gives diamond. These rewards in the form of precious stones and coins motivates students to apply knowledge and clear each level.

Illustrative example: Numbers upto 1000 : Grade 2

This is one of the games present in this chapter called “Kaun Banega crorepati?”, which gives rewards in the form of money.
Logical chunking and connectedness (P7) is scored Exemplary. The construction of the learning unit is structured which helps in meaningful learning. The content videos are chunked logically, and are typically as short as 2-3 minutes, never exceeding 10 minutes. If the content needs more explanation then two or more connected short videos are provided. Quizzes and activities are present immediately after the content video. A meaningful connection was observed between content videos and their related assessment, hands-on activity, and games.

Illustrative example: Adding up to 10: Grade 1

The content is covered in four parts. Each part has a short video followed by activity. All parts are arranged with increasing complexity.

1. Introducing addition
2. Addition by counting on up to 10
3. Addition on number line
4. Activity- Word problems on addition up to 10

4.2.3 Assessment of Learning

Learning objective - assessment alignment (P8) is rated Exemplary. The reviewers noticed the learning objective is aligned to the content, and the assessments are aligned to the corresponding cognitive levels being shown in the content as well. Assessment questions are asked through hands-on activities, quizzes, and games. This helps learners to recall, understand and apply the content.

Pedagogy-assessment method alignment (P9) is rated Exemplary. Observations by reviewers shows that the pedagogical strategies used in the product are as per the recommendations for these grade levels. According to NEP 2020, some of the pedagogical strategies recommended are playing or gamified activities for learning, earning of stars/ smileys and rewards instead of scorecards. This product has given complete attention to the pedagogical part. Content is taught in storytelling and playful manner with real-life examples, also the presence of game-based activities that will give stars, smileys and other rewards instead of giving scores.

Cognitive levels covered (P10) are rated Exemplary. Questions are present at various cognitive levels, ranging from understanding and identifying, to application and estimation. Questions from higher-order thinking (HOTS) skills are present for most of the topics. Most topics have problems where learners need to apply the concept, solve problems and make connections between different ideas.
Detailed Review: Pedagogical Alignment

Illustrative example: Money: Grade 2

In this unit activities address basic questions like identifying the coins and notes to higher-order questions like counting and converting paisa to rupees, as well as guessing the price and which coin and notes to use for purchasing different products.

Illustrative example: Shapes and patterns: Grade 1

In this unit, the basics of shapes and patterns are explained but in addition HOTS level concepts such as the difference between rolling and sliding, which objects roll and which one slides are clearly explained through content as well as activities.

Feedback Quality (P11) is rated Valuable. The product has made some effort in providing effective feedback but lacks some key points. On marking wrong answers, learners see feedback such as ‘Try again’, but no guidance is given on what they should do. Many quizzes and learning activities have no explanations of the answers, and only a binary response (Correct/wrong) is provided. There are no suggestions to revisit related content if a learner answers several questions incorrectly.

Illustrative example: Numbers upto 1000: Grade 2

In the concept of counting up to 1000, where a learner needs to count the number of objects shown, the explanation just contains the answer but does not show how and why the answer given is correct or wrong. Ideally, the objects could have been highlighted or the counting process could be shown as a simple animation.

4.2.4 Teachers Support

Teacher support for in class orchestration (P14A)  
Teacher support to generate out-of-class activities (P14B)
Teacher Support for in-class orchestration (P14A) is rated Valuable. Teachers are provided a small set of star lesson plans for some learning units which suggest good practices for use of the product in the classroom. The product company also stated that teacher training and professional development workshops were provided as a part of the school onboarding and engagement process.

However, the reviewer did not observe any features to support teachers in lesson planning or using the learning material built in the product.

Teacher Support [Out of class] (P14-B) is rated Exemplary. This product offers ample affordances for supporting the teacher out of the classroom. The reviewers found that the teacher has a lot of flexibility in the creation of worksheets, practice tests, and different kinds of adaptive and personalized tests for the students. A teacher can choose the questions from various topics to include in a test, choose the number of questions of similar type (which are automatically generated systematically) and assign different questions or tests to a desired set of students.

Illustrative examples

- Teachers can create quizzes and assessments from any topic or combined questions from all the topics covered.
- Teachers can assign this quiz to the entire class or to a particular group (Band) in the class. And also teachers can see the student view for the quiz or assessments.
- In the type ‘Adaptive tests’, a teacher can decide how many similar questions a student gets to attempt until they get them correct.
- Tests of varying difficulties can be created by filtering questions which are at a particular difficulty level, among easy/medium/hard.
- A test type called ‘Prasso’ can be assigned which the students can attempt directly on the platform and get immediate feedback and mastery levels.
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

<table>
<thead>
<tr>
<th>Interface design (T1 and T2)</th>
<th>Learner navigation and pace (T3)</th>
<th>Universal design (T4)</th>
</tr>
</thead>
</table>

**Interface design: Enable intuitive use (T1)** is rated Exemplary. Reviewers found that the product is very intuitive to use, and all user events lead to the expected effect. All buttons are clearly visible, with text or other cues, and are placed in meaningful locations on the screen. The learner can easily find the visual elements and functions required to do the given task. The interface follows a consistent pattern for all actions.

**Illustrative examples:**

- All grades and units are similar to a chapter list on the left side and videos/activities/games on the right side with a little description of the video/activity.
- Buttons like “Submit, Check answers, Show answer, Next, Play again?” are clearly visible and placed accurately. Also the presence of question marks for hints might help learners.

However, within a particular lesson, it was not initially intuitive how to move to the next part after one part ends. But this was a one time easily learnable idea, which was pressing a button on the screen which toggles between the available content. Thus reviewers observed that the user interface followed principles for visibility, affordance, consistency, and mapping.

**Interface design: Assess consequences of an action (T2)** is rated Exemplary. The product provides appropriate feedback to each learner’s action and the learner is able to correct unintended actions easily.
Illustrative example:

- There is a ‘Start’ button given while starting a game. Feedback provided during practice is easily comprehensible.
- For each correct answer, a button such as “>” for quiz and “play more” for a game is displayed, whereas for a wrong answer, a button ‘Try again’ is displayed.
- A prompt message is shown once the teacher assigns the content to a selected set of students. Your reading assignment Time has been assigned successfully. You will be redirected to the summary page.

This also allows for recovery from error and helps the learner attempt the incorrect questions once again. If the learner stops the video in between then it can be resumed from where the learner has stopped. In some places, the text for the buttons is missing but once the learner plays with the buttons it is easy to understand. There is very little likelihood of any major unrecoverable error for a learner to make.

Learner navigation and pace (T3) are rated Exemplary. According to the reviewers’ observation the product provides an almost complete control to the learner over their learning path. They can navigate within and across the learning unit, and at the pace that they desire. Learners can skip the videos or the practice questions and move ahead to the next higher up a level or they can revisit the content as per their requirement. Thus navigation and pace through content is based on the learner’s requirements.

Universal Design of Information Technology (T4) is rated Valuable. Reviewers noticed although the product includes most features of Universal Design and Web Content Accessibility Guidelines that ensure a low entry barrier for diverse learners, few important features are missing. Text alternative to non text content (videos) is provided in the form of subtitles, but for text or subtitles, voice-over is missing in few places that might be difficult for students to only read and understand. A few places where for putting answers, only the keyboard can be used no other options such as drop-down with options are given.

### 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>
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Analytics for learners' progress (T5) is rated Exemplary. The reviewers found that the product has a robust dashboard for students.
Illustrative features: Teacher Dashboard

- Allows them to do tasks,
- Check topic progress, and get an overview of the report.
- In case of different levels in a test, the learner can see their mastery on each level.
- A view to compare their mastery with the overall class performance on a particular test is also available.
- Details of the time spent on different topics and content pieces can be seen.

The student dashboard is comprehensive as it allows for each learner to check assigned work and see the solutions provided and progress. The dashboard is learnable for students on their own. Also, information is provided on how many lessons are accessed and assignments are submitted.

The product also has a teacher 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: Teacher Dashboard

- The teacher can get information about the time spent by each child on different lessons.
- The question wise report on the tests is also available and has multiple views, like student wise report or an overall class level report.
- Teacher has the capability to assign various practice sets, tests or questions individually to students or the entire class or any subset.

Tools to support Problem solving (T6) is rated Exemplary. Mathematical tools present are in the form of scratchpads (notebook), Meter scales, for helping with problem-solving. Abacus spikes are provided in the activity for representing 3-digit numbers.
Meaningful interactivity (T7) is rated Exemplary. The overall product has most of the basic interactivity features which are used appropriately to help the learner move forward with the learning in a meaningful manner. In the videos, reviewers observed that there is an option to play, pause, forward as per the learner’s need. In the assessments, there are a good amount of variations of multiple-choice questions, input boxes, drag and drop, and other features which enable meaningful learning. No superfluous interactivities have been observed by reviewers.

Content type-technology alignment (T8) is rated Exemplary. The visualization type used suitably maps to content type. Diagrams are present to show shapes and patterns. Images and animations were also used appropriately to help learners visualize a process.
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.