

LOBE: Learning Object Evaluation Instrument

What is LOBE?

- LOBE is an instrument to evaluate the teaching-learning effectiveness of e-learning content.
- LOBE should be applied on a *learning object*. A learning object is a multimedia teaching-learning resource that contains dynamic visualizations with voice-over (i.e. animations/simulations/videos) as its core component and either all or a subset of the following components – i) activities, ii) set of assessment questions, iii) solved examples, iv) stepwise lesson plans for teachers.
- LOBE measures the quality of the learning objects along three dimensions - content quality, pedagogical alignment and technology integration.
- LOBE can be used by the quality control team of e-learning companies to measure the quality of the learning objects produced.

What is the scope of LOBE?

- The learning objects, that LOBE evaluates, can be at the granularity level of a topic in a textbook chapter where a chapter would typically contain 3-6 topics.
- LOBE is currently designed for topics in STEM domains.
- LOBE has currently been tested for multiple topics at primary, secondary and higher secondary levels.

What is the structure of LOBE?

- LOBE is organized according to the dimensions of: content quality (C) (6 questions), pedagogical alignment (P) (16 questions), and technology integration (T) (8 questions).
- The LOBE instrument is in the format of a 4-scale rubric. Each question evaluates how well the learning object addresses the evaluation criteria at different levels: Missing (score 0), Inadequate (score 1), Almost (score 2), Target (score 3).
- The questions evaluate various aspects of the components of a learning object and the manner in which the components are integrated in the learning object. If a question pertains to one or more specific component, it will be indicated. However, the questions in the instrument are not organized component-by-component, since the unit of application is a learning object.

How to use LOBE?

- Please go through all the different components of the learning object and then answer the questions in LOBE.
- Give a score for each question based on the extent to which the level of operationalization in the learning object matches the descriptors given for that question in LOBE.
- If a learning object does not have a certain component and it can be justified that the component is not needed for that context (like lesson plans for student self-learning learning objects), then it is ok to mark corresponding questions as 'Not Applicable' (NA).
- Once evaluation scores have been obtained for a set of at least 30 learning objects, you can compute average C, P & T percentage scores across the learning objects. This will give you an overall picture of how well the learning objects, on an average, fare along content quality and quality of pedagogical alignment and technology integration on a quality scale of 0 -100.
- You can do more detailed analysis like strength-weakness analysis for a set of learning objects. You can compute a matrix of percentage of learning objects scoring 0,1,2,3 (in columns) for each question in LOBE (in rows). This matrix will help you locate the questions (i.e. aspects of the learning objects) that are not meeting the Target level by majority of learning objects as well as locate the questions where the Target level have already got addressed.



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Content quality (C)				
Question \ Score	0 (Missing)	1 (Inadequate)	2 (Almost)	3 (Target)
C1. Is the content accurate? <u>To evaluate this question:</u> Consider the content in the dynamic visualizations (simulations/animation/video), activities, activity solutions and solved examples	Content is not accurate at all since it contains many incorrect facts, explanations or examples.	Some of the content is accurate, but there are one or more major errors such as incorrect explanations or examples or inaccurate activity solutions; or the way the content is presented is likely to cause major misconception.	Most of the content is accurate and contains correct facts, explanations and examples, and presents accurate activity solutions. However, there may be a few minor errors; or the way the content is presented may lead to minor ambiguity.	All the content is accurate, and contains correct facts, explanations and examples and activity solutions.
C2. Is the content sufficient and up-to-date with respect to relevant advances in the topic in a grade appropriate manner? <u>To evaluate this question:</u> i) Consider the content in: Dynamic visualizations (simulations/animation/video), activities, activity solutions and solved examples. ii) Consider only advances in the topic which are appropriate for the corresponding grade, i.e. if there are advances in the topic which are understandable only in higher grades, don't consider them while scoring this question.	Content is not sufficient to explain the topic completely.	Content is sufficient to explain the topic but does not include any mention of grade-appropriate relevant advances in the topic.	Content is sufficient to explain the topic and contains some description of grade-appropriate relevant advances in the topic, but the description may be incomplete or contain minor errors.	Content is complete and sufficient to explain the topic, <u>and</u> it includes clear and correct descriptions of grade-appropriate relevant advances in the topic.
C3. Is the content situated in an appropriate context? <u>To evaluate this question:</u> Consider the content in: Dynamic visualizations (simulation/animation/video), activities, activity solutions and solved examples. <u>What is meant by context:</u> A context is something that motivates the student to care about the topic. For example, a motivational introductory scenario or a real life example or application may be presented. The context is appropriate when it is relevant and sufficient for the specific content.	No context is provided for the content.	Some context is occasionally provided, however it is irrelevant to the content.	A relevant context is provided for the content. However the context may not be sufficient for the specific topic.	A relevant and sufficient context is provided wherever required.

<p>C4. Are the assessment questions and their solutions correct, clear and unambiguous?</p> <p><i>What does correct mean: The question as well as the solution should contain correct facts and accurate scientific explanations.</i></p> <p><i>What does clear and unambiguous mean: The wording of the assessment questions and solutions should be clear and complete for the student, the question should not be open to more than one interpretation. An example of a question which is ambiguous is: Write a short note on WWII.</i></p>	Assessment questions are missing.	Assessment questions are factually inaccurate; or solutions are wrong.	Most of the assessment questions are factually correct. However, they may be slightly ambiguous in their wording leading to lack of clarity in interpretation; or, solutions may contain minor errors.	All assessment questions and their solutions are factually correct and unambiguous.
<p>C5. Do the assessment questions contain an appropriate context?</p> <p><i>An appropriate context in assessment questions can be a relevant real-world scenario or an application on which the question is based.</i></p> <p><i>Note that a context is not required in all assessment questions. However, there should be sufficient questions containing a relevant and meaningful context so that students realize the application of the topic.</i></p>	No context is provided in any assessment question.	A context is occasionally provided in a few assessment questions but a context is missing in most assessment questions.	A context is provided in sufficient assessment questions. However in some questions, the context may not be meaningful.	An appropriate and meaningful context is present in sufficient number of assessment questions.
<p>C6. Is the spelling, grammar, pronunciation and correct, and the formatting consistent, in various parts of the module?</p> <p><i>Examples of inconsistency in formatting include arbitrarily varying font sizes, bold/italic, justification etc.</i></p>	There are serious errors in all of spelling, grammar and pronunciation leading to difficulty in comprehension.	There are some errors in spelling, grammar or pronunciation or the formatting is inconsistent. The errors may lead to negative effect on comprehension such as misinterpretation, or need of significant effort to comprehend.	The content is free of spelling, grammar, pronunciation and formatting errors for a majority of time. However, there may be minor errors such as typos. These errors do not have any negative impact on comprehension.	Spelling, grammar, pronunciation and formatting are correct all the time.

Pedagogical Alignment					
Question	Score	0 (Missing)	1 (Inadequate)	2 (Almost)	3 (Target)
P1. Are learning objectives stated explicitly? <i>What does “stated explicitly” mean? The learning objectives are either written as text or orally spoken.</i> <i>Consider any of the following places to locate the learning objectives: Dynamic visualizations (simulations/animation/ video), lesson plan, activity (or its solution).</i>		None of the learning objectives are stated explicitly.	Only some learning objectives are stated explicitly.	All necessary learning objectives are stated explicitly, but they cannot be easily found in expected places like at the beginning of the dynamic visualization component or lesson plan.	All necessary learning objectives are stated explicitly. They can be easily found in expected places like at the beginning of the dynamic visualization component or lesson plan.
P2. Are learning objectives stated correctly? <i>What does this question mean?</i> <i>A learning objective should satisfy the following criteria:</i> <i>(i) Is student-centred</i> <i>(ii) Uses measurable action verbs</i> <i>(iii) Specifies conditions, wherever possible, under which performance is to be carried out.</i> <i>The first two criteria are particularly important while stating learning objectives.</i> <i>Note: If you feel that list of necessary learning objective is not exhaustive, then P1 is the correct criterion to capture it. P2 focuses only on evaluating if the learning objectives have been correctly stated.</i>		None of the learning objectives are stated correctly.	Few of the learning objectives are stated correctly	Most of the learning objectives are stated correctly.	All the learning objectives are stated correctly
P3. Have the prerequisite topics been stated? <i>Note: It is sufficient to state prerequisite topics which are immediately required at one previous level to understand the content in this module. There is no need to go back several levels.</i>		No prerequisite topics, required to comprehend the current content, have been stated.	Only few of the key prerequisite topics, required to comprehend the current content, have been stated.	Most of the key prerequisite topics required to comprehend the current content, have been stated but there may be a few minor ones which are not included.	All the key prerequisite topics required to comprehend the current content, have been stated.
P4. Does the content in the dynamic visualization and activities include instances under multiple conditions? <i>What does this question mean?</i>		The content includes only a single instance.	The content shows a few instances, but they are insufficient or incorrectly chosen instances.	The content shows instances under multiple conditions but a key condition is missing, or there is an error in the instances shown.	The content shows instances under all necessary and meaningful conditions.

<p><i>In order to understand a topic, a student needs to see multiple examples and applications of the same topic. The examples and applications should be meaningful for the topic. The more diverse they are, more effective is the learning.</i></p> <p><u>Examples in science:</u></p> <p>i) To show examples of a metal, show multiple colours (grey, golden, black, white), different textures, lustres etc.</p> <p>ii) Effect of changing multiple values of a variable (such as temperature, chemical composition etc.) on the behaviour of a system. For example: While showing change in states of matter, show the effect of a range of temperature values so that all states of matter are seen.</p> <p><u>Example in maths:</u></p> <p>In measurement of length, show measurement of different objects – small as well as large, horizontal as well as vertical as well as at an angle, measuring breadth/height of rectangular objects as well as diameter of circular objects.</p>				
<p>P5. Does the content effectively resolve common student misconceptions?</p> <p><u>To evaluate this question:</u> Consider the content in the entire learning object including dynamic visualizations (simulation/animation/video), activities, activity solutions and solved examples.</p> <p><u>How to score this question?</u></p> <p>It is useful to have an idea of common student misconceptions in a given topic, so that one can judge whether the content addresses them. This can be found by discussion with teachers or in education research literature.</p>	<p>There is no mention anywhere of any of the common student misconceptions.</p>	<p>There are explanations to address some common student misconceptions, but they are not effectively resolved, or key misconceptions are not addressed.</p>	<p>There are interactive activities that students can use in an attempt to resolve common student misconceptions. But interactive activities are missing for some of the key misconceptions.</p>	<p>There are interactive activities that students can use in order to elicit and resolve all the major misconceptions themselves.</p>
<p>P6. Is the dynamic visualization component for a topic organized in segments than as a continuous unit?</p> <p><u>What does this question mean?</u></p> <p>Dynamic visualization component for a topic should be organized as a set of segments with the visualization pausing at these segments. The</p>	<p>The dynamic visualization component is not segmented and is presented as a continuous unit.</p>	<p>The dynamic visualization component is segmented into a set of sub-topics but the segments are not sequenced properly. Or, content is not interleaved with activities, that is, a number of content segments appear one after another, with the activities appearing only towards the end.</p>	<p>The dynamic visualization component is properly segmented into a set of sub-topics and sequenced. Each content segment is interleaved with an activity. But these segments appear as a physically continuous unit.</p>	<p>The dynamic visualization component is properly segmented and sequenced into a set of sub-topics. Each content segment is interleaved with an activity. Additionally, these segments appear as physically separate units.</p>

<p>segments should also be sequenced properly (such as from simple to complex content).</p> <p>The dynamic visualization component should be segmented in the following way: (i) The topic in the learning object should be further divided into smaller segments based on sub-topics, (ii) Each segment containing content should be interleaved with a segment containing an activity (iii) Segments from (i) and (ii) should not only be logically separate, but should appear as physically separate units.</p>				<p>One way to make this happen is that the learning object automatically pauses after each segment containing content and presents an activity for students.</p>
<p>P7. Does the learning object use a conversational style and include on-screen coaches?</p> <p><u>Why is this question important?</u></p> <p>It has been shown that when e-learning content uses conversational style than a formal speech, students learn more effectively. Usage of active voice and words such as 'us' and 'we' is preferred to passive voice. For example: "Let us now see what happens..." is preferred to "It can be seen that..." Similarly, the use of on-screen coaches/tutors or 'pedagogical agents', such as age-appropriate cartoon character or teacher-like character, is known to be effective for giving instructions and feedback.</p>	<p>The style of speech is formal and didactic and there is no on-screen coach.</p>	<p>There is an attempt to use conversational style occasionally, but it is not present in many parts of the learning object.</p> <p>No on-screen coach or pedagogical agent is present.</p>	<p>A serious effort has been made to use conversational style, but it is not always present. An on-screen coach or pedagogical agent is present for some tasks (such as giving motivation), but is not present for an important task (such as giving feedback).</p>	<p>A conversational style is used in various parts of the learning object, to give instructions and feedback. In addition, an on-screen coach or pedagogical agent is present which motivates and guides the student along with giving instructions and feedback.</p>
<p>P8. Are higher order thinking skills (HOTS) being addressed in the dynamic visualization, examples or activities?</p> <p><u>What does this question mean?</u></p> <p>Higher order thinking skill (HOTS) covers apply level and above of Revised Bloom's Taxonomy. Ideally, dynamic visualization component should include those HOTS examples or learning activities that are important for the topic.</p>	<p>HOTS are not being addressed in the dynamic visualization component, examples or activities. They are limited to Recall only.</p>	<p>HOTS are not being addressed, but the dynamic visualization component, examples or activities address up to Understand level with students doing some interpretation or explanation.</p>	<p>HOTS are being addressed to some extent in the dynamic visualization component, examples or activities. However, some of the important HOTS relevant for the topic are missing.</p>	<p>HOTS are being sufficiently addressed in the dynamic visualization component, examples or activities.</p> <p>(Sufficiently addressed means the HOTS important for the topic has been included.)</p>
<p>P9. Are the activities in the learning object or in the lesson plan aligned to the learning objectives?</p>	<p>The learning object or the lesson plan does not contain activities that are at the same cognitive level as any of the learning objectives.</p>	<p>The learning object or the lesson plan contains activities that are at the same cognitive level for some of the learning objectives. But a majority of learning objectives, especially at HOTS levels, are not</p>	<p>The learning object or the lesson plan contains activities that are at the same cognitive level for most learning objectives. But a few learning</p>	<p>The learning object or the lesson plan contains one or more activities that are at the same cognitive level for all learning objectives.</p>

<p><u>Why is this question important?</u></p> <p>The activities must be such that they should achieve the purpose of the learning objectives. Thus, learning objectives at higher levels need corresponding activities that allows them to go beyond recall and understand.</p>		<p>addressed by the activities in the lesson plan.</p> <p>Or, the activities seem like they are at the same cognitive level as the learning objectives, but the activity is unlikely to achieve the purpose of the learning objective.</p>	<p>objectives are missing activities at the corresponding level.</p>	
<p>P10. Do the dynamic visualization, activities or lesson plan promote student-centric learning?</p> <p><u>What does 'promote student-centric learning' mean' and why is it important?</u></p> <p>The dynamic visualization component and activities should allow students to construct understanding of the topic on their own by connecting the content to what they already know, organizing and making sense of the content, testing and revising their understanding, applying the content and so on. This can be promoted by providing sufficient relevant activities where students are required to do the above. Such activities are essential in getting students to be engaged with the content and for effective learning. In addition, for a teacher-led learning object, the lesson plan should guide the teacher to go beyond mere transmission of information and demo of simulation/animation/video, while teaching with the learning object.</p>	<p>The dynamic visualization component or activities or lesson plan do not allow students to work in a student-centric manner.</p> <p>There is only show and tell.</p>	<p>There are some activities in the learning object but these are very structured and guided. Students may wind up following the procedural steps while performing these activities. Thus there is limited opportunity for students to construct their own understanding.</p> <p>Or, the majority of the lesson plan is teacher-centric, i.e. they are based on teachers doing transmission of information and demo of simulation/animation/ video.</p>	<p>There are activities in the learning object that are intended to promote student-centric learning. However some of the important features of student-centric learning are missing in the design of such activities, or, there are a few instances in the lesson plan which should be converted from teacher-centric to student-centric.</p> <p>For example, the activity is worded in such a way that it explains the probable solution without requiring the students to think and express their reasoning, or, connection between the activity and the content is not clearly brought out, or students are not required to reflect and make sense.</p>	<p>There are sufficient activities in the learning object relevant to the content that allow students to construct their own understanding. These activities require students to interact with them and do as many of the following as relevant: connect the content to what they already know, organize and make sense of the content, express their reasoning, test and revise their understanding, apply the content, work in groups, do problem solving, and so on.</p>
<p>P11. Does the lesson plan provide opportunities to diagnose students' learning gaps and fix them?</p> <p><u>What does 'learning gap' mean?</u></p> <p>Learning gap refers to the difference between what the student has learnt and what he/she was expected to learn. This gap may be because students have not grasped certain sub-concepts within the topic. Due to this inadequate grasping, students may end up making errors in application of the concept. Some targeted help is required to fill this gap.</p>	<p>The lesson plan provides no opportunities for diagnosis of students' learning gaps, neither by the teacher nor the student themselves.</p>	<p>The lesson plan provides opportunities where teachers can diagnose students' learning gaps (like doing unstructured activities e.g. asking for doubts). It does not however equip the students to diagnose themselves.</p>	<p>The lesson plan provides opportunities where students themselves can diagnose their learning gaps (like doing structured activities like small group activities that lets them compare their solution with their classmates). But it does not equip them to fix the gaps on their own.</p>	<p>The lesson plan provides opportunities where students can themselves diagnose their learning gaps and subsequently fix them (like discussing and reflecting on their solution with their classmates in a group).</p>

<p><i>Note: This question will not be applicable for a learning object meant for student self-learning. However, this is a mandatory question if the learning object is a teacher-led resource.</i></p>				
<p>P12. Are various components of a learning object - dynamic visualization, activities, examples and assessment questions – integrated in a meaningful way?</p> <p><u>What is meant by ‘integrate components of a learning object in a meaningful way’?</u></p> <p><i>The various components of a learning object should use each other to enhance learning, instead of remaining as an isolated piece.</i></p> <p><i>Examples of meaningful integration of various components:</i></p> <p>i) <i>Some of the assessment questions can be designed such that the feedback to the question makes reference to the simulation/animation/video on that topic. Along with the verbal explanation in the feedback, the student is asked to watch a specific part of the animation/video that contains the corresponding visual explanation.</i></p> <p>ii) <i>Insert an activity in between an animation / video instead of relegating it to the end. You may show animation/video for certain time, pause it, pose an activity question and resume the animation/ video to provide solution to activity.</i></p> <p>iii) <i>For simulation, you may start with an activity that students can solve and then cross-check their understanding by interaction with the simulation.</i></p> <p><u>Why is this question important?</u></p> <p><i>Such an integration will lead to effective use and reuse of the components created in the learning object. This will help students since they will then be able to connect various parts of the learning object. This will also help e-learning companies as it will allow them to reuse what they have already created.</i></p>	<p>No attempt has been made to integrate various components of the learning object.</p>	<p>The learning object attempts to integrate its various components. But they are not done in a meaningful way. That is, when one component is being used, it arbitrarily refers to another component, but such an attempt at integration is unlikely to enhance student learning.</p>	<p>There are some instances where the learning object integrates its various components in a meaningful way. But a few meaningful integrations have been missed.</p>	<p>The lesson plan integrates components of the learning object wherever meaningful, i.e. when one component is being used, it calls in and uses another component in a way that is likely to enhance student learning.</p>

<p><i>Note: For a teacher-led learning object, this integration should be made explicit in the lesson plan.</i></p>				
<p>P13. Are the assessment questions aligned to the learning objectives?</p> <p><u>Why is this question important?</u></p> <p><i>If assessment questions are at a lower cognitive level than the learning objectives, then there is no source of evidence to test if the learning objectives have been achieved. On the other hand, if the assessment questions are higher than the learning objectives, then it will not be fair to students.</i></p>	<p>None of the learning objectives have assessment questions aligned to the corresponding cognitive level.</p>	<p>Only some learning objectives have assessment questions aligned to the corresponding cognitive level.</p>	<p>A majority of learning objectives have assessment questions aligned to the corresponding cognitive level.</p>	<p>All learning objectives have corresponding assessment questions which are aligned.</p>
<p>P14. Do the assessment questions or activities provide adequate corrective and explanatory feedback to students?</p> <p><u>What does this question mean?</u></p> <p><i>Corrective and explanatory feedback goes beyond saying whether an answer is correct or wrong. It must contain an explanation of why a particular answer is wrong and what a student can do to correct their understanding.</i></p>	<p>No feedback is provided to students in the assessment questions or activities.</p>	<p>Feedback is provided by assessment questions or activities. But in most cases, the feedback is only in binary format of correct or incorrect without further explanation.</p>	<p>Feedback is provided by most of the assessment questions or activities. The feedback informs student of the correct response along with explanation for why the chosen response is correct/ incorrect.</p>	<p>Feedback is provided by most of the assessment questions or activities. The feedback informs students not only of the correct response along with explanation, but also remedial help is provided. This guides students to revisit specific content portions for better understanding.</p>
<p>P15. Have any segments from the dynamic visualization component (simulation/ animation/video) been reused, such as in the activities or assessment questions?</p> <p><u>Why is this question important?</u></p> <p><i>For effective learning, it is important for a student to be able to apply the concepts in multiple situations. Reusing segments from the simulation/animation/video in the activities and assessment question will provide such an opportunity. This will also ensure that the usability of the learning object can be extended.</i></p> <p><u>Note:</u></p> <p><i>This reuse may occur in the activities or assessment questions in a different learning object than the one being evaluated. This is perfectly acceptable, and this question should be given a high score. Hence it is recommended that the same person score all learning objects pertaining</i></p>	<p>No segments from the dynamic visualization component have been reused.</p>	<p>A few segments from the dynamic visualization component have been reused in the activities or assessment questions. But there are many other pedagogical opportunities for reuse which have not been used.</p>	<p>Some segments from the dynamic visualization component have been reused in the activities or assessment questions. There are a few others not reused, but could have been reused for effective learning.</p>	<p>Sufficient relevant segments from the dynamic visualization component have been reused in the activities or assessment questions.</p>

<p>to a chapter, so that they become aware of what segments are being reused across learning objects in a chapter.</p>				
<p>P16. Is there adequate representation of diversity?</p> <p><u>What does this question mean?</u></p> <p><i>It is important for learning materials to contain representation of diverse socio-economic groups, similar to what can be found among the students in a classroom. Hence the various components of a learning object – simulation/animation/video, activities and assessment questions should contain an adequate representation of different sections of society in terms of gender, race, socio-economic class, religion, looks etc.</i></p> <p><u>Note:</u></p> <p><i>This question may be answered by considering all learning objects of a chapter together. You may decide to give the same score to all such learning objects. However, please give make sure you do evaluate each learning object.</i></p>	<p>No consideration is given to include diversity in terms of gender, race, socio-economic class, religion, looks etc.</p>	<p>An attempt has been made to include diversity in the learning object(s), but major sections of society have been missed out, leading to an inadequate representation.</p>	<p>Serious consideration has been given to include diversity, and most sections of society have adequate representation. However a few are missing.</p>	<p>A systematic effort has been implemented to include diversity in various components of the learning object. There is adequate representation of the relevant sections of society in terms of gender, race, socio-economic class, religion, looks etc.</p>

Technology integration (T)					
Question	Score	0 (Missing)	1 (Inadequate)	2 (Almost)	3 (Target)
<p>T1. Do the graphics and sound serve an instructional or motivational purpose and not merely cosmetic?</p> <p><u>Why is this question important?</u> <i>Graphics and sound must serve a clear purpose, preferably an instructional one. People may consider pictures and animation (such as flashing words) to be motivational but they can become distracting especially if used often. Similarly, people may consider certain sounds as motivational (such as happy/sad sounds while giving feedback) – but that becomes annoying if repeated too many times. Graphics used for cosmetic reasons (such as many colors/ fonts), or sounds such as background music can be distracting. Such technology overload can adversely affect learning.</i></p> <p><u>To evaluate this question:</u> <i>Consider the content in all components of the learning object: dynamic visualization (simulation/ animation/ video), activities, solved examples, assessments and their solutions, etc.</i></p>		Graphics and sound have been used merely for cosmetic reasons, and serve no instructional or motivational purpose.	Some but not all graphics and sound seem to serve instructional or motivational purposes. However: i) Their specific purpose and how they support learning may not be clear. OR ii) There exist a fair number of graphics or sound which are unnecessary and can lead to distraction.	Many graphics and sound serve clear and important instructional purposes, for example, the content is better understandable due to the presence of the graphic. However, there exist some unnecessary graphics or sound that may be distracting and do not clearly support an instructional or motivational goal.	i) Mostly all graphics and sound serve clear and important instructional purposes, for example, the content is better understandable due to the presence of the graphic. AND ii) If any graphic or sound is used for motivational purposes alone, it is done sparingly. Also, they are likely to support better learning (such as higher attention).
<p>T2. Are the types of visual representations in the learning object chosen such that they are suitable for the corresponding content type?</p> <p><u>What does ‘visual representations’ mean?</u> <i>The term ‘visual representations’ in this question refers to both static diagrams & dynamic visualizations i.e. videos, animations or simulations.</i></p> <p><u>To evaluate this question</u> <i>Consider visual representations in all parts of the learning object. These may be present in the dynamic visualization component or in other components.</i></p> <p><u>Why is this question important?</u> <i>For learning to be effective, a particular content type should be mapped to its corresponding suitable type of visual representation. For example, use:</i></p> <ul style="list-style-type: none">• <i>Diagram if content type is fact</i>		None of the visual representations in the learning object suitably maps to the content type.	Less than half of the visual representations in the learning object suitably maps to the content type.	Half or more of the visual representations in the learning object suitably maps to the content type.	All the visual representations in the learning object suitably maps to the content type.

<ul style="list-style-type: none"> • Animation or video if content type is process • Simulation if content type is concept/principle 				
<p>T3. Do the dynamic visualizations or activities or assessments include interactivity features that are meaningful for learning the corresponding content?</p> <p><i>Examples of interactivity features are: slider bars, input boxes, drag & drop, drop-down, activity question popping in between content presentation.</i></p> <p><i>'Meaningful for learning' means that the choice of including these interactivity features is determined by the learning purpose they serve. For example,</i></p> <ul style="list-style-type: none"> • for navigation – use back/next, play/pause buttons • for choosing from a set of values – <ul style="list-style-type: none"> - if no. of values < 5, use radio buttons; - if no. of values >5, use drop-down • for control/modify variables – use slider bars • for matching and selection – use drag & drop 	No interactivity features are included.	Some interactivity features may be included. But they are insufficient or not meaningful for learning the content.	Most necessary interactivity features are included and they are meaningful for learning the content. However some interactivity features included are superfluous.	All necessary interactivity features are included in the dynamic visualization component or activities or assessments. They are all meaningful for learning the content. Superfluous interactivities are avoided.
<p>T4. Is the interface easy to use for a new user?</p> <p><u>What does 'easy-to-use' mean?</u></p> <p><i>The interface should be intuitive to a new user, information should be easy to find, organization and hierarchy of content should be clear and consistent, screens and buttons should be consistently placed, labels and legends should be placed near the graphics.</i></p>	The interface is not intuitive, information cannot be found easily, and there is severe inconsistency.	Some tasks within the interface are intuitive and possible to do without assistance. Some information is easy to find in expected places. But for a large number of required tasks (such as going to the previous screen or finding out the organization of content in the learning object), the interface is not easy to use.	Most tasks within the interface are intuitive. Information can be found at most times, but occasionally some effort is needed. There is some lack of consistency, for example, in terms of placement of buttons.	The interface is organized and easy to use. It allows users to do tasks by interacting with the various components of the learning object without difficulty or assistance related to information seeking and navigation.
<p>T5. Does the interface contain appropriate cues to make the user aware of possible interactions?</p> <p><u>What do 'cues' mean?</u></p> <p><i>Cues are visual indications to the users about possible interaction with the interface. For example, from the visual look of each element in the interface, it should be clear whether it is clickable or not. Example - a blinking button to indicate that the user can click the button. Other clickable elements are: buttons, sliders, hyperlinks, navigation buttons.</i></p>	<p>The interface contains no cues to make the user aware of possible interactions.</p> <p>For example, there is no difference in the appearance of clickable versus non-clickable elements in the interface.</p>	<p>The interface contains some cues to indicate the expected output but the cues are insufficient or not useful in terms of where / when they are provided.</p> <p>For example, having an answer-box without a cue whether it expects alphabetic or numeric input is insufficient. Showing an error message about the type of</p>	<p>The interface contains sufficient cues which inform the user about the possibility of interaction, but they are not clear in communicating what will be the effect of the interaction.</p> <p>For example, there is a clickable button whose purpose is to pause the AV. However, no conventional symbols (such as two vertical lines) or explicit</p>	<p>The interface contains sufficient and clear cues which inform the user about the possibility of interaction and also communicate what will be the effect of the interaction.</p> <p>For example, a clickable button whose purpose is to pause the AV is accompanied by conventional symbols (such as two vertical lines for pause) or explicit labels (saying</p>

<p><u>Note:</u> You may decide to give the same score to all learning objects for this question. However, please make sure you do evaluate each learning object.</p>		input after the user submits their answer is not very useful.	labels (saying 'Pause') have been used to indicate the function of the button.	'Pause') to indicate that pressing this button would pause the AV.
<p>T6. Does the interface provide appropriate response (textual, auditory or visual) upon user action?</p> <p><u>Examples of appropriate response:</u> Invalid or wrong input by the user should result in one or more of the following responses that indicate error:</p> <ul style="list-style-type: none"> • an error message popup box (textual), or, • an alarm sound (auditory), or, • appearance of symbols such as red cross (visual) <p><u>Note:</u> You may decide to give the same score to all learning objects for this question. However, please give make sure you do evaluate each learning object.</p>	<p>The interface does not provide appropriate response to user action.</p> <p>For example, user submits an assessment solution but does not get any confirmation about submission / non-submission, or correct/incorrect.</p>	<p>The interface provides response to user action, but some of them are inappropriate.</p> <p>Examples of inappropriate responses:</p> <p>Responses which are delayed, placed far away from user's action area, too small/big as compared to other content, wrong or non-conventional graphics (showing broken wire image for network error instead of yellow triangle)</p>	<p>The interface provides response to user action, but some of the responses confuse/obstruct the user from further interaction.</p> <p>For example, flashy, oversized pop-ups that covers the screen and obstructs the user from interacting further.</p>	<p>Interface provides appropriate response to user action with the interface.</p> <p>For example, warning or success notifications are displayed immediately following user action, are in proximity of the interaction area or, does not visually obstruct the other information on the screen.</p>
<p>T7. Does the user have appropriate control of navigation and pace within the learning object?</p> <p><u>Why is this question important?</u> It is important that the user be able to go from one part of the learning object to another as desired, go back & forth, interact with the learning object at their desired rate (for example slow down / speed up an animation) and contain obvious exit options.</p>	<p>The user has no control or flexibility. All decisions related to navigation and pace are controlled by the program.</p>	<p>The user has some but not a lot of flexibility and control of navigation and pace.</p> <p>For example, certain navigation paths are allowed, but other required ones are not allowed. Or, only pause and play (but not rewind / forward) are allowed as controls within an animation.</p>	<p>The user has a fair amount of flexibility and control of navigation and pace. However a few minor controls may not be possible.</p> <p>For example, it may be possible to pause, restart, rewind and forward an animation but not change its speed.</p>	<p>The user has adequate flexibility in terms of navigation and pace control. The user can go from one part of the learning object to another as desired, go back and forth and interact with the learning object at their desired rate.</p>
<p>T8. Is there sufficient guidance provided to teachers on how to effectively use the various components of the learning object together?</p> <p><u>Why is this question important?</u> Guidance should be provided to teachers on how to make effective use of the various components of the learning object together. Consider various components such as the dynamic visualization, activities, examples, assessment questions. Effective use of various components means teachers should be able to use one or more components of the learning object with another to enhance student learning. For example, teachers can</p>	<p>No guidance is provided to teachers on how to use the various components of the learning object together.</p>	<p>Guidance is provided to teachers on which components of the learning object can be used together. But no guidance provided on how to use the components together.</p> <p>For example, the guidance will include the following instructions: Pose this activity question from the learning object and use the dynamic visualization along with the activity.</p>	<p>Some stepwise guidance is provided to teachers on which components of the learning object can be used together and how. But the steps are not detailed enough, or do not contain sufficient information to help the teacher design and implement a lesson to meaningfully use the technology features with suitable pedagogical strategy for the content.</p>	<p>Detailed, stepwise guidance is provided to teachers not only on which components of the learning object can be used together, but also how and when. Guidance is provided on how to meaningfully use the technological features. With this guidance, the teacher can design and implement the lesson to make effective use of the technology features (like interactivity) with a suitable pedagogical strategy for the content in the given class time.</p>

<p>pose assessment questions, feedback to which can be visually shown through the dynamic visualization.</p> <p><u>Note:</u> This guidance should go beyond user help for technology features.</p> <p>This question will not be applicable if the learning object is a self-learning resource for students. But this is a mandatory question for a teacher-led learning object.</p>			<p>Example1: The following guidance is provided to teach with an animation in the learning object:</p> <p>Step 1 – Play the animation</p> <p>Step 2 – Pause the animation and pose this prediction activity</p> <p>Step 3 – Ask students to make the prediction</p> <p>Step 4 – Resume playing the animation.</p> <p><i>Some details are missing – when exactly to pause the animation, should students make predictions individually or in groups, what to do after resuming etc.</i></p> <p>Example 2: The following guidance is provided to teach with a simulation in the learning object:</p> <p>Step 1 - Pose the prediction activity question from the learning object</p> <p>Step 2 - Ask students to answer the question</p> <p>Step 3 - Use the simulation to show students what will happen.</p> <p><i>Some details are missing – should students make predictions individually or in groups, which values to input in the simulation etc.</i></p>	<p>Example1: The following guidance is provided to teach with an animation in the learning object :</p> <p>Step 1 – Play the animation</p> <p>Step 2 – Pause the animation at specific time-stamps, such as, just before the animation shows a change in behaviour of the system</p> <p>Step 3 - Pose the activity question, such as, predict what will happen to the behaviour of the system</p> <p>Step 4 – Ask students to work in groups to make the prediction and explain the reasoning behind it</p> <p>Step 5 – Resume playing the animation to show what will happen to the behaviour of the system. Along with it, explain why this change occurred.</p> <p>Example 2: The following guidance is provided to teach with a simulation in the module:</p> <p>Step 1 - Pose the prediction activity question</p> <p>Step 2 - Let students work in groups and make the prediction of the behaviour of the system</p> <p>Step 3 – Use the simulation to give feedback. Move the slider bar to specific values and show the effect on behaviour of the system</p> <p>For example:</p> <p>a) (Science) The behaviour of water at temperature values of -1°, 10° and 100° C</p> <p>b) (Maths) The type of angles formed when clock hands display 12:05, 12:15, 12:40 and 6:00.</p> <p>Step 4 - Compare and discuss the effects.</p>
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