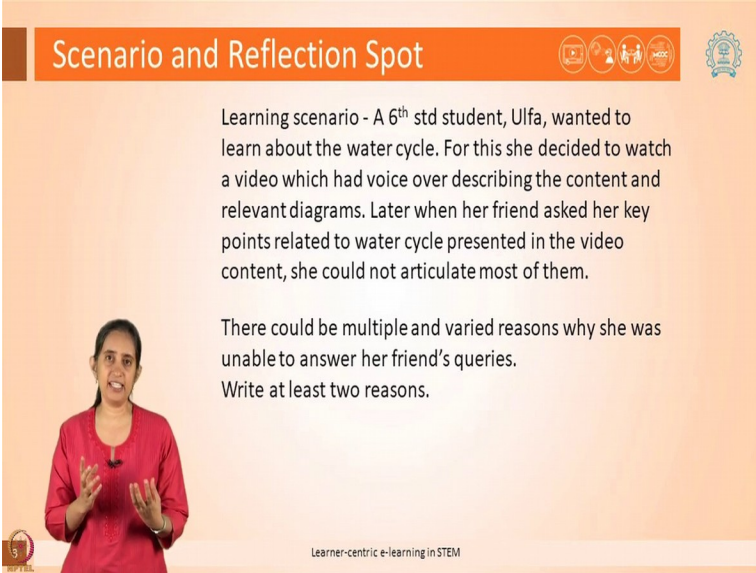


**Designing learner-centric e-learning in STEM disciplines**  
**Prof. Sahana Murthy**  
**Interdisciplinary Programme in Educational Technology**  
**Indian Institute of Technology, Bombay**

**Lecture-12**  
**Interactive Video**

We have been looking at ways to engage learners with the e-content such as videos. In this learning dialogue, we will focus on the principles and strategies to design interactive videos.

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**Scenario and Reflection Spot**

Learning scenario - A 6<sup>th</sup> std student, Ulfa, wanted to learn about the water cycle. For this she decided to watch a video which had voice over describing the content and relevant diagrams. Later when her friend asked her key points related to water cycle presented in the video content, she could not articulate most of them.

There could be multiple and varied reasons why she was unable to answer her friend's queries.  
Write at least two reasons.

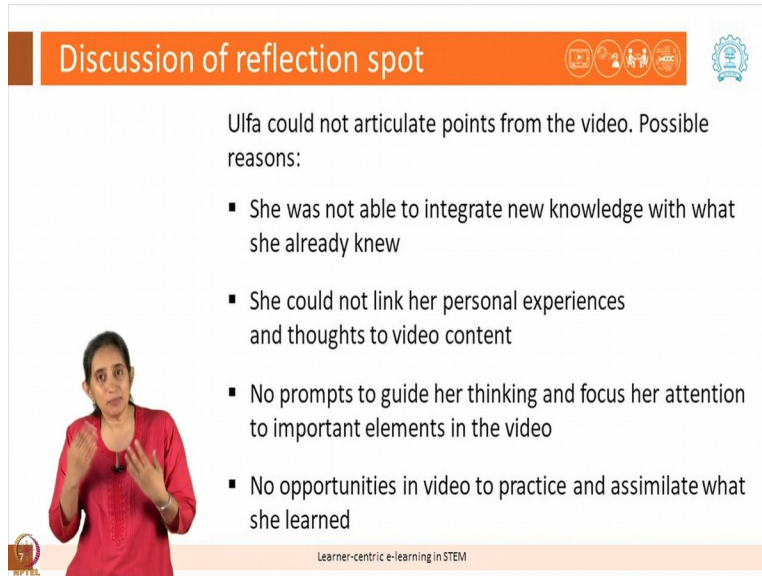
Learner-centric e-learning in STEM

Let us begin with a reflection spot which contains the following learning scenario. 6th standard student Ulfa, wanted to learn about the water cycle. For this she decided to watch a video which had voiceover and diagrams relevant diagrams that explain the various stages of the voiceover. After she watched the video one of her friends asked her to summarize the key points of the water cycle which was presented in the video and it turned out that Ulfa could not articulate she could not summarize the key points.

There could be multiple and varied reasons for why she was unable to answer her friends questions. Imagine a video which has accurate content and relevant as well as attractive diagrams, yet there must have been some limitations because of which she was unable to

summarize. Write at least two such possible reasons you can think of in the text box provided, when you are done you can submit and resume.

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**Discussion of reflection spot**

Ulfa could not articulate points from the video. Possible reasons:

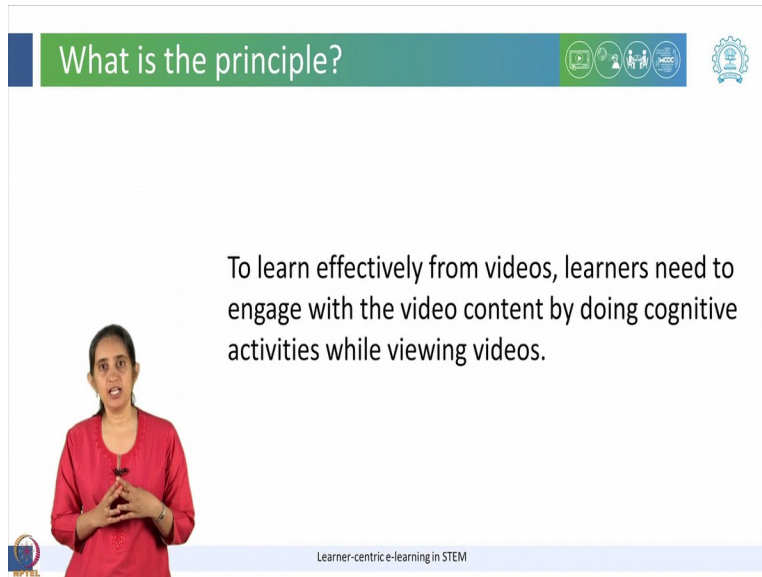
- She was not able to integrate new knowledge with what she already knew
- She could not link her personal experiences and thoughts to video content
- No prompts to guide her thinking and focus her attention to important elements in the video
- No opportunities in video to practice and assimilate what she learned

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Let us look at some possible reasons, why the student was not able to summarize the key points in the video. While the video may have had new content perhaps she was not able to integrate it with her prior knowledge and experiences with things that she already knew. Some of you may have thought of the reason that perhaps she could not link her personal experiences to the formal and abstract content the water cycle process presented in the video and she was never asked to connect her experiences.

Others may have thought that the video lack prompts that could have guided her thinking and or focused our attention on the important elements and perhaps many of you may have realized that the video lacked immediate opportunities for the student to practice and assimilate what she learned.

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What is the principle?

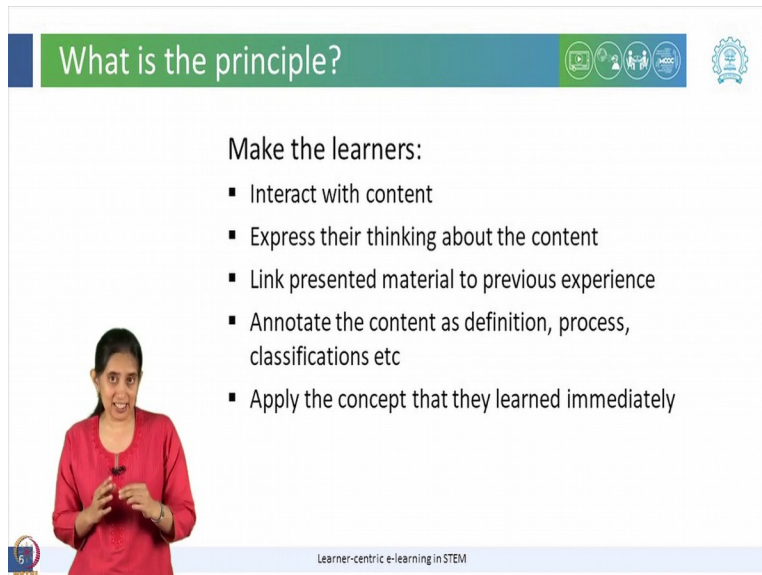
To learn effectively from videos, learners need to engage with the video content by doing cognitive activities while viewing videos.

Learner-centric e-learning in STEM

The slide features a presenter in a red shirt on the left. The title bar is green and blue. The main content area is white with a light blue background. The footer is a light blue bar with the text 'Learner-centric e-learning in STEM'.

Let us look at a principle to help learners learn effectively from videos. To learn it effectively from videos, learners need to engage with the content of the video by doing cognitive activities while viewing the video.

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What is the principle?

Make the learners:

- Interact with content
- Express their thinking about the content
- Link presented material to previous experience
- Annotate the content as definition, process, classifications etc
- Apply the concept that they learned immediately

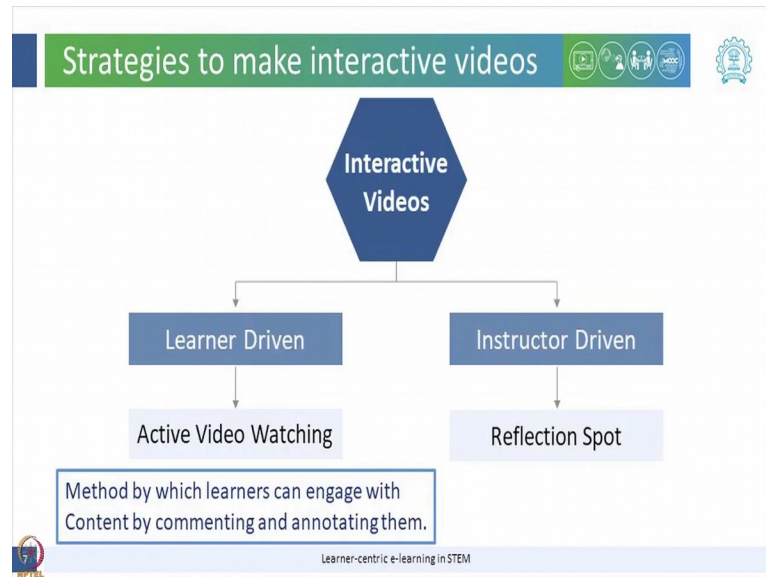
Learner-centric e-learning in STEM

The slide features a presenter in a red shirt on the left. The title bar is green and blue. The main content area is white with a light blue background. The footer is a light blue bar with the text 'Learner-centric e-learning in STEM'.

For this, we as designers of the e-content need to make the learner interact with the content during the viewing of the video, we need to make them express their thinking about the content,

we need to help them link the presented material with their previous experience, they can annotate the content as definition or process or classification, learners need to apply the content that they learned immediately.

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When we give learners the opportunity to do many of these activities, we are designing interactive videos. In this learning dialogue, we will focus on two key strategies to design interactive videos one of them is called active video watching, active video watching is a method by which learners can engage with the content of a video by commenting and annotating at various parts of the video.

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## Support for Active Video Watching

Provide support for active video watching with features such as

- Commenting at different points of the video
- Focus questions to elicit learner comments
- Tagging / annotating parts of the video with elements from content (**for example** - Definition, process, principle, outcomes)



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As designers of e-content, we need to provide supports for active video watching and we need to provide features so that learners can comment at different parts of the video, we need to provide focus questions to elicit learner comments explicit focus questions, we need to provide opportunities or and features so that learners can tag or annotate different parts of the video with the elements of the content such as here it is a definition, there it is a process and so on.

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## Example System for AVW

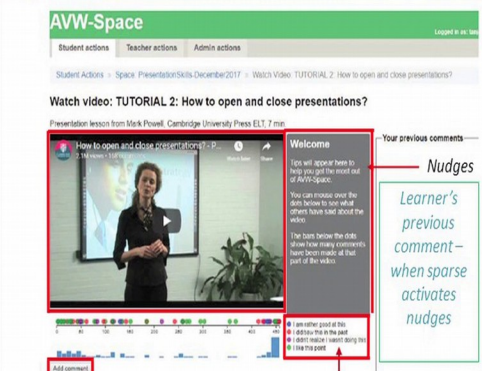
**AVW-Space**

Student actions Teacher actions Admin actions

Student Actions > Space PresentationSkills December 2017 > Watch Video TUTORIAL 2: How to open and close presentations?

Watch video: TUTORIAL 2: How to open and close presentations?

Presentation lesson from Mark Powell, Cambridge University Press ELT 7 file



**Nudges**

Learner's previous comment - when sparse activates nudges

Space for learner to add comments

Tag comment with learner experience

In this example interface for Active Video Watching, you can see:

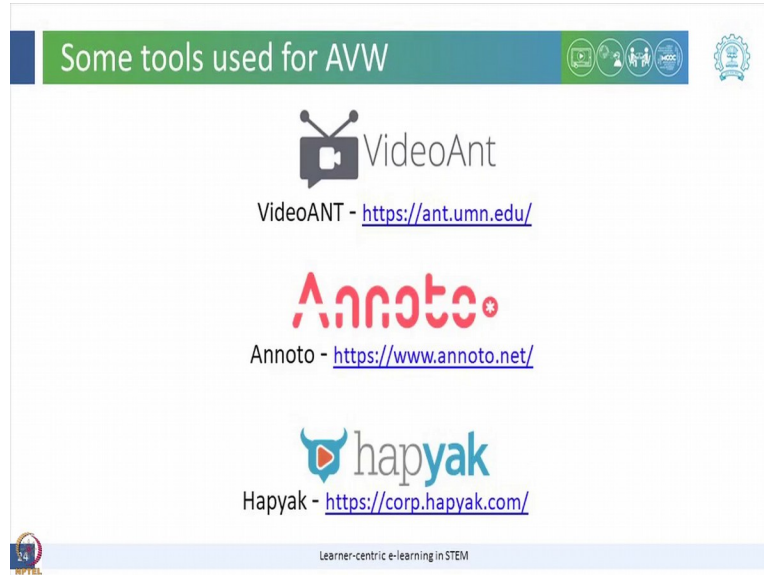
- Video player.
- Space for learner to add comment.
- Means for learner to tag the comments with learner's experience.
- Nudges that prompt learners to comment or link their experience to parts of the content.

Ref: Tanja Mitrovic, (2018). Towards Personalised Support for Learning Transferable Skills via Active Video Watching. Keynote speech at International Conference on Computers in Education.

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In this example of a system which has active video watching, you can see the interface which contains the video player, the space for learners to add comments, means for learners to tag the comments with learner's experience and nudges that prompt learners to comment or link their experience to various parts of the content.

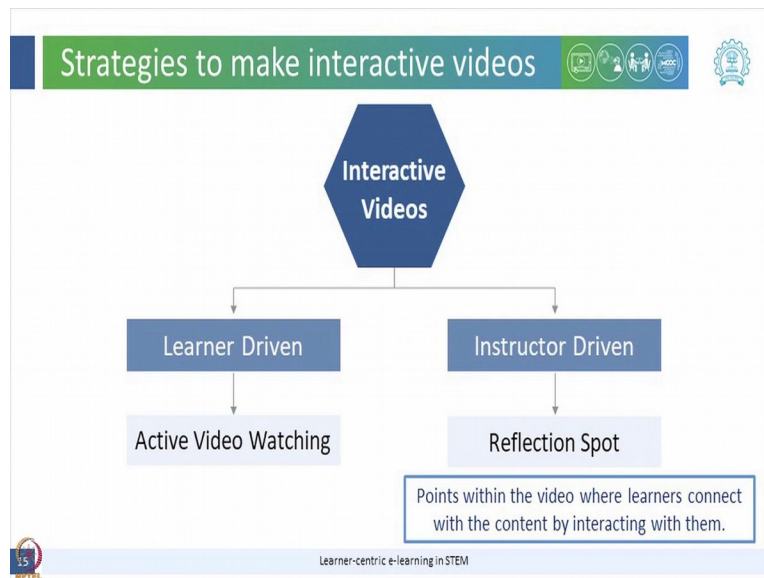
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There are some tools available to be able to design active video watching for example, VideoAnt or Annoto or Hapyak. So, you can visit these websites and try to use some of them.



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Another strategy to design interactive videos are reflection spots, reflection spots are points within a video where learners connect to the content by interacting with it and you will all be familiar with reflection spots because we have extensively used it in all the learning dialogues in this course.

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- Identify logical points in the video where learners can be provided with opportunities to express prior conceptions or do micro-practice or reflect
- Frame a simple reflection spot questions or activity and use an appropriate technology – here we have used H5P
- Ensure that reflection spot activity is short and is followed by an explanation or discussion.

In order to design and implement reflection spots, we need to first identify the logical points where learners can be provided an opportunity to express their thinking or do micro practice, at these points we need to frame questions or activities and provide them using appropriate technology, in this case we are using H5P. We need to ensure that the reflection activity is short and after learners interact and do the reflection activity and submit their answer or write something, we need to provide a discussion, we need to discuss various possible responses to the reflection spot activity.

Hence we call them learning dialogues. So, we do not call them simple videos, but these are learning dialogues because a question is posed by the instructor, the learner in this case the participants you are all answering them, you are responding, you may be submitting an activity and then there is a discussion by the instructor. So, there is a two way communication happening even within a video. Using the appropriate technology, various formats of activities can be provided as a reflection spot.

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The slide is titled "Implementation of Reflection Spots" in a green header bar. Below the title, a list of activity types is presented with corresponding icons:

- Multiple Choice Questions**: Represented by a clipboard icon with a checklist.
- Annotate an Image**: Represented by a laptop icon showing a diagram with arrows pointing to different parts.
- One line Answers**: Represented by a clipboard icon with a question mark and a text box.
- Drag and Drop**: Represented by a laptop icon showing a file being moved into a folder.
- Fill in the blanks**: Represented by a clipboard icon with a list of text boxes.

At the bottom of the slide, there is a small logo on the left and the text "Learner-centric e-learning in STEM" in the center.

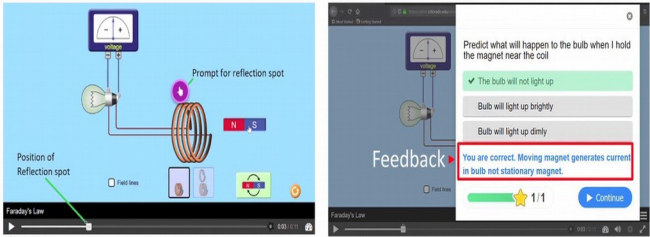
We can give multiple choice questions, drag and drop activities, we can ask learners to annotate an image, fill in the blank or sometimes even give a short text box where some response can be filled in by the learner and I think many of these have already you may already have experience about these from this course.



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### Example Reflection Spot Activity using H5P

Website: <https://h5p.org/>



H5p provides multiple ways to create quizzes and introduce interactivity to videos.

Video paused at Reflection spot

The screenshots show an example of multiple choice question is embedded in a video


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In order to implement reflection spot activity using H5P here are a few examples, H5P provides multiple ways to create quizzes and introduce interactivity within the videos, the video will get paused at the reflection spot there will be a dot appearing on their timeline of the video and these screenshots and images can show a few such examples.

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### Why is interactivity in videos important?

- Cognitive activity during video viewing enhances student learning and engagement [1].
- Interactive features facilitate linking learners' experience to the content – reflective experiential learning [1].
- Explicit prompts focus learners' attention on important elements presented in videos [1].
- Ensures active role of students in learning leading to better comprehension of the topic [2].
- Intensive use of interactive functions in interactive videos (hypervideos), correlated to increased knowledge of the video topic [2].
- Quizzes interpolated in videos promote retention of concepts and transfer via the testing effect [3].



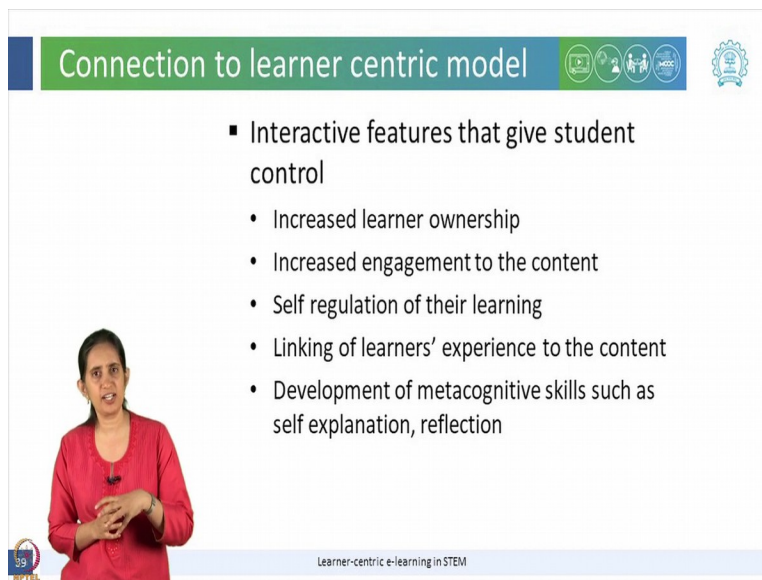
(Ref. 1. Antonija Mitrovic, Vanja Dimitrova, Amali Weerasinghe & Lydia Lau (2016). Reflective Experiential Learning: Using Active Video Watching for Soft Skills Training. In proceedings of the 24th International Conference on Computers in Education.  
2. Carmen Zahn, Beatriz Barquera, Stephan Schwan (2004). Learning with hyperlinked videos—design criteria and efficient strategies for using audiovisual hypermedia. Learning and Instruction, 275-291  
3. Cheryl L. Johnson and Richard E. Mayer (2009). A Testing Effect With Multimedia Learning. Journal of Educational Psychology Vol. 101, No. 3, 621-629.)

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Why is interactivity in videos important. Cognitive activity during the video watching enhances learner's engagement and learning, there are several empirical studies where measurements have been done that show these claims. Interactive features within the video facilitate learners experience to the content this is called reflective experiential learning. Explicit prompts such as focus questions or nudges focus learners attention to the key parts the important aspects of the content.

The empirical results say that active video watching leads to better comprehension of the topic, it has been shown that intensive use of these interactive functions in interactive videos these are called hyper videos, they are correlated to increase knowledge of the topic retention and knowledge and quizzes interpolated within a video promote retention of concepts and have also been shown to affect transfer of learning in further tests.

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The slide is titled "Connection to learner centric model" in a green header bar. Below the title, there is a list of interactive features that give students control. To the left of the list, a woman in a red shirt is speaking. The slide also includes a small logo in the bottom left corner and a footer text "Learner-centric e-learning in STEM".

- Interactive features that give student control
  - Increased learner ownership
  - Increased engagement to the content
  - Self regulation of their learning
  - Linking of learners' experience to the content
  - Development of metacognitive skills such as self explanation, reflection

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Let us actually take a step back at this point and think about the learner-centric approach that we have discussed in the previous week and that we are using throughout this course. The interactive features within a video where learners actually do activities while the video while they are watching the video, they give student a control and this facilitates increased learner ownership, increased engagement with the content, it addresses self regulation; that means, learners can reflect and modify and evaluate their own thinking, they can maybe go back to some part of the

video watch it again and come back, it helps link their experience to the content and it has also been known to develop metacognitive skills such as self explanation reflection and so on.

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**Takeaway**

Goal - Learners' cognitive engagement with video content

Recommendation - Use appropriate technology to provide in-video activities:

- Comment and annotate at different parts of the video
- Do reflection spot activities

Learner-centric e-learning in STEM

Our goal is to make learners cognitively engage with the video content. The recommendations for us as designers of learner-centric e-content are that we need to use appropriate technology in order to design in video activities so that learners can one, comment and annotate different parts of the video both with their own thoughts as well as view their peers thoughts and respond to them and two, do reflection spot activities wherein they answer short in video questions and these can be in various formats such as multiple choice, drag and drop, text box and so on.

Thank you.