Andrea: Right, hello everybody. Welcome to the online question and answer session. We've got Chris here with us at the National STEM Learning Center. Unfortunately Dylan is out travelling so he is not able to join us live in the room. However, he has kindly recorded responses to a variety of different questions that you've posed, so thank you very much for those and they will be inter-cut throughout the questions and answers that Chris and I are doing so that you will get to see the answers and his thoughts and reflections.
This is the Assessment for Learning in STEM Teaching online course hosted by FutureLearn. We are currently in week four. Thank you very much everybody and thank you Chris. Off we go.
Right, moving onto a question from Matthew Jones who is asking about questioning and discussing. His question is how do you remember everything that pupils say as you question, which is a really good question.

Chris: You don't I think is the answer, Matthew. I think again you need to think about what Assessment for Learning is doing and Assessment for Learning is finding out through activities and questions what the children know, what do they partly know and what don't they know. It's the partly knows that you want to go for.
I think if I was doing it in the classroom, and again I've seen teachers doing this, I'd be noting down the bits that I need to deal with later in the lesson or next lesson. That's the important bit. It's not recording everything a child does and doesn't know, it's the partly knows that you can work with that you need to record.

Andrea: That's brilliant. Thank you, Chris. Which is something Matthew said about do you focus on two or three pupils, and you're saying that it's the key things that come out linked to maybe those students [crosstalk 00:01:42].

Chris: Yeah, and if the kids are working in groups then it's not two or three pupils, it's two or three groups. You can get quite a big feedback, otherwise for some teachers they just feel that they never get around the whole class, but if you've got your kids working well collaboratively and using one of them as a resource then it is much better to do it that way.

Andrea: Brilliant. Thank you, Chris.
Paul Martin has submitted a question that asks about any ideas on making hinge questions that have a minimal effect on students with low self-esteem would be very welcome. A few people have asked about self-esteem and the questioning culture.

Chris: Yeah, I think with hinge point questions they are really a tool for teachers to slip in the odd question here and there ... Those key points when you want to find out whether it is now the opportunity to move on or do I need to do some remediation of some sort. You don't need a lot of these. I think the odd question just here and now won't effect children's self-esteem too much. It's different from getting a low mark in say a twenty mark quiz or hundred mark examination paper. The other way is how you handle it. If you say to the children look I'm going to put this now because I just want to check where different people are to know where we are going to go next in the learning. The children know then that there is a reason for asking that. It's not that I want to try and catch you out, it's that I actually really want to find out where you're at and whether I need to do some more work with you. I think if you are honest with the children and explain why you are doing things it doesn't effect their self-esteem.
I know one thing that Dylan does and this is maybe more in the maths arena than possibly in the science classroom, although there may be some science teachers that get this to work. That is to have multiple answers that are correct within your multiple choice. There might be five answers, so

a through to e, but maybe three of those are correct or two of those are correct. If you make one of those a really simple one, then all kids get that, so all kids feel they've achieved something in that answer. Then next time they might look more closely to see whether there is a second or a third answer. I know he uses that quite a lot within a maths context.

Andrea: That's brilliant. Thank you, Chris. There's some great advice there Paul. Thank you, Chris for that.
Moving on to a question from Cheryl Townsend. She worked with post-16 learners, which is a particular group, and she's talking about how we get the group to participate. Any support or activities that you can suggest for group participation post-16 she would really appreciate.

Chris: Post-16 are usually quite focused on getting ready for exams even though we want them to do a lot of learning. If they're in the UK, they'll have just done exams at age sixteen and in the past few years have opted to have exams at seventeen and eighteen. It's very exam orientated. Sometimes get them to work on model answers together, maybe just to rank three or four model answers, it might not necessarily be a whole essay it could just be a short answer part, maybe a six mark question. Then to think about, if you've got them in advanced to advanced at that question, think about where their answer would go in that ranking. That sort of thing helps them to start looking at what is a good piece of work and when they get to doing what is a good piece of work and talking about that, they start talking about learning and working better collaboratively. All those other bits with Assessment for Learning which we've not really dealt with in the MOOC can actually help here.
The other thing is to get them to start coming up with questions. Explain Bloom's taxonomy or SOLO or whatever you use. Maybe you use question stems that we've been using in the STEM videos to get the kids to come up with good questions when they've read a bit of the text for homework. That can be part of discussion in the lesson with the teacher just refereeing and developing the answers even further.

Andrea: Lovely. I hope that helps Cheryl and it would be good to know if you do try any of these out how you got on and feedback to us on the MOOC, please if you get a chance before the end of the course. It would be interesting for us and others to see.

Chris: Yeah, it would be good.

Andrea: Moving on now to a questions from Paul Thomas. He's asking about the importance of the terminology for students. He says he can ask a question one way and most of the class get it correct, but if he tweaks the phrasing even a little, many will get confused. He's looking at assessing the same idea different ways and looking for common stumbling blocks. What are your thoughts about the terminology and the developing of these questions, Chris?

Chris: It depends what the stumbling block is, I think really. If the stumbling block is a literacy thing then you're assessing their literacy rather than you're assessing their conceptual understanding. It's a bit hard without knowing precisely what you're talking about. [Messick 00:06:44] when he's talking about when you're looking at the validity of a question, he talks a lot about irrelevance. Sometimes we put things in that actually prevent students displaying the performance that they've actually got and sometimes language is a very important part of that.
If I was you, I'd maybe record you working with the kids and doing that and seeing what are the things that are actually holding them up. Or selecting a range of students and doing the little study yourself on what's helping and what's not helping them to actually access questions. If the questions that they've eventually got to answering their exams are more complex than that, thinking about how you [inaudible 00:07:29] towards that. There's lots of good stuff if you go back to National Strategy stuff on how you develop the type of language, the type of literacy, that's there. Certainly,

in the new National Curriculum in England, both numeracy and literacy are more important within the science curriculum than previously. We do need to pay attention to that.

Andrea: Thank you, Chris. Just to let you know as Chris mentioned there Paul, the National Strategy Materials, a lot of those are available on the National STEM Learning Center. If you go online and register, you'll be able to look through and find some of those materials to support you with that. Thank you, Chris.
I've got a question here from Ian Valance who is talking about maths, particularly the new maths GCSE program, about this idea that you don't move on until everybody in the class has grasped the current content ... The current topic. For those who have grasped it, the idea is to give them materials which take their learning wider rather than further. There's a lot of talk in the minute, in the UK particularly, about mastery which I think this links to. Ian's question is: is this people's understanding about taking that learning wider and if so, is there anywhere where we can find these new thinking wider materials? How could we ...

Chris: Right. If I just do general bit first and then I'll ... It's hard to think about materials because maths is not my specialism, it's more Dylan's but I have got a project where I am working with maths teachers and I'll try and remember some of the things they've told me of good places to look.
Yeah, mastery I think ... Mastery is something we should try for for all of our students. There's mastery in terms of thinking about are they secure in that concept or have they got at least a [gem 00:09:22] of the understanding of that concept. Differentiating between those two is worth talking about with your colleagues in school as to what that would look like in maths.
One of the things that I constantly challenge my maths colleagues to do is to ask me a question that would actually test whether I could do Pythagoras or I could do trigonometry. What's that one question or those two or three questions because I don't need to do twenty questions in order to test that. That's just more practice of using particular ideas in maths. What's the one or two or three questions? They're going to be really important questions for me that will help you both form the sorts of questions and the sorts of activities you'll need in your [intentional 00:10:08] dialogue or performing hinge point questions.
I'm trying to remember the website that my teachers use a lot. I've got an inquiry learning project in mathematics that I am doing and they do a lot of work on problem solving. There's one particular website which probably everybody who is a maths teacher is now shouting at the screen saying "It's this!" But I can't remember what it is [crosstalk 00:10:32].

Andrea: It's not Enrich, is it?

Chris: Enrich! Thank you.

Andrea:

Chris: Well done, well done. Yeah, it's Enrich. There's some really good activities on there that you can engage the kids in. It really does get them to apply ideas ... Not only problem solving ideas, but some of the conceptual understanding that they've picked up in other parts of mathematics. That might be useful.
One of the things that both the science and the maths curriculum are trying to do, which I think is actually one of the good things of our new curriculum, and that is to actually connect things more. Rather than just learn things in isolation, it's about connectedness which is a much higher order, thinking thing to do. So again, getting kids to relate. I remember when my own daughter was doing maths at school, she hadn't got any clue that fractions got anything to do with percentage et cetera. She learnt everything separately. Then all of a sudden it twigged that they were linked and she started understanding much easier and gaining confidence. It does help students if we can help

them connect as well as to actually get one particular bit of mathematics sorted out.

Andrea: Brilliant. That's really helpful. I hope you find that useful. There was some ideas for materials there but also the bigger picture about that connectedness. I can echo with Chris, that my two children learning maths -

Chris: And yours have recently done their GCSEs, haven't they?

Andrea: Mine found it really difficult last year answering some GCSE questions because they couldn't link ideas they'd learnt, rote learnt, and didn't have that deeper understanding, that connectedness. The new context came along and it just floored them. Floored them. So Chris is right. Thank you very much.
Moving on to [Emalina 00:12:07] Munda. A question here about how do you ensure young learners, I suppose this will apply to lots of learners, do not copy one anothers' answers when we are using question and particularly, I suppose, if we are looking at whole response classroom types of questioning. So how do we ensure that doesn't happen, Chris?

Chris: I think you're probably responding to hinge point questions. One is to make sure they know that if they are honest with their answers, then they'll get help. It's no good trying to get the question right and then later on be penalized because you really haven't got it. If you do questions early on and then say "Okay, so all those who answered C come here because I'm going to help you. All those who answered A and B go to those tables, you've got some worksheets to do." They pretty soon pick up that they are going to get help if they don't know it. Those sorts of things help.
I think the other thing ... I know some teachers like to use [finger 00:13:10] answering rather than cards or whiteboards, and then it makes it much harder to answer because if the child has either got their hand on their shoulder like this and saying its C or up here and saying its B or whatever. One finger for A, two fingers for B and so on, then it's much harder for them to actually copy off each other. Some teachers use things like that. Eventually you want students to realize that they get benefit from answering the question they truly believe is the right answer and if its wrong then the teacher will help out or they'll some sort of help in sorting it out. It just changes the way they look at things. I'm in school to be helped and learn things, not I'm in school to get things right.

Andrea: Yeah, which is all about that classroom culture that's coming through strongly in lots of the answers we're getting from Chris about how we establish this culture to get learners seeing that actually us finding out what they are thinking is crucial.

Chris: Yeah.

Andrea: Brilliant. Thank you, Chris and thank you, Emalina.
Moving on to Marc Coleman. He is struggling with the distinctions between assessment for, and assessment as, and assessment of learning. It seems to him that hinge point questions could fit into any of these categories. Is it the purpose that makes the AFL items?

Chris: Okay. The for, of and as ... There's a historical context to this which I'll go through quickly.

Andrea: That'll be good.

Chris: Originally we had formative assessment. When Paul Black and Dylan William wrote 'Inside the Black Box' in 1998, we called it formative assessment. But the assessment reform group brought in the terms "Assessment for Learning" to distinguish it from exams and tests which was assessment of learning, mainly. Although you can tests formatively.

That was around for quite a while. We've done a lot recently ... Dylan and myself and Paul Black and others, where we talk about classroom assessment and classroom assessment for formative purposes that's assessment of ... Assessment for learning sorry. Formative assessment in the classroom is Assessment for Learning and then assessment ... Classroom that's for summative purposes that's assessment of learning.
The as comes in from the Scottish take on this. Our northern colleagues led mainly by people like Louise Haywood, who has written a lot in this area, and others, have talked about assessment as learning. What they are trying to say with that is this idea that assessment is taking place as learning is taking place, which I agree with but I don't like this one of assessment as learning because I think it just takes the focus off what the purposes are. It just makes it sound as though assessment is everything and it's not. It's purposeful.
That's just the bit about the ... How this all came about.
Where do hinge point questions go? Definitely in Assessment for Learning because that is why you are asking hinge point questions. That's the purpose of it. If you want to ask test questions, use test questions that are from the summative type things they are going to do later as long as they are near that particular point when they're being assessed. If they've got GCSEs or if you're in Scotland if you've got Standard or Highers coming up, use some of those questions that are there. Keep the hinge point questions for the formative. If you want to use diagnostic questions, go look at some of the questions that Robin Millar and Mary Whitehouse have developed on the York Project because they can be quite useful as well. It's thinking about getting the right type of questions for the purpose you want. Not just any question will do and I will work out afterwards how to use it. One of the things I think we've learned with assessment over the last couple of decades is we need to be purposeful and not just that it's a catchall as long as they've got an answer we'll do something with it.
I hope that's helpful and not too confusing.

Andrea: I think that's really helpful, Chris. One thing I'm going to share because Chris and I have talked about this before, and Marc, I think lots of people discuss it too. Chris once said to me that Assessment for Learning, a phrase which you thought was really useful was responsive teaching and I think for me that sums it up really nicely. It's the fact that we use assessment and then it has an impact and we do something with it. That responsiveness and it's just a phrase that I think brings clarity to a lot of teachers I work with in terms of Assessment for Learning is this responsive teaching.

Chris: Yeah, I've just written an article on that. It's not been accepted yet but hopefully it will get accepted by a journal. It is responsive teaching and not reactive teaching, all right. So it's thoughtful responses of teachers to what children are saying and doing in their learning.

Andrea: Brilliant. Thank you, Chris.
Moving on to a question from John Wood, which is an interesting question John. Thank you very much. One of the things he would like to know is about how we're using Assessment for Learning in the course. He says it would be ironic if we weren't, which I think is a really interesting point because we did think about that, John, as we set the course. He has asked about the fact that we provided discussions that highlighted their misconceptions and that we've taken ... We've made them take quizzes. He asks whether or not the next three weeks will be modified in any way as a result of what the participants on the course are doing?

Chris: No. Can I say when we set up the course that ... Last year, with the help of particularly Seb Schmoller who really advised in doing this. I had a complete, almost nervous breakdown, in terms of setting up this course because I hadn't realized what a control freak I was in that usually when I'm working with teachers, I do practice Assessment for Learning as well as I possibly can in that I am

forever changing things. I never let teachers have my PowerPoints until the end of a session because I am constantly, as they are working on things and responding different ways, changing my PowerPoint during a session.
You can't do that on a MOOC. What we had to do was make many of the activities as open as they could possibly be so that people looking at them for their own particular understanding would translate them in one way or another, and then to think about the possibilities that they might come up with and then design the next activity so it could respond to that. Some of the quizzes we've put in are for doing that, for picking up on things where we feel teachers may find some things difficult or where they might have gone astray and be thinking of something else by what a previous activity has led them to.
One of the things that's really helped us with that as we are going through, and maybe has helped us produce another layer, that allows us to be more formative, are the discussion boards. I know that Andrea spends a lot of time, and poor Paul Browning who works on the project, looking regularly at what people are writing as they are trying out some of the activities. Then they alert myself and Dylan to those when they feel ... Well, either they respond because they both are very experienced in terms of Assessment for Learning, or they ask us to respond. I spend, when Andrea or Paul send me an e-mail, I usually spend an hour or so not just looking at what those few people they have alerted to me have written but going back through what other people have written. It gives me some sort of idea.
We are thinking of doing other MOOCs leading off from Assessment for Learning, and what's in this first one will help us in that second one. We are getting medium and long-term thought assessment in, and a little bit of short-term. We are relying on you out there to respond to things on the discussion boards because you actually will by what you're actually encouraging other colleagues to think and write about, be influencing their learning and giving them formative feedback by the responses that are there. Either they'll read what you've said and think 'no, that's rubbish, I'm right', or they'll read what you've said and think 'oh no, maybe there's something in that' and they'll respond in various ways. There are some things that are there. It is very different from face to face. It is very different from how I'd work in a classroom or how I'd work if I was actually running a course for teachers. I don't know because you run quite a lot of courses, Andrea, do you feel the same?

Andrea: Yeah, absolutely with the face to face courses it's very much about identifying where people are, what their needs are, responding then so that the CPD, the continued professional development, meets their needs and tailoring that. As Chris has said, the formative part of this online course is by looking at discussions and threads, and then we can respond. If anybody wants to raise a question or has ideas or wants further strategies, we can respond and give you some research literature for you to go away read and think about, or we can point you in the direction of somebody else on the course who has responded and we can start linking you up and getting that connectedness going across people's responses. We are being formative and responding to your need through the discussion thread. As Chris said, they are a really powerful place for you to think about, and reflect, and share your learning with each other.

Chris: Yes.

Andrea: Thank you, John and thank you, Chris.
[Shreesha 00:22:48] Kumari has asked a question here which is a really interesting question. It's about ... It's about our understanding about intentional dialogue and hinge point questions and misconceptions. I'll try and paraphrase this correctly. She says am I correct in understanding that an intentional dialogue stimuli is a question that is open-ended and draws in a lot of misconceptions? That's the first thing and then: does a hinge point question come after these misconceptions are clarified through work in the class, whatever that might be? What do you think?

Chris: Yeah, hinge point questions come later. The intentional dialogue would probably come earlier in the learning cycle so that the ideas that students have got that maybe are alternative perceptions or misconceptions are aired, and you do some work on trying to rectify or at least present evidence that will challenge those misconceptions. That's not to say the misconceptions go away with all kids but you try to do something about it.
Then the hinge point questions come later. Although, of course, a good hinge point question probably has distractors in there based on misconceptions to see just how much of those misconceptions are still held by the students.
I hope that's useful.

Andrea: Thank you, Chris. As you said the misconceptions can still be there, it's constantly assessing and seeing if that is addressed.

Chris: Yes.

Andrea: Okay. I've got another question here from Sabine who's already asked a question but I thought, Chris, that this would interest you because Sabine ... She's asking here about picking Assessment for Learning as an area for research. Doing a thesis and some data collection. I thought that would go to the heart of what you believe in. She asks if she wishes to do Assessment for Learning, how can she make her data authentic, should she go for a comparison between classes, experimental types, any rubrics that she can draw on. I just thought it would be a good chance for you to support somebody who is looking to research in this area.

Chris: You should be answering this one, Andrea. You're doing a PhD in Assessment for Learning at the moment.
It depends on your research question, Sabine. You need to think what is your research question. What do I really want to find our about and then you can then think about your methodology and look for bits to go with that. We've got a specialist group in the Association for Science Education that looks at research, and one of the things that they're doing a lot of at the moment is looking at helping teachers do action research. So it's well worth looking on the Assessment for Learning website. I know that the STEM Learning Center here are running a research conference, I think it's in May. Pretty sure it's in May as I'm coming to speak at it. That, again, would be a good place and there's quite a lot of help for that now.
What is important, though, is that you approach this very much from exploring ideas and finding out more rather than doing it as an evaluation. It's not to say right I'm going to try this strategy, does it work? You'll find out yes it does because always when we try new things, as long as we are thoughtful about it, you're going to get them to work in the short term. It might not help long-term learning. Think of it very much as I'm going to find a question that explores ideas and finds out more. We never find out the whole truth in research. If we did, I'd be out of a job. We do find out more. I've been working on Assessment for Learning now since 1993 and there's still a lot of questions that I need to explore. Found out a lot, but I need to explore more and I need to find the right methodology and questions to do that. So you'll need to do the same. I hope that's helpful.

Andrea: Sabine, as Chris says, I'm doing a PhD at the minute. It has taken a long time for me to actually refine the questions. I'm talking a couple of years. Once you've refined the questions, and that was going in and out of classrooms and seeing what was happening, to then come up with the methodological approach I've actually put in place as a consequence. As Chris says, it takes time and it's really worth exploring the field and digging more around.

Chris: That's not to say that it will take you that long because, you know, Andrea's doing a PhD which is pretty high level. If you want to do action research in the classroom, then it is actually

finding a question that is relevant to your context and that you actually want to work with. As Andrea was talking, there is a school in London that I've been working with who have actually done that with groups of teachers. If you are interested, Sabine, put something on the discussion board and I'll come back to you on that and tell you a bit about the sort of work they've been doing.

Andrea: Brilliant, really helpful. Thank you, Chris. Thank you, Sabine and good luck with that. Good luck with it.
Patricia [Otsarpa 00:27:52] has got three questions here. I don't know if we will answer all three, Patricia, but we'll have a look. She's asked in intentional dialogue, what kind of questioning works best? The next question I thought was particularly useful for others as well: how long can you keep bouncing a question in class when you've not got the desired answer?
That's interesting.

Chris: You need to make questions that actually encourage discussion and encourage thinking. That's what an intentional dialogue question is. There's various ways of doing it. Some teachers are very good at using Bloom's taxonomy so they ask an application, or a synthesis, or analysis question rather than just a recall question. Others use SOLO where they're getting children to connect ideas together et cetera within the question. I tend and many of my teachers tend to use the question stems that we've put into the MOOC. One of my favorite ones is: is it always true that ... Then I make a statement. They can't just say yes or no, they have to justify their answers.
Your second question is how long do you keep bouncing it round? One of my favorite techniques, still, is pose, pause, pounce, bounce. I still use that a lot. I found that usually by the time that I've got up to six or seven bounces, which is pretty good, quite often it is only four or five. When I get up to six or seven bounces, we might not have got the answer that I was hoping for, might have got the correct answer, but my students will have said enough so that I can then pull it together and know how to move them forward. In that particular case, what the question is doing is really finding out where are they at? Where are the students at? It's a bit more like a hinge point question in a way when it goes in that particular way. It gives you that bouncing time to actually think about how do I move them forward.
In a majority of cases they do sort one another out. The great thing is you get students listening to one another, which is not an easy thing to achieve in more traditional teaching. They tend to listen to the teacher or not listen at all. In that sort of context ... Here we've got students listening to one another and again they're more likely to compare their answers with that of peers and to think about the more nuanced type of answer that they're giving, and so sort out their ideas better in that sort of situation.
I think persevere. It's hard when you start with pouncing and bouncing, but persevere with that and let it bounce quite a few times so it gives you that time for teacher thinking.

Andrea: Looking back at our questions ... We have our next question coming up from Jennifer Kitchen. Thank you, Jennifer. Jennifer asks are there any strategies that we can use to encourage pupils with processing delays who often find it difficult to have the time to answer questions if they are asked quickly? I presume that's what Jennifer is asking.

Chris: I'm not a specialist in this particular area. I think with all of these things if students are finding it difficult to do whole class question-answer, or whole group question-answer, what some teachers do is to do things that actually take away the stress of question-answer and create discussion as a way. One particular strategy I've seen teachers use is to have what I call yes/no cards. There might be six, eight, ten cards with either a term or maybe a sentence or a couple of words on about some part of the topic and the kids have to just go through the cards first of all, maybe in a group of three saying yes I know something about this. No, I don't know anything about this. The no cards they put aside and then with the yes ones, they pick one card up and each takes it

in turn to say one thing about that particular card they know something about and it goes around the group. They are creating the dialogue but they are doing it step wise and then building it up.
That works very well. It works great for the teacher because you can go around listening in and picking up what's the bits that they're not so sure about. What's the bits they've already got and how do I take this forward? It's a good Assessment for Learning strategy and it takes that stress away when some children actually feel that they can't think when they are asked a question directly, they need a bit of time to do that.

Andrea: Great. Thank you, Chris. That's really helpful. Thank you, Jennifer, for asking the question. I've got a question here now from Jorgen [VanRemourtyr 00:33:06], apologies Jorgen if I've got that wrong. He's asking about self-assessment with students who are at the age of twelve and sixteen, he's asking how reliable is it for the student themselves as a learner? He's saying that his students can often provide work for their peers but they're not very good at internalizing it for their own work. Any advice on self-assessment, particularly that age group?

Chris: Okay. We've not actually dealt with self-assessment in the Assessment for Learning in STEM Subjects, it's just really questioning and dialogues, but obviously as part of our work, we've done quite a lot of research on this.
Self-assessment is really hard. One of the ways that we found that helped students develop those skills they need for self-assessment, is to do good peer assessment. Good peer assessment only works if teachers model feedback well to start off with. Really, you need to get your dialogue and feedback to students both oral and written sorted out before you move on to doing a lot of peer assessment and a lot of self-assessment. Students gradually build-up their skills.
One thing that helps is to get children to develop an understanding of what quality work is, so modelling answers, getting students to improve on either anonymous answers and then eventually on to one anothers' answers and then eventually they start to do it for themselves because they start to recognize what they see in other people's work within their own work. It's very hard to be critical of yourself, especially if you've put a lot of effort into it. That gradual build-up will probably help. Twelve to sixteen year olds can do it very well. Four year olds can do it, but it takes time to develop the skills and with four year olds it's saying what are you most proud of? Gradually, if the teacher is actually saying they're proud of a piece of work because, or the TA is saying that, the student starts to learn that language and build it up. If four year olds can do it, you'll get twelve to sixteen year olds to do it eventually.

Andrea: Brilliant. Thank you. I hope that helps Jorgen. It's the idea that it is going to take time but a structured approach that follows Chris' advice will really help. Thank you.
Next, Chris, we've got a question from Paul Sinnet. He asks how do you encourage students to persevere on hard problems?

Chris: Just tell them to keep going. I think if you say to them ... You set them up for it. You say "This is going to be challenging but I know you'll make a good go at this." So that they know they can get part way through. The other thing is to get them to, if it's hard problem, to get them to work on it in pairs or groups of three.
I know on our very first Assessment for Learning project, Karen, one of the maths teachers got the students to do the most difficult questions from the SATs papers- that's a test they used to give them at age fourteen here in the UK. She just picked out five of the most difficult questions and got students to work on those five questions in pairs. Most of the students couldn't do those questions on their own but they struggled through to an answer in a pair. Then they checked the answers against a mark scheme and were saying things to one another like "Oh, I could have got this far." Getting them to realize that they can pick up marks for getting part way and getting them to see that they can be helped get the full way through peer support. Sorry we got skim those of you who [inaudible

00:36:40] development. That sort of approach can work really well.
I think the other thing you can do with students in terms of perseverance is get them … Praise them for that. People praise kids for all sorts of things but praising kids for having a real go at a difficult homework, or really trying to answer a question rather than giving up. That's the sort of things that we should praise for and not just for getting things right. It's for actually the way the work on things.

Andrea: More of that classroom culture popping up.

Chris: Absolutely.

Andrea: Brilliant. Thank you, Paul.
Moving on to a question from Jennifer McClooney. Jennifer is asking here about when pupils have selected an answer to a hinge point question, is it suitable for a pupil who got it right to explain the correct answer to the rest of the class to help with misunderstandings?

Chris: You could do, but again hinge points really are there for teacher use just to gauge what is going on in the class. They are not really meant to be a learning opportunity at that stage. You might use them in other parts of the learning cycle, maybe during revision parts or … You might want to set things for a homework for students … Give them a couple of hinge point questions that they've done a few weeks before and see whether they can do it, and if you can't ring one another up. Get them them to be collaborative. I mean, they're always phoning one another on their mobiles or Skyping one another. You might as well let them do that and sort that out rather than spend class time on that, when if they haven't got it it is probably going to take quite a lot to get them to sort it out. More than just one student telling them the answer.

Andrea: Brilliant. Thank you, Chris. Thank you, Jennifer.
Moving on to a question here from Nanny Handiyani. I've seen this question several times actually, Nanny, on the course dialogue. How many hinge questions, ideally, should be asked in a class?

Chris: As many as you need, but usually only one or two. Only in some classes. Hinge point questions are not for every lesson. They're there when students have actually got to a point where you feel they have actually grasped, or quite a lot of them have grasped a concept. That's when they come up. They are to be used sparingly.
It is those challenging sorts of questions. It's not the simple type question that you would as just to engage pupils and just check that they are not asleep. It's not those sorts of questions, they are really challenging questions. Just use them sparingly. One because that's their purpose but secondly they are hard to write. I challenge anybody to write ten hinge point questions. It would take me a good month or two, with people's help to do that. Just use hinge point questions sparingly.

Andrea: Brilliant. Thank you. Thank you, Nanny.
I've got a question here from [Nazij Junaid 00:39:51] who is working in early years. She asks how can you make hinge point questions work effectively in an early years context?

Chris: I've got a colleague Sally Howard who wrote 'Inside the Primary Black Box' with me who is much more gifted in this area than I am, with early years work. I think it's … Hinge point questions are about getting kids to decide on one thing or another so maybe it's reducing the number of options they can choose from, therefore thinking very, very carefully about maybe having two or three answers to do that. Also, getting them to sometimes do things like really commit.
I saw a teacher doing this in a classroom with early years who was working actually on looking at the moon as a reflector and the sun as something that actually emits light, and what she did was get the kids to … She gave them all a pen and they had to tick on particular board if they believed this

and one particular board if they believed that and so on. The kids did it really sensibly. I was quite amazed by how they did it and really enjoyed doing it. She then said "This is really interesting. Sixteen of you believe this and three of you believe that, and what that tells me is we need to work on this."
Even with these young children, five year olds I think they were, hinge point questions were being used in a way that not only allow the teacher to assess but say to the children this is what learning is about in the classroom. This is what I value. I value you telling me what you believe because then I know how I can help you. I know how we can move your learning forward. It can work with early years and early years specialists are the ones that know the best way to engage the learners in the learning. I'm sure you've got lots of ideas on this yourself.

Andrea: Thank you, Chris and a great idea there [inaudible 00:42:09] that you can go away and try if you've not. Again, let us know how you get on trying it out. It's always good for us to learn from each other.
Moving on to [Denarazea Denova 00:42:19]. We've got a question here ... She's asked for the educator's opinion on the following and I think this is something I've come across with several teachers in different contexts. How can group work be assessed with using formative assessment? What kind of evidence of student learning can be gathered when they are working in groups? I suppose she is thinking about the individuals in the groups and what that can tell us, or maybe whole group thinking. What are your thoughts, Chris?

Chris: This is a huge one. I've got so many thoughts on this mainly because I've got two big pan-European inquiry projects where we are working a lot on group work and how do you assess group work.
I think the thing to say is that what you need to think about is not group work being problematic in terms of trying to get at how an individuals is doing, but maybe thinking of it as a more authentic way of actually judging students learning. In everyday life, in the world of work, we don't work individually most of us. We work in teams and so the part that they can play in a team is probably worth thinking about. Part of what you might want to do is to watch how some groups work and to look at how you can actually help them to be more honest in making the judgement themselves about how well they are doing in the groups. If you can get them to say, not just the answer, but the person who gave this idea to start off with was Tariq and then Emily built on that and then Joanne added this. It's giving you really rich data in terms of the sorts of answers that are there.
Treat group work as something where you just want to really help the learners to use one of the resource and sort things out. You can use it also to do a quick feel for how people are progressing. Use your hinge point questions to get at individuals. I think that's probably quite good. Obviously, when you collect students' work in, just assessing those artifacts will tell you how individuals are doing as well.
You've got lots of different ways of collecting evidence of learning of individuals and individuals working in groups. When you have to report on that, just sum that up in whatever way is best for your particular context.

Andrea: Brilliant. Thank you, Chris. That's really helpful.
We're nearly there. We've only got a couple of questions left. I've got a question here from Christina [Samadaciava 00:45:09] who is asking how can we distinguish between the two types of formative questions? Can they overlap? Can one question do both jobs? This might be difficult, Chris, off the cuff but can you think of a couple of examples. I'm sure we can refer people back to the course because there's lots of examples in there. It's ... The question is more about the two types of questionings and their purpose.

Chris: Questions from intentional dialogue tend to be, as we've said before, very open type questions

although you might want to ask a question like what's similar and what's different about something? You could see how a question like that could easily be turned into a hinge point question because the distractors some of them could be similarities and could be differences. You could link the two together a little bit but I think what you are better doing is thinking about which is more suited to that particular point within the learning cycle. Diagnostic and open questions are probably better early on in the learning cycle with the hinge point questions coming as they start to get really a little bit more secure in their understanding of that particular concept.

Andrea: Brilliant. Thank you, Chris.

Dylan: Matthew Jones asks how do you remember everything that pupils say as you question?
My advice is just keep it simple. I would advise teachers just to look for two things when you listen to students' responses. One is which students are actually so confused that you are probably going to need to sit down with them and explain things one to one. Look also for what things can I actually do with the whole class to put things right. You're going to miss an awful lot of information, but just remember the fact that you are getting these responses from students through these hinge questions means you are getting far more information and making your teaching far more responsive to the students needs than will be the case with traditional teaching.
Paul Martin's question is whether we have any ideas on making hinge questions, or any kind of assessment for that part, have a minimal effect on students with low self-esteem?
I think one of the most useful techniques that I know of here is to ask hinge questions with multiple correct answers. The idea is that a hinge question has at least one option which all students should be able to get correct. The idea is that every student should be able to get a correct answer, but that the question also has more than one correct answer. Some correct answers might be so subtle that only high achievers will be able to spot those so subtle and sophisticated answers. Students who get one right answer will feel okay, and it is my experience that those students will not feel bad they didn't get all the right answers, but I think that your more able students might actually be paying more attention in future once they realize that they may have got one right answer that you put into the question but they didn't spot the other ones. I think that is a way of keeping students on their toes as you might say.
Sabine Kabal asks have you, while devising questions thought or come across an idea that when you planned as a hinge question turned into a stimulating, constructive dialogue?
The answer is yes, many times. Something starts as a set piece and you might pursue this as a really interesting diversion. The important point is that as teachers get more and more experienced, as teachers develop more and more good questions in their heads, then any moment in a lesson is potentially a hinge and is a stepping off point for some kind of diversion. The important thing, however, is to be clear about the original learning intentions and to see whether this diversion is actually going to take you towards the main intention or is going to be a detour, side tracking a teacher away from the important material. This is really important in the context of schools where teachers are expected to stick to the lesson plan.
My own view is that one of the hallmarks of expert teachers is the willingness to ditch the lesson plan when it is clear that it is not going very well. I think hinge questions are just one way of creating evidence, that gives teachers feedback about how a lesson is going, the decisions maybe to say we're going to put this to one side. We're not going to do anymore work on this. I need to go away and think through more clearly how to do this with this class. The idea is that hinge questions provide the evidence. The conclusions the teacher draws from that evidence are potentially infinite.
Tim Ward asks does the use of a hinge point question hold back the very able in a mixed ability class?
It depends on the design of the question, is the answer to that. So for example, as I've said before, I really like hinge questions with multiple correct answers. One at a level that should be accessible to every student in the class, and others that are a bit more subtle and maybe only the highest

achievers will realize that they are actually correct as well. I've often tried this with students and then if a student that should have spotted that there was more than one correct answer doesn't do so, I might tell her that there was a correct answer there that you missed. You can bet that the next time such a question is asked, that student will be looking very carefully for possible alternative correct answers that maybe aren't as obvious as the one that you put there for the whole class.
Vicky Willby's question is how do you support new or inexperienced teachers in the use of these hinge questions?
My advice would be to keep it very simple. To begin with as student teachers plan lessons, I would say to them just try to identify the hinge. Where do you think do you want to stop and check the students are with you? Then ask them what question are you going to set at this point and make it a very simple if they get it right, I'm going to move on, if they don't get it right I'm going to go back and teach it a different way. Maybe just plan one additional way of teaching it. It will make it a very simple go/no go decision. As teachers get more experienced, they can actually look for more complicated branching paths, multiple paths or options, different kinds of activities to follow-up, but to begin with I would keep it as absolutely simple as possible. One question, halfway through the lesson, do you go forwards or do you go back.
John Love raises a very important point, which is how can teachers sustain focus on using these strategies in day-to-day planning of teaching? How long does it take to feel a sense of personal competence and of impact on the progress of learners?
I think it's a very slow process to be honest and one where if you think you're ever going to arrive at the destination, I think you're probably deluding yourselves. I don't think anybody I've ever met thinks they've cracked this. The important point is we should first of all take small steps. In your day-to-day planning of teaching, maybe just try to put in a good question in one lesson per week. Once that becomes more straightforward, then maybe go for one per day, but then I would suggest that the emphasis should be on improving the quality of hinge questions rather than just making sure you've got a hinge question in every lesson. Good hinge questions take time. We come back to them year after year. Marc Wilson's team at the University of California Berkeley ... They've been working on questions and changing the wording and finding out how they go ... They've been working on the same items for over fifteen years and these items have continually improved, but there's no destination. There's no final point of "Yes, we've got this question perfect now." The idea is that we constantly refine these questions but we're always going to be improving them because there is no such thing as a perfect question.
Alison Skelding's question raises the issue about how we can get better student responses to our feedback, especially with mixed ability and EAL students.
Obviously, many students find responding to feedback very difficult. One of the key things then is to make it more structured. For example, we might make responding to feedback a task of choosing or selecting some ideas rather than necessarily writing an extended written responses. Students might, for example, be told that five of these calculations are wrong. You find them, you fix them. The big idea here is making feedback into detective work so students actually have to think, and choose, and select. EAL students, they might find it useful if there's other speakers of the same language in their classroom, to discuss their responses orally in their mother tongues and then think about how they might represent that in English. The important point is we structure these response patterns to students so that it actually becomes less demanding on their linguistic abilities.
Paul Thomas raises a question about terminology in science and mathematics. He, quite correctly, points out that you can ask a question one way and most of the students will get it correct, and yet if you tweak it very sightly, many will get confused.
This is a really important insight. It shows that the learning is very much tied to the context of the learning. If students can't tweak the answer a little bit, if they can't apply ... Even when a small detail is changed, it suggests that their understanding of this issue is very, very shallow.
Graham Nutall has shown that getting students to be able to apply what they have understood in a slightly different context is crucial to long-term memory. So, yes students will get confused, but I

think it is really important that we get students to apply what they've just learned in another context. Without that the learning is far too tied to the actual context of the lesson in which they learned it for the first time.

Ian Valance's question raises the thorny issue of acceleration versus enrichment.

This has been a very, very longstanding issue in science and in mathematics education. Some students find learning the classroom materials we want them to learn very, very easy and others find it much more difficult. There's always a spread of achievement in any group of students. Estimates are that within a class of twelve year olds there will be some students functioning at the level of the average eighteen year old, and others functioning at the average level of a six year old. You have got to twelve year gap in achievement in a typical classroom in lower secondary school. There's no clear answer about whether acceleration or enrichment is the best. It's often bend at will values.

However, there does seem to be relatively clear evidence even from the mathematics community ... The university mathematicians, that enrichment is probably better than acceleration.

Ian also raises the specific issue around something that is often called mastery learning. The idea is that no one should move on until the whole class has mastered something. It strikes me that that is a council of perfection. It would be nice, but it is going to be very difficult to do that consistently. The important point is the teacher needs to make a professional decision about whether it is right to move on or whether the class needs to revisit this topic, and the teacher needs evidence to make that decision professionally. As long as you have good evidence, and how you interpret that is a different issue, but you need the evidence.

Marc Coleman said he's struggling with the distinctions between assessment for, assessment as, and assessment of- learning.

You're not alone. Paul Black, Chris and I actually tend to use the term formative assessment far more than we use the term Assessment for Learning because we don't think it actually helps.

This is what Jim Poppham calls the prepositional permutation and it's very easy to slip into an idea of assessment of learning is bad, assessment for learning is good. I think it is really important to understand that these labels aren't particularly helpful unless you are clear about their meanings.

More recently people have talked about assessment as learning and as far as I can work out, this idea has come from writings in Canada and what they've done is they've talked about assessment for learning as being mostly around the teacher's role - eliciting evidence and giving feedback. Assessment as learning considering the students role as both self-assessors and assessors of each other.

My own view is those terms aren't particularly helpful. An assessment is a procedure for drawing conclusions and therefore, I think the term assessment as learning isn't particularly helpful. As long as e are clear that assessments are about eliciting evidence, interpreting them to draw conclusions, then I think we won't go to far wrong. Sometimes the conclusions we draw are about how much of a particular set of materials a student has mastered. That would be a summative example. Sometimes we want to draw conclusions about what would maximize that student's learning in the future. That would be a formative example. I think the important thing is I don't find assessment for, as, and of learning very helpful. I think the summative/formative distinction is helpful provided we are clear there is no such thing as a summative assessment or a formative assessment. Formative and summative are descriptions are the uses to which information from assessments is put. The same assessment can yield evidence that is used both summatively and formatively.

Jennifer Kitchen raises an important question about whether there are strategies to encourage pupils with processing delays to be involved in an open discussion. Often the trains of thought are going too quickly, not giving them time to formulate or answer questions.

This was very much an issue in the TV show 'Classroom Experiment' that I did with with the BBC a few years ago. When we actually said the rule was no hands up, first of all the high achieving students said "I never knew my classmates were so smart." When teachers allow students who are confident to dominate the classroom discussion, the classroom is dominated by those who are confident and quick not those with the most important or useful or interesting things to say. For

example, I would routinely expect, after I've asked a hinge question to give students time to discuss, to think and maybe even give them two minutes to actually think about that before asking them to make the choice of an answer. That way, I think students with perhaps more profound but slower thinking styles won't feel that they are constantly playing catch up.

People often worry about pace, but the important thing is pace is not the same as speed. Pace in teaching is about ensuring that as much of the time as possible is spent minds on. Often, that's done better by slowing things down, but it is done by speeding things up.

Jorgen [VanRemutrye 01:01:51] asks how reliable is self-assessment for students?

I think there's an important issue about here, about whether even reliability is the right way of thinking about this. The question is how meaningful, how valid, self-assessments are for students. There's no doubt that if we are just asking students to make judgments about how happy they are with their understanding, then those judgments are going to be influenced by the students' desire to feel that they are successful. If the stakes are high, then self-assessments will be inaccurate. There's plenty of research to show that. I think the really important thing is that we must in some way anchor the student self-assessments so they know what they are deciding.

That's why just asking students give yourself a green, a yellow, or a red circle according to whether your are confident, less confident, or not at all confident, doesn't help very much. We often see boys giving themselves a green, where a girl would give herself a yellow. If we can say, for example, green means I am now ready to teach this to somebody else, then that begins to give the students some idea of what it is that they are meant to be signalling when they are signalling green.

In the longer term we do see students' self-assessment abilities improving. Especially when they are not high stakes. I don't think the students own self-assessments should ever be factored into any kind of grade or report that is given to a parent for example. For me, self-assessment is all about the formative purpose, not about the summative purpose.

Jennifer McClooney asks when pupils have selected an answer to the question, is it suitable for a pupil who got the correct answer to the class?

I think absolutely. It may be also useful to have several students helping groups who are still struggling. The important point is that it is still the teacher's responsibility to look after the quality of learning. Before we get students explaining to each other, we have to be very clear that they understand what kinds of things they should be saying and the teacher needs to be eavesdropping on those conversations. It is easy to do if it is a whole class discussion, much harder to do if students are in smaller groups. The important point when students help each other, the teacher is still responsible for the quality of learning that takes place.

Nanny Hamniyani asks how many hinge point questions should we ideally ask in class? Can the hinge point be used for a simple question or can it be used only for assessing a student's understanding in a concept?

I would say it is whatever you want to find out. Sometimes you might want to find out that all the students can correctly apply a straightforward technique, in which case a hinge point will be entirely appropriate for that purpose. Sometimes, you want to find out something much deeper, in which case a hinge point will be appropriate for that too. The important thing is that if you want to find out, then hinge questions are a good way to do that. If it is important to you, it's worth doing.

Edith Davis points out that some children find it very difficult to take part in group discussions. Particularly because they are worried about getting things wrong.

I think that's where the teacher can make a real difference in creating a culture where students understand that being wrong is good not bad. As I mentioned in 'The Classroom Experiment', we encouraged teachers to use no hands up and some of the higher achieving students were quite surprised by how profound the responses of the lower achieving students were. What was even more interesting was the reaction of the higher achieving students to being picked on when they didn't know the answer. The teacher's perception was that these students had their hands up all the time but they didn't. The higher achieving students had their hands up most of the time, but only when they were absolutely certain they knew the right answer. When teachers started picking on students

at random to answer many times the students who were seen as being high achieving were actually getting things wrong. This was tremendously powerful in terms of the cohesiveness of the class because now everybody was getting things wrong.
The big idea here ... This is based on Carol Dweck's work on mindset. We need students to understand that work that doesn't make them struggle isn't going to make them smarter. So I say to students, mistakes are evidence that the work I gave you is tough enough to make you smarter. If you're not making mistakes, the work I'm giving you is probably too easy. I'll try to make it more difficult for you in the future. That's the kind of mindset we need from our students. I think particularly making sure that the high achievers are seen to be making mistakes, the idea that everybody makes mistakes, because this is worthwhile and challenging work, that is a very powerful idea in helping low achievers see that it's okay to make mistakes and if you're not making mistakes this probably isn't worth your while.

Andrea: Okay, so I thought it would be useful ... I am amazed as always at the ability of Chris to think about the variety of experiences she's got and draw on so many different ideas, but I thought we've had quite a few recurring themes coming out across the various questions that have been answered, so I thought it would be good just to sum them up.
Something that has come out really strongly from the discussion that we've had here is this idea about questions being used to assess concepts and thinking about not the facts, and the knowledge, and the recall that we're doing, but actually the concepts that those facts and information link to and how we are assessing that and building that.
Something else that Chris has talked about really strongly is that learning is a cycle. I think that has come out really, really well over lots of different people's questions and then thinking about questions that we ask during that learning cycle and how it links to what we are wanting to identify in the learners, and then how we use the feedback in that cycle to respond to the evidence that we are getting and keep that learning going forward.
We have also had the idea about connectedness, about concepts linking and helping our learners understand more about the subject because we are starting to link those concepts and ideas.
A big thing that has come out is about classroom culture and the culture where it is about identifying learning and getting all students to feel that no matter what they're thinking, their ideas are all valid. They are all useful for us as educators to think about.
We've had lots of strategies. We've had this idea about purposeful planning and Chris has given some really good ideas about how we can actually manage that in classrooms where we have either in secondary high [turner 01:09:18] of students or in primary where we have got younger children, how we can actually get them engaged and how we can start grouping and organizing groups and using learning and learners to help support each other.
Thank you, Chris. I don't know if you've got any other themes that have popped into your head, I think you've been answering questions and I've been distilling that out. If there's anything you want to add ... But I want to say a big thank you to you.

Chris: Thank you, it's been amazing, Andrea. I couldn't have done it myself like that so it's really good. Thank you.

Andrea: It's because I'm researching at the minute and coding and thinking about people's responses that's why it's very at the forefront.
A big thank you to Dylan as well who I am aware is not with us, but obviously it's the experience and the expertise that Dylan and Chris bring and that research underpinning pedagogy that really helps us all move forward.
I'm sure that as this is on YouTube and you access it for a long time you'll find that you keep coming back to it and finding new things out, so thank you very much.