Assessment for Learning in Medical Education: Supporting Students' Growth and Development

On-screen: [Assessment for Learning in Medical Education: Supporting Students' Growth and Development.

Anastasiya Lipnevich, PhD Visiting Scholar.

Christopher Feddock, MD Vice President, Educational Strategy.

Krista Mattern, PhD Director, Constructs Research.

Pamela Treves (Moderator) Senior Vice President, Growth and Innovation.]

Pam: Morning everyone, and welcome. My name is Pam Treves and I head up our Growth and Innovation division here at NBME. I'm glad to have so many participants on the call today to talk about formative assessment.

This is an area that NBME cares about deeply, and we've been pursuing ways that we can support learners and educators in the medical education community. Advances in innovation technology have opened up new opportunities to develop effective tools in this space. And joining me today, I have a few experts who are going to help us with this discussion. So let me introduce them.

First I have Ana Lipnevich, PhD, who is a visiting scholar at NBME. She's a professor of educational psychology at the City University of New York and an expert in formative assessment and feedback.

In addition, we have Krista Mattern, also a PhD, who is a Director of Construct research at NBME and focused on how to extend NBME's research and expertise into formative assessment.

And then finally, Chris Feddock, MD, who has extensive experience in medical education, and he at NBME is tasked with heading up the educational strategy unit and how we've linked the assessment in a practical way to the real world of medical education.

And before we get started, I'm going to tell you a little bit about what we're going to do today. The first part of this, meeting is going to be talking. There's going to be a 20 minute video of Ana and Krista addressing some common themes of interest in formative assessment. And then we're going to go into our live Q&A session. I

encourage you to enter questions into the chat while you're - not into the chat, but into the Q&A - while you're watching the video. And, once the video is completed, we'll come back and answer some of those questions. And with that, I will turn it over to the recorded portion.

Krista, Ana, thank you for being with us today. We're going to talk about formative assessment. Let's start off with what is formative assessment?

On-screen: [Anastasiya Lipnewich, PhD. NBME Visiting Scholar]

Ana: Formative assessment refers to the process of collecting and using information to guide teaching and learning. And we are not talking about the specific method, the tool, but rather the function that this assessment serves. So, if it's used to diagnose understanding, if it used to generate feedback in relation to a certain learning objective and then shape teaching and learning shape what happens next, then the function is formative.

In contrast, when we think about summative assessment, the purpose of summative assessment is to evaluate what learners have achieved. So it's used for the purposes of licensing for the purposes of ranking and determining the readiness of learners.

On-screen: [Summative Assessment:

- Performed at the conclusion of an instructional period
- Provides insights into student comprehension.

Formative Assessment:

- Conducted throughout the learning process
- AKA assessment for learning
- Helps adjust and improve the teaching and learning process.]

But here I would like to introduce a little nuance. We would like to emphasize that, these two categories are not mutually exclusive. So, the exact same task depending on its implementation and the way the data are used from this task, the exact same task can serve both function - formative and summative.

Pam: Thank you. Another term I hear a lot is assessment for learning. How does that term relate to formative? What are the differences or similarities between the two?

Ana: That's where things get really, really interesting because in some corners of medical education and K-12 and in higher ed, there are researchers who feel very

strongly about drawing a really hard line between assessment for learning and formative assessment, because some, again, scholars define formative assessment as provision of feedback, whereas assessment for learning is something that requires evidence of learning improvement.

But in our perspective, and it's based on decades of research and consensus definitions, is that these two categories are not distinguishable. So, they are functionally, and in practice they are exactly the same. If instructors provide the most perfect feedback to the learner, and then the learner does nothing with the feedback, then we are failing from both definitions.

So again, we think that these two notions shouldn't be separated. So, we can use both of these interchangeably.

Pam: Yes. Thank you. So understanding a little bit now more about what formative is, tell us a little bit more about why formative is important.

Ana: So formative assessment has a lot of benefits. And at this point in our own work. And then there are compendiums of literature and a meta analysis that show that formative assessment and especially feedback, which is at the core of formative assessment because one of the largest effect sizes and has the largest contribution to learner improvement. So in formative assessment we're helping learners to define their goals by clearly formulating their learning objectives, then we are telling the learner through frequent assessments, who are telling them where they are and what's their developmental trajectory is. And then we communicating, kind of guiding them on how to get there.

And in medical education in particular, where kind of the margin of error is really, really narrow and then, cognitive load is really high and stakes are really, really high. So having this structured support is really important because ultimately, in the end, what we're trying to do, we're trying to cultivate mastery, adaptive learners, people who go into the wild go to practice, and they are capable of kind of self-monitoring and self-reflection and improvement. So formative assessment provides kind of the structure for that.

And for instructors, formative assessment provides information on where the students are. So, it offers this diagnostic lens so they are capable of pivoting the instructor is not taking it too far in the wrong direction. Kind of take a step back, repeat and help each learner individually.

And in formative assessment, we are not judges. We are not arbiters. We are working with the learners on helping them improve the most.

Pam: Given that formative assessment is a really important and really useful tool for learners, how does that work in practice?

On-screen: [Krista Mattern, PhD. Director, Constructs Research, NBME]

Krista: So before jumping right into the assessment, I think it's important to talk about what are the competencies we're going to measure. What are the important skills and behaviors we need for medical practice.

Recently, ACGME, ACOM and AAMC co-sponsored an initiative to really articulate and develop a common set of competencies for undergraduate medical education. And I was really excited about this work. This is fantastic. This is the foundation that we need to drive meaningful assessments for student learning.

Once we have that competency in place, we can start thinking about what are we going to measure, why, for whom? So the intended population, the purpose, the use. And I mentioned a lot of purposes. It could be to promote learning, it could track progress, it could verify competence. And we talk about this the term we use in that MedEd is programmatic assessment.

And formative assessment plays a really key role in that, to provide that feedback to learners. Say, here you are, here's where you need to be and how do we close that gap? And really helping learners make sure they can reach those learning objectives set by their program.

One other thing I do want to just stress, as we think about formative assessment and helping learners, is really thinking about it from an equity lens. As we think about summative assessments, the question we're asking ourselves is does the learner have the skills? Yes or no?

Formative serves a very different purpose. We're thinking, well, it's personalized. We're giving feedback to them. Here's where you're at. Here's where you need to be. Here are some strategies to really reduce that gap. And so instead of saying do you have it or not, we're saying, how do we help you get there so that everyone can realize their full potential. And so again, I think formative from an equity lens holds great promise and providing equitable outcomes to learners, so that they can reach their goals.

Pam: So, Ana, what are some strategies that educators can take to incorporate formative assessments into their classroom?

Ana: In general we need to talk about kind of the larger picture. So formative assessment. It's not just about increasing the number of assessments. Right. So, it has to be the program of assessment has to be intentional, continuous and integrated into the curriculum.

On-screen: [What does effective formative assessment look like in practice? Intentional, continuous, varied, aligned, and reflective.]

So, learners have to have enough opportunities to get their understanding checked. They have to have enough opportunities to engage with feedback that's provided for them. And that's why instructors need to plan ahead and embed those instances, those opportunities for check ins with their learners ahead of time.

Furthermore, alignment with curriculum. So if learners understand how each of the assessments contributes to certain learning goals or learning objectives, then they'll be much more motivated. They're much more engaged in the learning process.

And that's the next point. So, assessment for learning is not something that we do to the learner. That's something that we do with them. So again, we need to encourage them to engage with the feedback that we provide to them. Formulate learning goals.

And this structure will help them to become master adaptive learners, which is the optimal outcome of medical education. This is what we all want to achieve and this will provide them again, kind of the framework of how to think about their own practice when they are there, without us supporting them.

Then what else? We can think about methods. Right? So, there isn't a single method assessment approach that provides us a comprehensive picture of where learners stands. So formative assessment, an effective formative assessment program involves a multitude of assessments. So we can have direct observations. We can have peer assessment. We can have structured self-reflection. And all of these in combination is what provides us with this clear picture of where students are and helps us design together with learners how to help them get to that ultimate point where we want them to be.

Pam: So, I can see how incorporating formative assessment is really going to make a difference in the classroom. But as we think about moving from the theoretical to the

practical, are there, Krista, for example, are there some considerations we should have of areas of challenge or things that we should think about so that we're ultimately successful in thinking about formative assessment as a good tool?

Krista: Yeah, I think, highlighting at least three challenges that come to my mind. Building on what Ana said, we want to be intentional. We want to integrate assessments into the curriculum. But that takes time, not just to administer it, but to provide that meaningful, personalized feedback to the learner. And so, we know curriculums are jam packed. And so just thinking through how you integrate it in a thoughtful and meaningful way, to provide that feedback to learners is really important.

Another challenge I see is just access to high quality assessments. Multiple choice questions are great for assessing knowledge, but as we think about these medical competencies and these complex skills and behaviors like patient centered communication, like clinical reasoning, we are really advocating for more high fidelity, authentic assessments like simulations or performance-based assessments. Those are really hard to develop. They take time, they take resources, they are really hard to score and med schools may not have those resources in-house.

And then the third one I really want to stress is measurement expertise. We're not just developing assessments. We're developing fair assessments, reliable assessments, ballot assessments, efficacious assessments. Really, when we think about formative, efficacious it’s so important. Are we improving those learner outcomes?

Pam: So given the challenges and some of the approaches that we've talked about on how you bring formative into the classroom, talk a little bit about how you think about creating or the ways in which you create formative assessment that's both manageable and meaningful.

Ana: I think the most time-consuming part, for formative assessment, is actually feedback delivery. This is how we think about it in the field. So, if anyone has ever tried to provide feedback, really detailed, individualized feedback to more than one person, you know that it's a very time consuming endeavor to do it well. So, we are focusing our effort on finding scalable ways of feedback, provision and helping learners to generate their own self feedback.

On-screen: [Approaches to Designing meaningful assessment: Use exemplars.]

And just to give you a couple of examples. So, we've had a lot of success in running our own studies with using exemplars. So, what I mean by that we have learners complete

the task and then we offer them an exemplar of optimal performance as feedback. So it's not in the beginning, we're not showing them what they're supposed to do. We have them complete the task, then we show them in the exemplar and then we ask them to compare what they produced to the work that's presented in an exemplar. So what it does for them, exemplar shows them the criteria for optimal performance. And then they are drawing those conclusions and then engage in deliberate and structured self-reflection. And as a result they can make conclusions. Okay, so here I failed. Here I did as well. And this is what they need to do to improve my work.

On-screen: [Incorporate rubrics.]

Furthermore, rubrics, we've been really successful with the use of rubrics in the same way as feedback. So, we have learners produce a task and then we have them self-assess using a certain rubric. And the rubric is also useful for instructors because it kind of organizing the framing of how they need to provide feedback and how they need to assess learners' performance. And in the literature, there are many colleagues working in this field. They're showing that rubrics may actually reduce bias.

On-screen: [Promote self-reflection.]

So all of these tools are focusing on self-reflection. And self-reflection is the culmination. It's kind of the core, the heartbeat of, formative assessment and assessment for learning. Because what we want our learners to be able to do is to take a pause, evaluate where they are, kind of think about where they need to go, and then formulate a strategy on how to get there or seek help. Because feedback seeking behavior is also very important skill that we want our learners to have.

Pam: Given the critical component, that feedback plays in the formative assessment, talk a little bit about how can feedback be delivered effectively to students.

Ana: Feedback is really complex and when I think about feedback, I think about this three P's of feedback of the function it serves. So feedback can be delivered on the product on something that students did. Then on the process, how they did it and then on the progress. So where is the student in relation to where the student used to be before? And then it should be also future oriented. Where are we going from here? So these are the three main blocks of feedback.

Then if we talk about the components of feedback. Because this cyclical process of student feedback instructor interaction includes for example, this source of feedback. So, we all know that feedback can come from multiple sources and students typically

prefer, this is what research shows, feedback gets delivered by the instructor by their supervisor, not liking peer feedback as much.

But then we know that in the formative assessment framework, peers are an incredible resource because it's virtually impossible for the instructor to provide very detailed, very individualized feedback, frequently right to each individual students. That's why harnessing the power of peers is very important. So we need to kind of create opportunities for peer feedback provision and some structure, some guidelines and teaching learners that this kind of feedback is very useful for their development.

Then we can talk about AI provided feedback. So here we also can teach our learners how to write effective prompts, how to critically evaluate the feedback. Because it's a great opportunity again to gather additional information and gather guidance.

So then when we move to the actual message, feedback message here, there are so many different characteristics that we can kind and dissect feedback. For example, we always hear that feedback should be timely and it's true to a degree. So if a learner is engaged in this in a certain interaction and things are not going the way they should be going, yes, feedback should be timely. We need to correct their course. But then there are cases, especially on complex tasks when delayed feedback is actually more beneficial. So there are a lot of studies on that.

For example, learners can use times kind of disengaged from the task. Think about what they did, what kind of maybe information that they received from different sources, and integrate this information and then receive additional feedback from, let's say, their supervisor.

Then when we talk about the balance of feedback, so positive negative, we all heard about feedback sandwich, which by the way should not be used because there is again, a lot of experimental studies that show that there's strong open and positive statement anchor students on it. And as a result, their motivation to improve is lower. And they're performance is lower as a result. So feedback sandwich, let's forget about it. And we can use an open sandwich so we can just use praise at the end.

Another aspect is future orientation. So it's good to comment on what you did, but it's even better to say how you can improve. So instead of saying your communication wasn't great in this interaction, you could say: maybe you could have asked follow-up questions in the future. So this future orientation in this suggestive nature of feedback is what really makes the difference with the learners.

And in some it has to be a conversation. It's not a one-way street. It's not me providing feedback to you. It's us having a constant conversation because the best feedback when they get asked the question, what is the best feedback? The best feedback is the one that learners use to improve their learning.

And this is what we are doing here at NBME and Krista will talk about it and I will cover it, touch upon it as well. So, what we are trying to do is to use this feedback to help learners to self-reflect, because self-reflection is a skill and we need to teach it. And feedback becomes this external feedback becomes that structure that they will use when they engage in self-reflection.

Pam: So, Krista, there have been a lot of advances and changes in formative assessment and assessment in general. Can you talk a little bit about some of the innovations that are happening in medical education around formative assessment?

Krista: So it's a really exciting time and an exciting time to be in the MedEd space. I've worked in K-12, and higher ed, and where I really see innovation being driven is in MedEd. They really were at the forefront and leaders and thinking about simulation-based training. We can think about OSCEs and standardized patients. We're just scratching the surface. There's so much opportunity as I think about emerging technologies, thinking about AI, thinking about large language models, thinking about GPTs. It's just opening the door up to the possibility of different assessment methods and different assessment approaches.

So again, going back to OSCEs and standardized patients, that's still happening. That's going to probably be the norm for a long time. But now we can think about how do we deliver that at scale. How can we use AI to instead of using human actors, we create virtual patients or use avatars. And so we can provide that not only at scale but also provide it in in a more consistent way, because it's AI, it’s the computer. We're programing the simulation to behave in a certain way so we, we can have more reliable, more fair, more valid assessments. And we can also deliver, and reach students that we really want to.

Another, interesting and exciting innovation is thinking about using virtual reality or even augmented reality. This is just starting. And we'll still want to collect evidence to see the efficacy of these different approaches. But we're seeing it, as an opportunity to provide training for procedural care. So, thinking about practicing surgical techniques or being in, in an emergency room and really having that immersive experience, allowing

learners to practice, maybe fail, and that's okay because they're not interacting with real patients. So it really is that formative experience where it's psychologically safe. They can have that high fidelity, and improve the skills. And it's just a really exciting time.

Pam: We've talked, you know, throughout the course of this conversation about how there's been a lot of change, how important formative feedback is, the importance of high fidelity and efficacy in research based approaches to formative. Talk a little bit about how NBME is thinking about these, these, needs and how we can best serve the community and some of the work that we're doing.

Krista: Yeah. I want to talk about two initiatives we're working on, we're focusing on two really important constructs: patient centered communication and clinical reasoning.

So for patients that our communication we're developing, as you said, as a formative assessment and a high fidelity assessment, with the goal with the intended learner benefits of improving those communication skills, but also improving that confidence. So, for communication, we're developing the communication learning assessment or CLA.

In terms of how we're designing that simulation based assessment, learners, when they're taking that assessment will get background information about the patient. A brief summary. And then they have a video where they're, they're interacting with the patient and the patient speaks to them. There's a communication scenario, and then the learner is asked to record their response.

So again, going beyond multiple choice about what's the right way to respond and actually capturing their verbal response, and then going into a really robust feedback activity, just really building on the principles that Ana has been talking about today, where we're designing it to make sure we really engage the learner so they have that deep and meaningful self-reflection and have that agency that they're in charge of their learning.

And so we're doing that in a number of ways. We're providing exemplars, as Ana mentioned, but they're also allowed to listen to their response. A lot of people don't like that. They don't like to watch how they did or review how they did, but it's really informative because you might have thought your response is great. But then actually, upon listening to your response, you see areas where you could improve.

We're also having them self-evaluate. We have very clear learning objectives. And so how did you respond and how are they aligned to these learning objectives? And then

going through that self-reflection exercise of what did I do well what could I improve on, and what are the strategies to help me get to where I need to be? And so we're really excited about that.

And then the other initiative that I just want to mention is, we're looking at developing a clinical reasoning learning tool. This tool is directed for clerkship students. So that's our intended population. And we're really looking at measuring the clinical reasoning process. What we've noticed, and this is building on a number of years of work, you may have heard of our NBME OSCE for clinical reasoning creative community. It was a multi-year project where we engaged medical schools to develop this simulated based assessment to really understand students clinical reasoning process.

And why we're focused again on process is what we noticed in the literature and in practice, is that most of the assessment tools out there are looking at clinical reasoning outcomes. So, did the learner come to the right conclusion that they identified the right diagnosis? And when they do, that's great. But when they don't, we don't know why. Where did that breakdown occur in their reasoning process.

And so, there was a lot of effort to define what that means, so that we can provide that really rich feedback to learners so that they can improve how they reason when they're interacting with patients. And so what we're doing now is building on that work, and adding to it, and extending it to make sure we do have a really robust feedback model, but also exploring, as I just mentioned, those AI technologies.

Pam: So here at NBME we care a lot clearly about the research we do in support of the tools and assessments that we put out. Talk a little bit about some of the evidence that you look for, in formative, given that it's not the same as some of the other assessments we've done in the past. So what approaches are you taking in? How are you thinking about, supporting these, these assessments?

Ana: So, in formative assessment, we can not necessarily use the exact same approaches that we do in our traditional summative assessments. So both tools that Krista described: communication learning assessment and clinical reasoning, we are designing efficacy studies. So we are looking at how our assessment and how our feedback models really work. Do they move learners to where they need to be? Are they accomplishing those learning goals that, you know, I definitional in kind of pertinent and inherent to formative assessment and assessment for learning?

So for example, right now as we speak, we're running this study an efficacy study for communication learning assessment. And it's a proper experimental design. And we are assigning our learners to different conditions. And we are testing out our multilayered feedback model that Krista has described.

So, some learners get just to hear their own performance. And then the exemplar of optimal performance. And in the next group they do that. Plus in addition, they have to self-evaluate whether they hit certain learning objectives. For example, did they address emotions properly? Did they explain the condition in clear and lay terms?

And then the next group, we are providing for them a structure for self-reflection. So we are guiding them with the questions on how they would go about thinking of how they did, what they may have missed, and what do they need to do next in order to achieve that ultimate level of performance.

So, our goal here with this tool and with any other tools, and our general approach to feedback, is not just to teach them this specific skill. Our hope is that they will improve communication skills for sure. But in addition, they will gain something bigger. By emphasizing self-reflection, we are not only teaching them communication skills, but we are also helping them with the structure of this deliberate self-reflection, which will help them throughout their careers.

Pam: Krista, Ana, thank you both very much for coming and discussing formative assessment today. I look forward to seeing some of these tools and the supporting research that you've put in place.

On-screen: [Video ends]

Pam: Alright, I hope that video was helpful. And starting to think about some of the really important concepts related to formative assessment, we've received a lot of questions, from those interested in, you know, at this, webinar about kind of things that they're thinking about as it relates to formative assessment.

So I'm going to start with one of the first questions, which is around student motivation. And the question is how can we foster student engagement and motivation when taking formative assessments, particularly given that it is typically considered lower stakes? And how do we think about even student resistance to feedback?

Ana: So, I'll go with this question because as a faculty member and as someone who does research into feedback and formative assessment, it's very dear to my heart. And

the way I think about it is that the real issue here is that it's not that students are lazy or unmotivated, so that we haven't made this connection for them between the formative assessment and the actual learning. So, when we think about how people learn effectively, especially in medicine, where stakes are so very high and formative assessment should be their best friend, not something that they tried to skip.

So the key here is in helping students understand that what they actually supposed, what they actually supposed to be learning, and clarifying those learning objectives that we discussed in in the video. So, I mean, if your learning objectives are vague or disconnected from what they're going to do as doctors, of course they won't engage. But when we tie formative assessment directly to clear and meaningful learning objectives. So, as an example, in case you'll probably do better once, by the end of this module, you'll be able to recognize early signs of sepsis and initiate the appropriate treatment. Suddenly, those formative practice cases become very relevant, and they realize that I guess I should try and practice that skill.

So, what really makes a difference is also feedback, so it's not just correct and incorrect that we give to our students. And it's not just good job. So, feedback should guide them towards better thinking.

And we need to teach students how to reflect on their own learning. And that's what formative assessment is about. Most students, especially high achievers who get into medical school, they are not used to being wrong. And then and they're not used to struggling. Right? So formative assessment is this great opportunity for them to normalize that struggle and teach them to ask themselves questions. So what did they miss here? What pattern they might not see? And how does this connect to what they already know?

And when students start using formative assessment as tools for self-reflection and guided practice, rather than some hurdles that we made them to jump over, that's when the real learning happens and they become more engaged and more motivated to, take formative assessment seriously.

And a quick note on grades, because we saw in the questions that, colleagues commented on whether or not we should be grading formative assessment. And this is where, my team and I, we've conducted many studies in which we noticed that when you provide the grade with comments attached to it, students go immediately to grade and they are less motivated, less likely to engage with comments. So, when it comes to

formative assessment, and if you are giving learners the opportunity to do something, then revise and implement that again, this intermediate grade is a really bad idea. So, in general, formative assessments should be graded on completion rather than the actual performance.

Pam: Thanks Ana.

Chris: That's a great response Ana. And I want to emphasize one point. One of many of the points, but one in particular, which is the fact that oftentimes we think of formative assessment as being separate from the learning process, and it really is part of the learning process. And, you know, when we think about assessment for learning, it is that tie that is so critical. And so, I think as we think about that motivation for students, I think sometimes our formative assessments are not providing that granularity of detail to help them improve.

Or as you pointed out, sometimes we're giving them a score or grade on it, which actually diverts them away from the primary purpose, which is really to identify what are those skills that you need to continue to build on, what are those skills that you have developed very well. And I think as long as our formative assessments are separate from the learning process, we're going to have difficulty with student motivation.

Pam: Thanks, Chris. So, the next question is around, the concept of bias. So, thinking about formative feedback, how is it best to mitigate bias and promote fairness and student evaluation and feedback?

Krista: I'll jump in. That's a great question. Thanks, Pam. I think before discussing strategies to mitigate bias, I think it probably is helpful to define what we mean by bias and fairness in assessment.

So when we talk about bias, we're usually talking about, whether that feedback, whether the assessment, systematically, overestimates or underestimates performance for certain groups, whether that's by gender or by race ethnicity. And so we don't want that to happen.

So with fairness, what we really are looking at and want to ensure is that all students are evaluated based on their actual performance, and it's not based on irrelevant factors. And so, with that definition in mind, I think, just building on what Ana said, with our first comment and what we said in the video is, one way to mitigate this is really having clear performance expectations and scoring rules established. I think this is

pretty straightforward when we think about selective response types like, multiple choice items, those are objectively scored. We know what's right. We know what's wrong.

It gets a little more complex when we start thinking about constructive response, performance tasks, simulations. It gets more gray and more squishy because what's right, what's the good response, what's the best response isn't clear, it's subjective. And so how do we take that subjectivity out of the process?

One foundational step that we talked about in the video is first defining what the assessment is measuring, what competencies are covered, what constructs are covered. And then directly tying that to learning objectives. And making that clear for the learner and making that clear for the faculty. And then from those learning objectives, really thinking about what is the performance criteria. So having performance level descriptors, having rubrics really detailing the distinguish between levels of learner performance is really important.

So, you can think about frameworks within MedEd. We have ACGME milestones that can provide that kind of structured observable behaviors that we're looking for to support consistent and fair, evaluation.

And again, I think the theme is to highlight transparency when we have specific and well-defined PLDs or rubrics, the learner really knows what they're being evaluated on. And it also helps ensure faculty are using a standardized, equitable way to evaluate learners.

One thing I do want to add, I know we're really talking about faculty and how faculty can provide feedback in a consistent manner, in a standardized manner, in a fair manner. And I think transparency is really important, as we think about AI and I think everyone's thinking about AI, using LLMs to provide automated feedback to learners, I think this, point becomes even more paramount. Things we hear a lot about is you can use AI, there's a simulation and all of a sudden you get a score out or you get feedback out, but it's black box-y. We don't know where that number, that score, that feedback came from. And so again, having clear criteria and learning objectives, rubrics that we're feeding into the LLM, so that we know how these scores are being derived. And then evaluating them is really important to make sure, we're not introducing bias as we use some of these new capabilities and tools.

Chris: That's a great point, Krista. And I would just add that as we think about formative assessment or assessment for learning, it really is part of ensuring that your

assessments are fair. We know that we have students with greater access to resources or who have better preparation for summative assessments. So, one of the ways that we can ensure that our assessment system is fair is by ensuring that we are providing all students with that high quality feedback from formative assessments and that actually is going to help all of our students know where they are. And, you know, as we think about it, students should be prepared when they enter any summative type of assessment, already knowing how well they're going to do, right, how well do they know each of those competencies. And I think that's why assessments for learning are so critical when we think about the fairness of our entire assessment system.

Pam: Thanks, Krista. Just, you know- I mean, thanks, Chris and Krista.

Krista brought up the concept of AI and formative assessment and how we think about it as it relates to bias. As it relates to using AI just in general, in feedback and the impact on student learning, Ana, do you have anything that you wanted to add? As it relates to, to AI's role in formative?

Ana: Yes, absolutely. It's definitely a hot topic these days in any educational domain. So the place of AI in medical education is about employee find and helping write human expertise as humans, rather than completely replacing them. We're not talking about that. So humans are not going anywhere. And I think, it's incorrect to think about it this way.

So, where AI can really help us and where it truly excels is taking care of the tasks that we do not like doing and taking care of the tasks that we as faculty would take forever to complete. But now we have this useful assistant that can do those things for us so it can identify learning patterns. It can process massive amounts of information. It's really good at pattern recognition. So, it can say, okay, this student can provide this output, and it can inform us that this student makes mistakes in these domains. So, it is a very useful formative tool. It's incredibly good at adaptive questioning. It's amazing at generating testing questions. So as a personal tutor we should by all means encourage our students to engage with AI.

Where AI fails, it's the human aspect, right? So, it doesn't see the context. It can't, you know, negotiate those complex situations where all learners have to engage in ethical, have to make ethical decisions, where they have to communicate difficult news to family members. So that's where AI would fall short. But integrating it together, it's a really

good idea. So there's this general knee jerk reaction that AI is a bad thing, or embracing it for all means, those extremes are not great.

I would like to note here that again, in our studies and our own studies, what we noticed consistently is this interesting pattern. Whenever learners notice one incorrect thing from AI output, they immediately ignore everything else. But at the same time they don't ignore, you know, feedback, all feedback. Even if the instructors, make mistakes. Because we as humans, we also make mistakes. We sometimes don't notice what they did. We misinterpret our students', you know, essays, their work, what they produce.

So, we need to really communicate to the learners that AI is just a source, just another source. So, there is peer who can make mistakes. AI can make mistakes, and humans can make mistakes. So, the main point here is that we need to give learners tools how to evaluate effective feedback, how to use this feedback to improve their learning. Right?

So what Chris mentioned what we talked about in the webinar. It's like really to get from where you are to where you need to be. So using all sorts of feedback is very important.

Chris: And when I think about how AI is oftentimes used, I think we have to caution learners that without a feedback model, which unless you're programing it into your AI agent, the feedback you're getting from AI can vary. And it may vary from hour to hour, day to day, week to week. And I think that's one of the things that we have to just caution our learners about, right? Because they can do something, they can have a performance, but the feedback they get today may be very different than what they get tomorrow.

And I think we've also seen there when we talk about bias, right? AI is usually overly positive, right? So oftentimes the feedback that AI gives really puts a positive spin on things, which may not help our learners identify those areas to focus on. They may not identify that gap as well.

So, I think, as we think about using AI, the more that we can use as a set feedback model where we're actually instructing AI on what are the elements we want to give feedback on. That's so critical if we're going to give consistent feedback to learners.

Pam: Thanks, Chris. So, I think we have time for one more question. So, this question centers a little bit around the master adaptive learner. Can you talk about how formative assessment aligns with or connects to other MedEd concepts such as master adaptive learner?

Chris: No, I'll take that one. I'll start with that one, because I think it's important for us to consider what is a master adaptive learner. And it really is this conceptual model of how we develop adaptive expertise. Right. And if you look at the master adaptive learning model, it is really centered around this cycle, this continuous cycle that we go through, right of identifying areas that we need to improve. Doing specific learning activities, seeing the outcomes of those learning activities. Have we improved our communication skills? How have our communication skills improved? Really thinking about those outcomes and once again identifying the next area that we need to improve.

So, when you think about that type of model, informed self-assessment is so critical to that. And when we talk about informed self-assessment what we're really talking about is not only the learner having that metacognitive ability to reflect on their own performance, but also seeing how that performance looks externally right, getting some external data about how their performance was received and really using their kind of internal notions, as well as that external data to really identify those areas that they need to improve and the areas that they can, work on, to once again just achieve higher levels.

So that's what assessment for learning is, right? It is providing that high quality feedback. So you know, master adaptive learner is almost reliant upon us having that high quality formative assessment.

Krista: And I want to jump in and just add a little, I thought that was a great response. I think, one way to think about it too is, both master adaptive learner and, formative assessment are grounded in self-regulated learning. And if folks are interested in learning more about that, Zimmerman was really a pioneer in that field. And I think, but Chris described, really talking about that cycle of, self-regulation, self-regulated learning was spot on.

The only thing I look at is I want to share a little bit about what we're doing at NBME, and adding in that self-reflection piece, because we talk about formative assessment. But they can come in lots of shapes, colors, sizes, and they don't all look the same. And we did talk a little bit about the feedback model. And that's a key component of formative assessment and how we're thinking about designing formative assessments at NBME. And so, what we're doing, and this is based on best practices, and Ana can share a bunch of her research, but really engaging in that self-reflection.

And so as learners go through formative assessment, part of that, feedback model is, posing these self-reflection questions. What did you do? Well, what could you have done differently? What strategies are you going to end up employ next time when you, do this task again?

And so, to Chris's point, it's not just getting feedback on that specific competencies, clinical reasoning, patient-centered communication, it's also being explicit and teaching them to build these metacognitive skills. And so, it becomes automated. This is not a natural process. People don't typically do that. They do an assessment and they look at their score. They don't really always stop and self-reflect. But if we intentionally build that in our feedback model, where we're modeling to them that this is important, and then hopefully, it just becomes second nature. And then when they move from the classroom to clinical practice, those skills that they've built, will come with them and they will be master adaptive learners, and lifelong learners throughout.

Pam: Thank you. Krista. And I see we're at time. So, I'm going to wrap up our session today, but a couple of items. The first is I just want to mention to everybody on the call that there is going to be a survey that's going to pop up. And if you have the time to fill that out, we'd really appreciate it. And I want to thank all of our panelists, Krista, Ana, Chris and those behind the scenes who, helped us put this together and the rich questions that we got from the audience. Thank you.

Ana: Thank you.

On-screen: [Assessment for Learning in Medical Education: Supporting Students' Growth and Development.

Anastasiya Lipnevich, PhD Visiting Scholar.

Christopher Feddock, MD Vice President, Educational Strategy.

Krista Mattern, PhD Director, Constructs Research.

Pamela Treves (Moderator) Senior Vice President, Growth and Innovation.