

**Transcript for Creating Engaging Educational Content on Social Media
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Educational Technology Users Group
Presenter: Trefor Bazett**

JAMIE:

The session is Creating Engaging Educational Content on Social Media with Trefor Bazett. Trefor is an assistant teaching professor at the University of Victoria. So we'll pass it over to Trefor.

TREFOR BAZETT:

Thank you. Maybe give me a thumbs up. Can you all hear me well? All right. I'm going to hope that everyone can hear me well. Thank you so much for being here, and thank you for willing to allow me to be in this remote circumstance. My children will definitely appreciate that. Let me just check the things. Audio is good. Lovely.

I have a bit of a strange experience, an experience that I didn't expect to happen, which is that I am both a math professor at the University of Victoria as well as being a YouTuber, somebody who posts educational videos within my discipline of mathematics online. And I thought that I would spend a little bit of time sharing what that experience was like, and some of the lessons that I've learned from being on that social media space that I've taken back into my own practice as a faculty member and vice versa. I find that both of these two things to be quite complementary to each other with quite a lot of lessons learned. And I say my journey is quite accidental in the sense that I started off with just 20 students in an online class before the pandemic down in the United States, and we didn't have a wonderful learning management system that was capable of large video sizes. I was just posting them on YouTube. I expected nothing else, but it has really blown up to a vast number of people. I think it passed 40 million people who have seen one of these videos recently, which is just a staggering amount. And these two environments, a physical classroom and an online course at a university, and then something which is on social media, YouTube. There are a lot of similarities and a lot of differences.

So one that strikes me right off the top is breadth versus depth. When I work with my students in classes, whether it's online classes or whether it's an in-person class, it doesn't really matter. I have a lot of depth with them. Over the course of a semester, I can work with the student, I can develop their mathematical competencies and they really shine. We can build relationships between the students between the students and the instructors, etc. With YouTube, they might only watch one of your videos for a few minutes one time, but it has this staggering breadth. I reach more people in a day. I reach more people in a few hours, to be honest, than I will in my entire career thus far as a faculty member. So this huge sort of breath. But the audience and the context and the purpose can be very different. When you have students in a classroom, already, you might be thinking that there are students who are there for different reasons, different purposes, different types of students with different types of backgrounds. And that is already a challenge to deal with when you're working in a classroom. But on YouTube, you have

this incredible diversity, and the purpose behind them can often be a little bit different. We're going to dive into some of those as we go along. But one of the things I'll note is that when I do post videos on YouTube that I'm doing explainers in math, math explainers. I'm explaining a concept. To really emphasize as I know with this audience. I will not have to emphasize much, explaining things is only one small portion of a learning journey. And YouTube does pretty good at that explaining part. I often actually think my YouTube videos are better than the same presentation that I might do in a classroom. We don't have feedback, and we don't have interactions and opportunities for questions and the social spaces that are formed both online and in in-person classrooms. It's just one good thing that you do really well in the context of YouTube. I want to tell you a little bit about how the YouTube algorithm works to understand what the lessons are, and I'm going to be very descriptive and not normative. I'm not saying this is how things should be. I'm just going to say this is how things appear to be

So I do two types of outreach two types of videos. The one that you'll see here on my right is called Bayes' theorem. This is a standard first- year or second-year topic that is seen, sometimes even in high schools, it is seen all the time. It's just a standard piece of the curriculum. On the context, the one on the left, who knows what this is about? I mean, you might have that memory of being in a math class one day and just like mashing the cos sign button on your calculator over and over and you might notice that if you do that, you always get to the same number, no matter where you start. That's interesting, but it's not clear what this video is about. I know what it's about. I know it's about some third-year math theorem that's kind of interesting. So these two videos are very different. And what I do is I really divide my work into two different categories. Core course content, design for courses. That's what this Bayes' theorem is. An outreach content, content that is intended to inspire people to make them think math is cool, to get them to watch math in conjunction with all the other videos in their social space. You can imagine that something like YouTube is like a carousel with many different options and many niches, reflecting many different passions that somebody might be interested in. My goal here with outreach content is to have mathematics, in my case, be part of that social conversation that occurs in places like YouTube. Okay. We're going to come back to this pair of images. But YouTube we think of maybe as one thing, but YouTube really is two things. It's a search engine, much like the Google search engine. YouTube search engine is the second largest search engine in the world behind google.com. And it's also a recommendation engine. So what this means is a search engine is for people who they know they're in the course. They know they have to learn Bayes' theorem. They know that Bayes' theorem is on the homework, and they type in Bayes' theorem and the search algorithm generates a video for them. They know what they want and the search engine gives it to them. The recommendation algorithm just says they're sitting there amongst all of the other things that they could be interested in, they could be interested in gaming. They could be interested in gardening, they could be interested in cars. Who knows what people are interested in. And it's going to say, I think, based on your history that you might be interested in STEM topics. And I'm going to show you a video that you never searched for. Nobody's typing this exact thing in to search for it. They don't know that it's interesting ahead of time. But the algorithm picks it up and promotes

it to them. So I do a lot of that latter work these days, trying to sort interject mathematics into these social spaces.

You'll notice that they have analytics. The way you can tell this is on that video above Bayes' theorem. This is using the search algorithm. YouTube search is 74% of their traffic and it's linked on various websites and the like. The majority is coming from search. Browse features is the fancy name for the recommendation algorithm, and this video is one that is shown to people who have already indicated an interest in mathematical things on YouTube to the YouTube algorithm. It'll show them more mathematics, and that's what it's chosen to show this video. Okay.

Who watches YouTube? I mean, I should say, who watches my YouTube? It's kind of interesting. It is a wide spread of things. YouTube tends to have a higher portion of males than females across the platform and specifically for my content. And as you can tell, 18 to 24-year-old being half of the content makes sense, given that I teach a lot of first and second year and third-year mathematics content, that makes sense.

It is really, really international. These are just the largest numbers, United States, India, Canada, and the like. But it is an appreciable number all the way down. So for example, I think I once looked and the number of countries to which there's been over 100,000 views in that country is most countries. So it is incredibly widespread.

Okay. So what does the YouTube algorithm care about? And should we care about that? They really care about two different things. One is called click through rate and the other is called average view duration. Click through rate says, if this video was presented to them? If the algorithm shows them the image and the thumbnail, do they click on it? Nobody clicks on it, they're not going to watch it. So the click through rate is very important. And all the information you have is, well, you have these kind of little images that I've shown before, a thumbnail and a title. The other one is average view duration. It just says, how long do people watch? If they click it, do they then watch it? Okay. What gets good metrics on these types of things?

These are four thumbnails that I have. And as you can tell from all of them, these are videos that all did particularly well. There's something very visual to them. There's something that grabs your attention and in a carousel of other images, it's not a big formula with the exception of this one, which is x to the x , and anyone who's taken first-year calculus if you have, you might notice that x to the x is a strange one and would leave a bit of a puzzle there. But some of the common features among these thumbnails that make people choose to watch them well, one, they're highly visual.

I want something that grabs people's attention, that's interesting. I'd like to know a little bit more about that. Second of all, well, there's an element of unexpectedness to them. Remember the cosine of cosine of cosine of cosine? That's weird. I haven't seen that before in most places. That's probably the sentiment that many people think. So anything that's got a bit of intrigue to

it or naturally leads to a question, I really liking ones that pose questions. These are all really good. You want something that grabs people and gives them a reason to click. Okay, so I'm talking about YouTube just to zoom back to our own practice here. I mean, this can seem a little bit gimmicky. Students are in your class. They have to be there, perhaps. But I actually now in my own practice really work on having something that's said at the very beginning of the class or at the top of an online module that tries to do the same business of hooking people and grabbing their attention visually as to why should they give me the next 50 minutes of their attention? The same principle, I think works there as well.

All right. I wanted to show these two graphs. These are retention graphs, and they're kind of depressing. What you can see is that they're actually both good. I've chosen good videos, that this is 100%, and this is the time. And as time goes on, you have about 30 seconds, which is people click on the video and then they realize it's about math, and they don't want to watch a math video, and they click away. What I'm really interested in is this long tail, how long does it go and then it drops off at the end. So I was just noting that in a space like YouTube, attention is very bad, even for very good videos, people leave very quickly and small improvements to having people stick around and be interested make phenomenal differences in how willing the YouTube algorithm is to promote them.

Generally, what I found is that what you want to do in that first 30 seconds to prevent that drop off is kind of the same thing as it was for the thumbnails. You want something very visual that grabs them. You want something interesting or unexpected that makes people think, why should I stay to the end of this video or why should I stay to the end of this 50-minute long class. You want to pose a question, a question that gets them thinking that makes them excited to know what the answer is. So I'm going to do one 30 second intro. This is the intro to one of my videos, loosely speaking. So we have this lovely giraffe and we notice there's this pattern on this back. And you'll notice how there's this interesting cellular shape. But if I zoom in on a dragonfly wing, you can also notice that there's a cellular shape that looks like that. If you look at a tree canopy, you'll notice there's also a cellular shape that looks like that. If you imagine crystals growing in a dish, as they come together, you'll see that they also form a shape like this. So that's my first 30 seconds. It's visual. It poses a question. Why? Like, why in all of these places in nature, is this same thing happening? I want to understand this phenomenon. I'm going to get to the mathematics, the formulas, the equations, the explanations for things later on in the video. This is a video about mathematics. But right now, this is a video that hopefully anybody in any discipline can understand and is motivated to have to be curious. I mean, I kind of want to know what the rest of the answer is.

Okay. So basically, what I tried to attend to, what was this sort of first 30 seconds, this drop off that we have. Now I want to focus on what have I really learned for keeping people throughout the rest of the video? How do I deal with this long tail? Keep up with that average view duration?

There's many things. The first one and the most important one by far, in my view, is storytelling. It's about having a compelling narrative that has people try to move on through the video, they're interested in knowing the result. There's tensions and resolutions. One of the ways I like to present this is I think often in mathematics, I used to present content that maybe to me wasn't thought this way, but to students was perceived to be, here's fact one. Here's fact two. Here's fact three, here's fact four. It was a bunch of isolated facts. That's not how I think of mathematics. I try to now think of it. I just change the connective tissue. How about this? Fact one. But then the surprising fact two, and therefore, fact three. This is very natural to the discipline of mathematics, but emphasizing this storytelling element, I think can make a really big difference. You might replace the words of facts but you've got a hook and then a tension comes along and then you've got a resolution. This is a really elementary way to think about storytelling. But if you just have this as a rubric in the back of your mind about telling effective stories as you develop a module or a class or a video, I think that this can definitely be very effective. Another thing I'm kind of a fan of is going along and having what I call ah ha moments. There's something in mathematics that's very pleasing. It's that time when you recognize, for example, why did all of those giraffes and canopies and butterfly wings or dragonfly wings look the same? Once you understand that it's the idea of things being seeded and growing out the way you can imagine a crystal form and that all of those natural processes are the same thing. It gives us the ah ha moment. That's why this appears in so many different places in nature. Maybe it takes a little bit more explanation than that to get there. But when you have this really pleasing payoff moment, I really love to centre my videos around those, something that really grabs people and brings them in.

Another thing, a really big takeaway from the literature is this idea of cognitive load. I only have a couple of minutes so I'll be very brief about this, but to say that loosely speaking in cognitive load theory, there's the idea of the intrinsic load, amount of mental effort that's needed to understand a concept regardless of how well or poorly it's taught. There's extrinsic load, which is based on how we are trying to teach it, which medium are we doing, what graphics? All the things that we're tweaking as instructional designers or faculty members or instructors. We're trying to change the amount of extrinsic load so it's a little bit easier. This is the guy, for example, we're talking about the idea of an LMS not being just a dump for all of your files, not being a Dropbox for your files. You try to put some structure into your LMS, this helps lower the extrinsic load. And then germane load is the thing that you really want to have. This is about trying to build up students' long-term retention and ability to form sort of mental schemas about what's going on. So what I really love about the video medium is the video medium allows us to quite precisely play around with extrinsic load. Because you're recording this ahead of time and you're making a presentation and you can edit it out, you can spend as much time as you want reducing those extrinsic load things. This is why I really believe that the visual medium can be excellent for the explainer part. And that often we'll buy time in the classroom or however you're doing it such that you can focus on the active learning and the student interactions and everything that goes to this germane load of students being involved and being able to understand the concept.

One of the things I'm a big fan of specifically. Maybe I'll just make two more points, and I'll close up here, is showing and not telling. I found that any period of time where you're talking without a lot of things happening on the screen. It's very clear in the analytics that you see a drop off. I really believe instead of just saying, "This is a rectangle," to show them what a rectangle is. This really helps with the mixed media ideas and keeps retention up a lot.

Then the final one that I'll say here is I'm a big fan of focusing on pacing. Different types of content requires different levels of pacing. Not necessarily how fast you speak, but how fast you're allowing the concepts to unfold. Are you carefully going every detail, just going one onion layer more complicated? Are you speeding through things? It depends on the content, and the point of this image that I've shown up here is just to illustrate that there's many different styles of video creation just talking to the camera, whether it's writing on a tablet, whether it's showing an animation that allows you to adjust your pacing a lot. I really try to think about pacing as a relatively important element of how to design a video that's effective.

So I just wanted to leave that there as I get to the end of my time. And I would love to hear your thoughts, if you have any questions. Please feel free to come to the front so that I can see them or put them in the Zoom chat if you're there. I'm a really big fan of social media, and I believe that in conjunction with all of our classroom education, social media has a role in particular to inspire people and to build a community online. And so I would encourage you if there's any part of you that's doing resources that you think might be able to put up on social media. I would definitely encourage you to do that. Feel free to reach out to me and thank you so much for having me.

JAMIE: Great.

Thank you, Trefor. Does anyone have any questions? Great. Thank you.

PARTICIPANT:

That was really fantastic. I was wondering if you could talk a little bit more about pacing. I've always been super into video. I think it's a super effective way of doing all of the things that you've talked about. But I was surprised about what my kids watch. My kids are in high school and they watch John and Hank Green videos at school. And they are very fast. I was like, Oh, I'm surprised that they're getting so much out of this. Then you were just talking about pacing. And I think that this is something that maybe people are missing that maybe sometimes they're going too slow with their videos, and that students, because they're probably going to rewatch, there's an opportunity to actually move quicker and really hold people for longer. Clearly you're doing something right. You're holding people for a really long time. I wonder if you could talk a little bit more about pacing.

TREFOR:

Yeah. Thank you. That's a really good question. And you shout out to John and Hank Green who do a lot of really lovely educational content. So I certainly think that content which is on YouTube. I don't mean this to be effective for learning. I mean, to do well on YouTube is

generally fast paced. If you look at a lot of the content that really big YouTubers that children might watch, our students might watch. A lot of it spend a lot of time cutting out any extra things. It's got a frenetic pace to it. This is often the case. And I think it really depends, in my view, at least when I'm doing it. The level of complexity of what you're describing in compared to the audience of who's listening to it. So what I mean is right now we're just talking about things. I think I can go with a pretty fast pace. If I was trying to show you some math equations, I think I would have to slow way way way way way way down. And so this is what I try to do. I try to have portions of the video where I'm talking about sort of big ideas, visuals, sort of the generic thing away, and those are snappy. I'm editing out pauses. I'm trying to get those first 30 seconds going really fast and quick so that you're engaged with me. And I think you're right. I think in those, most people can be much faster than they think that they can be. And that's something like having a script ahead of time to enable you to be faster is good. But I also think that there's times where now you're deep in the calculation. This is the real point of it. This is why the students need to understand it. And you want to be really careful to say things in multiple different ways so that different people with different backgrounds can get it to develop the content really carefully, to do those cognitive load tricks like have one equation come and merge into the other equation so that they see why it is. I think there's times when you want to slow down. I think my claim is not to go fast or slow. I think my claim is to vary the speed according to the difficulty in the audience. I don't know if that makes sense, but that's why I think I take away.

JAMIE:

Yeah. Thank you. Are there any further questions?

TREFOR:

I see one on Zoom here. It says, "I love your storyteller's approach, which reminds me of the use of sales that having that hook tension, resolution, perhaps is something that's done in sales as well." And of course, it's done in lots of movies. I mean, people sometimes think they look at some of these data from the MOOCs where video retention is short, which is what I think I've shown you here as well. And then, but people are quite happy to sit through a 2.5 hour long Hollywood movie. It's not to say we should make all of our things movies, but to say that if content is engaging, people will be willing to engage in it a long time, and I will have some of my 20- and even 30-minute videos that do as well as some of my five-minute videos. So length really can depend. Keith said, "Do you ever have a chance to look at deeper analytics of your videos? Do learners rewatch clips? Could this reveal what was difficult or what was rewatching a valuable learning strategy?" Yes, absolutely. Um, Okay. YouTube is maybe not great at giving all the perfect analytics, but you can get a lot of really, really detailed things. There is one specific graph which does highlight areas where people are rewatching and it's incredibly instructed to go through it. Usually the things that are rewatching, this is for me to doing math, the technical computations that are the important key things of the video. So in that example of Bayes' theorem, it's me actually using Bayes' theorem for the example. It's right when I'm plugging the numbers into the formula, like the thing that the students will actually have to do on their homework. That's where you can tell that there's this massive spike in people

rewatching. What I think happens is people will look at this video and they think, well, what do I need to do? I need to be able to do this thing to solve my problem, and they'll find it within the video, sometimes skipping the intros and the outros and the motivations and the development, and they're going, This is the thing that I need. I'm going to rewatch that a few times to make sure I really get that. I think that's an effective learning behaviour. So I don't grudge them for doing that.

PARTICIPANT:

Thank you for this great presentation. Just touching on this last point that you've just mentioned of users that need something from you. If we're thinking learning module design, for example, it is not always the case that they have a need for that, that they feel this kind of need. How do you apply that kind of thinking, for example, in your lecture design or in your teaching?

TREFOR:

Yeah, I think that's totally fair. Sometimes the things actually that I think are most interesting are the parts that are most likely to be skipped. Like, I'm making the online class, and I've got this lovely motivation piece right at the beginning, and they just skip right over it and try to get to the thing that they think is the valuable thing, perhaps, like a core calculation in the context of mathematics. And I don't think I have any perfect answers. I do think that the focus on narratives and story arcs over the course of a module helps people be interested in having a question at the beginning that gets answered at the end, having that tension and resolution. My hope is that that goes and helps to solidify questions of motivation and questions of why was this developed and how was this developed as opposed to just this is the answer that I need for my homework. But I think that that's really dependent on the specific content of the day, whether that can be done effectively. And to be honest, when I think. You know how I was talking about I do outreach videos and I do sort of the service course videos, the tendency, even though I try to do storytelling and motivation and all of that in both of those, I think it works in the outreach case where people are there because they want a story, and that's why they're clicking on this. They want to be interested in mathematics and see cool mathematics. Then I see those parts being rewatched a lot and those are the ones that get things. The cool visual where it all came together is the part that's really interesting. With some of the core course content, that's not the case, as I say, it's the core thing that you would need. So I don't know if I have a great answer, but I would say you can never be hurt by focusing more on narratives and story arcs within a module or a classroom or a video. That's my theory at least.

JAMIE:

Thank you. All right. I don't think that it doesn't look like there's any further questions. So thanks, everyone, and thanks, Trefor. That was wonderful. Thank you. You are moving into a break and we'll be back at 2:45.