

Trades Summit Series: Strengthening Teaching and Learning for the Future
Growing Open Educational Resources in a New Makerspace
BCcampus: November 24, 2022, Day 1
Speakers: Darel Bennedbaek and Jessie Sorensen
Host: Tim Carson

TIM CARSON:

Here we go. We have Darel and Jessie. And they are doing for us the first panel of two for today, Growing Open Educational Resources in a New Makerspace. And Darel has worked in academic libraries since 2012. And then he started as systems librarian and then moved into the role of library coordinator in 2021. And Jessie has worked in both academic and public libraries since 2016. And they started it in the Buchanan Library in 2020 and in 2022 they researched and led the creation of the Centre for Teaching, Learning and Innovations' Makerspace. So it was my honour to introduce to you Darrel and Jessie. Thank you.

DAREL BENNEDBAEK:

Hello. Perfect. So we are going to be talking to you a little bit about our various Makerspace initiatives and adventures that we've been having over the last few years here. But we're going to start. If we go to the next question, we're actually going to start with some questions. If we go to the next slide here.

And the nice people at BCcampus have made us a couple of mentees. So if you could bring those up. We're curious how many institutions that are here have a Makerspace. Give you a second to login and find your way to the mentee.

JESSIE SORENSEN:

I got a yes. No, more Makerspaces, more.

DAREL:

I'm actually pretty surprised that there is quite a few. But the fact that there's more than just a few, that the numbers are kind of like, it's not entirely equal of course, but the fact that there are quite a few out there is exciting to us. We'll talk more about this in a moment in our presentation here. But collaborations between Makerspaces, both in terms of sharing information and being able to work on projects with them is exciting. So if we can move on to the next, to the next question on the mentee.

In a word or two, how are, how does, or how would a Makerspace benefit your institution? And I'm going to throw something in there as well. If you feel that it is not a benefit, go ahead and throw those words in there as well. Can everyone get to the. There it is. Yeah.

JESSIE:

I haven't seen this before. This is fancy. I like these. They're fun.

JESSIE:

My graphic design brain is like, ooh.

DAREL:

I'm interested. And I would agree that collaboration and community are driving forces behind these. As you're going to see when we talk about them. And the way that it's been going here, one of the main areas that we've been able to thrive in is in our collaborations. Yeah, definitely right. Engagement. So yeah, This is why I'm not going to give away the future here.

JESSIE:

Also seeing a lot of creativity. 1,000% interactivity. Engaging million percent.

DAREL:

Yeah. So these things are. These things are, not only do they help make and make space fun to have, but they help the Makerspace drive education in ways that you wouldn't even have thought that they could. So if we go back to the slideshow, and I'll just run you through a few points about our organization here at Lethbridge College. And then we will hand it over to Jessie to talk about the history. But so let me start just by explaining a little bit about what the Centre for Teaching, Learning and Innovation is here at Lethbridge College. So I'm the library coordinator here. But the library is part of the Centre for Teaching, Learning and Innovation. And that centre has about 10 different departments in it, I want to say. We've got the library, the learning cafe, accessibility, testing services, digital learning, digital learning team. The learning experience designers group called LC Production, who, they do LC Studio that do a lot of our branding. The art side of what we do.

JESSIE:

They also help a lot with building courses and creating consistency between, because we are so many departments in an even bigger institution. Creating consistency between all of the departments, at least in our appearance. And setting that expectation so that everybody in CTLI is meeting that standard and it's communicated out to the college and recognize that, oh, you're a part of CTLI.

DAREL:

Before I worked at this place, the libraries that I worked in usually were stand-alone. They might be part of a consortia, but they were not generally part of a Centre for Teaching, Learning and Innovation. But what being part of this department, or this centre, has allowed us to do is create networks that we didn't necessarily expect that we could. So Jessie is currently working not only in the library and the Makerspace, but they're also part of the actual digital learning team. So there's this cross-pollination that happens and drives the innovation and reinforces flexibility and collaboration. So all of those words in the word cloud there are what infuse our ability to work together as a bigger team in the centre. The flip side of that is that not only do we get to work together effectively, but the work that we do is all focused on delivering tools, resources, and experiences that enrich the student life. The student experience. They lead to learn a success. So the Makerspace, one of our long-term goals for it, and we'll talk about this a

bit more in a little while here. But one of the long-term goals would be to integrate it into our integrated supports. So are embedded librarians, our embedded learning strategists. And then we're playing around with this idea of embedded tech support and Makerspace. Embedded Makerspace into classrooms.

JESSIE:

Yeah, so basically adding elements of the Makerspace or Makerspace involvement into course requirements and projects et cetera. Exactly.

DAREL:

And this whole thing is driven by what we call the student core competencies. So if I were to try and list them all from memory as I should be able to do, I would certainly not succeed. So I'm actually going to grab our website here and I'll pop it in the chat. I'm going to pop this in the chat here that will tell you everything that you need to know about core competencies, but they are communication, career and personal development, innovation, problem-solving, global citizenship, critical thinking, and teamwork and collaboration. And these are the additional to curriculum that we are beginning to get students to follow so they're very well-rounded. They don't just know how to do a trade or have a degree in nursing. They also have this very holistic approach to what it means to be a worker. And the Makerspace is becoming what is ideally going to become one of the central drivers of these. Help reinforce this. So if we could go to the next slide, Jessie is going to give a little bit about the history of our space.

JESSIE:

Welcome to my history lesson. So our Makerspaces has come a very, very long way. So it initially was just on an AV cart. Everybody knows what an AV cart is, I'd like to hope. The size of a small desk with just a small filament printer on it that we were just operating off of that. And then pre-pandemic 2020, we got our Maker cart. It's a big blue cart, a bit more custom so you can actually fit the filament spools on the back, have other things stored in there, have other tools for creation just like simple, clay, crafting, Lego. Always our Lego was just started on there. Then pandemic. Nothing changed because pandemic. But once we got back open, 2021, September 2021. We started pulling things off the cart and putting it into the space so students were actively thinking about them. So as simple as taking the Lego off of the cart and putting it by some of our couches on the table there. And students were actively playing with it and making sure that we had some signage to recognize like, Hey, this is the Makerspace stuff. It's pretty cool, so helped us build a bit more traction. And then as of this year, we expanded our cart slash station into an actual space. So it's just as of September, which is pretty exciting. And we're hoping to build on that more. Hopefully get an even bigger space. We're finding very quickly because of how much excitement there already is in the faculty. We have a lot of tech and we just need more. Go to next slide because

DAREL:

This is exactly what we're working towards.

So Jessie just talked about 2015, 2019. And we're going to talk more in depth about the adoption of VR, but we don't want to give that away yet. No spoilers. But the large-scale application of resin printing was actually put together by Jessie and Eric from the trades. And then one of the guys from CTLI here, he actually has a different job now. But Chase Bougart, they pioneered this idea of using resin printing and all kinds of different things. And we have faculty PD event called Camp Horizon, which we made and we designed a whole bunch of small tipis and then put our logo in it and around the base. We customized it with our name.

JESSIE:

Well, it was also nice too because then we were also able. We had our resume and finally, still have our baby filament printer. We were able to do versions of both. So while it's a take-home, it's also constructive. You can see the differences between it, and it got faculties thinking a lot.

DAREL:

That's the thing out of that. You'll see some of our projects later. But we have been printing brains for faculty. We've been helping us design all kinds of interesting things. Yeah, we'll get there. No spoilers. So as time moves on here, the one thing that of course is a bit complicated is getting all the OHS paperwork and all the training that we actually need for people to freely use this space. Because right now it's mainly driven through Jessie. and Helen of course. Yep. And essentially people have to work with them. But starting in December, we're going to be putting together courses so that people can take courses, take training. And then that'll bring in like the faculty and students.

JESSIE:

Have students actually have a bit more of that self-driven learning instead of us just like yes, yes, it's good that we're providing them with these tools. It's still hands-on learning, but having them be able to go into the space and create things from start to finish. Just takes that another step further. So we're working towards that.

DAREL:

And if you want to just go to the next slide here, Makerspace and maker pedagogy.

So I just was in a meeting yesterday with our local public library. And I was describing some of the things that we've been beginning to do with our Makerspace. And this idea of creativity and pedagogy. It works both ways, right? So you've got faculty that are basically becoming more creative in terms of how they can use Makerspaces. And then building off of student creativity, which creates this nice arch of creativity, a community, if you will. So it strengthens the community in your classes. And then it starts breaking down barriers between those roles. So where a faculty member might be thinking about a specific topic, a student might know something about a Makerspace and then bring that to the faculty member, which then expands that horizon. A really good example of this is what Jessie is doing right now with one of our agricultural science classes. They're building a new class that will essentially look into the

technology of Ag Science. But part of that is going to be looking at what Makerspaces and Makerspace technology can do in agriculture.

JESSIE:

We're focusing on stuff that we have to. So as they go through, we're going to be teaching them at least at a basic level like, Okay, here's how you can make a model really quick. And here's how you can pull free resources and they're going to have to come up with problems that need solutions.

DAREL:

But that's exactly the thing, right? The faculty member, I was in one of the meetings right at the beginning, before Jessie does everything, and I was talking to the faculty member about it. And the one thing that he said that stuck with me was that they'll get these ideas into this, into the hands of students and then essentially wait to see what the students can do. And that's that breaking down of that wall where not only are you empowering students, you're training them to become lifelong learners, adapting to new technologies, using current technologies in new and creative ways. And then as a faculty member, learning from that and implementing, implementing that into the curriculum. So that's part of the Centre for Teaching, Learning and Innovation. We do. If you can go to the next slide real quick.

We work a lot with things like work integrated learning, universal design, our core competencies, and many of the teams like our learning experience designers, our instructional designers, our learning cafe strategists, and integrated librarians. They all work with faculty in many different ways to build a holistic approach to education. And so UDL, work integrated learning. This is a real driving force in Alberta. And our centre works to empower faculty to be able to do that. And then Jessie, you've been making accessibility tools.

JESSIE:

Yeah. So we're also looking at, because Makerspaces have so many incredible opportunities. Not just in the classroom, but day-to-day life too. So we're looking at easy and affordable ways to create accessibility tools, accommodate learning materials to be more accessible, so with the power of 3D printing, we can take something that's very tiny, blow it up. So if you have somebody who has arthritis and they can't necessarily have the ability of gripping and actually being able to interact with this due to the disability. We can give them that opportunity for that learning in, just in a different way.

DAREL:

And that's really where you get to the variety of being able to support student learning. Because very often you think, okay, we'll make sure that everyone can access this material either electronically, asynchronously, whatever that's super. But then what about real accessibility for students that have special needs? Sometimes you're able to find stuff out there, but so often it's so expensive.

JESSIE:

Expensive because it's a specialty tool. Even though some people need it, it's a necessity. So we're able to help with that. And even not just accessibility in the sense of people with needing learning accommodations, but accessibility in the general sense too, of, well, I can't just have access to a human skull on a Wednesday. Spoiler alert.

DAREL:

So actually this brings us to the next slide which Jessie's going to talk about. Because one of the most important things that you have to remember in education as well is play. Without it. Education becomes, well, go ahead.

JESSIE:

You stole my thunder. Yeah, Well, play is so fundamental at any age. And a lot of the times it feels like that's forgotten in post-secondary education or education in general once you hit a certain age. That's super-duper not the case because you'll learn so much through play. Just from basic skills like you can see on the PowerPoint, like problem-solving skills, adaptability. But it also helps learners retain that information better because you're creating a positive environment, you're creating a fun environment. You're creating a point of collaboration. So everybody is excited. It's a shared experience. You're more likely to hold onto what you're learning and you're more likely to be excited going into what's next. Also next slide.

I'm just going. But it also has supreme. Like that from the previous slide, but keep it on this one, sorry. Super-duper mental health benefits too, because it does create that positive teaching and learning environment like everybody wants again. Creates a great environment for everybody. So basically how Makerspaces work is it's a lot of hands-on learning, a lot of hands-on teaching, which is great. I mean, I know myself. I struggle a lot with typical learning practices. I have ADHD. I can't sit still. I mean, it's great because then I can run a million things now at my job. But for school, sitting in the classroom is really, really hard for me. I'm really lucky I'm stubborn, so I have good grades. I'm attending school still, of course. But it's so hard to sit still and I've always found when I can actually physically touch it, when I can label it, when I can play with it, when I can have it broken and fix it myself. I'm going to learn a lot more out of that because I'm gaining that life experience. It's not just reading a textbook. It's not just talking through it. It's literally problem-solving in your hands. And we're really trying to push that more, at least at our institution. Just giving that ability to learn in a way that's good, that you're going to hold onto that information. And like I said, build onto those very important life skills beyond the classroom that you're then going to take to whatever field you go into because you've retained it. You're going to be thinking, okay, well, when I learned this in class, I utilized the Makerspace. This is how I utilize that. This is how I utilize that technology. And I've found even in faculty, they're starting to do that right now. They'll come down a lot of the times with an email or they'll come to the library, because I sit up at the front, and they'll just go, hey, I have this problem. I'm not sure how to fix it. What can we do? And basically what I start with is just start pulling models that I have out of my cupboard and go, okay, well, this is how we solve this problem through this. And this is how we solve this problem through this. And you can see them light up and get excited and the hamsters in the wheel and he's running, sauteing fast. To

take that just from the learner, the teacher perspective. But we also want learners to be actively doing this as well. We can go to the next one. Next slide.

Sorry, I'm getting excited. Yeah. So once again, it's that importance of play and how that can affect not just education, but your mental health as well. Once again, my ADHD brain. You get super down on yourself because you want to be doing good. You want, everybody wants to feel great and successful. And oh dang, I'm getting it. It's clicking. This is awesome. So by giving that opportunity through utilization such as the VR or the Makerspace, you're able to boost that mental health. And the fact that things are going to start clicking a lot easier, but you're also able to play. Like play is just fun. Who doesn't have fun playing? It's great. You get your imagination going. You're having that positive experience, which means that students aren't going to be stressed out coming out of your class. You're not going to be stressed planning your class. Everybody's mental health is going to be better even if it's just for that one class. Let's say everybody else is still, you're still sitting in lectures for every other class. You're going to look forward to that, that 12:00 class where you're going to go and design a building using clay.

DAREL:

Well, there was an impromptu request the other day where a faculty member came in at noon and told us that she was going to be teaching a class at 2:00. And could we maybe just come in and showcase some of the Makerspace stuff and, you know, talk to I think it was early childhood care.

JESSIE:

Yeah. Early childhood development.

DAREL:

Early childhood development. That's right. So we went there and Jessie wowed them. It comes full circle from the cart back to the cart. Yeah. Exactly. Like we have a room and now we're using the cart. That's amusing. But the two words that stuck with them was fun and informative, right? So this builds resiliency. And so students, when they are, actually enjoying their learning and being able to build on it and see themselves in the real world.

JESSIE:

It was also good. Tapping into the mental health side. The instructor is fun, so she checks in with her class. We get in, and we sit down and she's like thumbs up, thumbs down, How's your day going? So many people were having such a bad day. But then we came in and we were like, Okay, let's give them 10 minutes just to play. Yeah. And right away you could just feel the energy in the room just lift even just a bit.

DAREL:

Well, that's funny because I actually forgot entirely about that right at the beginning where everyone was, meh we're at school. And then at the end of it, I'd completely forgotten that everyone was sad because they were designing things. We were making buttons with them and all this fun stuff.

JESSIE:

They were colouring. They were laughing. They were like, look at my snowman.

DAREL:

So if we go to the next slide. Because I have to try and keep track of time here because we could talk a lot about stuff. But so VR is often included into Makerspaces. Fairly often. We were just at the University of Lethbridge the other day, touring one of their very fancy, very cool Makerspaces. And they've got this whole section where there are VRs are set up. They've got computers. I tried to get him to sell me one of the computers because he said they wanted to upgrade, but he said, No, they're using them elsewhere. So I was very disappointed. But nevertheless, the sense of bridge building that VR can allow is just amazing. So if we go to the next slide and play this video, I think that'll get us started on that part of the conversation.

[VIDEO STARTS]

DAVE:

When this all started, basically what it was. I was teaching an engines class with another instructor and I noticed that the students had a hard time gathering around and seeing what was being done. So I realized we need something like a camera or something like this. So this was the beginning of all of this starting. So it came upstairs at coffee time and I chatted with Eric here real quick about what we could possibly do. And he came down to the VR guys and within 30 minutes they were down there setting up a camera. Okay. So it all started from that. So they ended up showing up.

ERIC:

They showed up, they got it all set up. Luckily, we had a TV, those already mounted up on the shop wall that had been there a number of years without ever being used. We had an HDMI cable there, everything was there so they were able to tap into it real quick. And then we started playing with the camera, which was great because we can show the students that things that were on the bench. I think you were dealing with pistons.

DAVE:

We were pushing the piston pins at that time.

ERIC:

But the problem was it was tethered. It had a hard line wired tether so we can only get so far. And then we started talking about, well, I wonder if we could lengthen out that tether. And then from that point, we started discussing, well, what about a handheld, sorry, a camcorder I think. I have a little action cam, kind of like a GoPro. And then we thought, Well, how about our TV or cell phones?

DAVE:

All of a sudden, boom, that took off. So we started using that. And then all of a sudden we can get right in and the students could actually, we may have maybe five or six students around

what we're doing. And then it was actually showing up on the wall on the TV, which was above the students and everybody could see it. So we started doing that. So that started working out really good.

ERIC:

And it was nice because you can also use in the Apple TV and our phones is that we're able to record it as well. And then if we needed to play it back in the classroom after shop time, we could do that. And then the students could see, not only in the shop, when there's a lot going on, they might forget, so we show it to them in the classroom as well.

DAVE:

Yeah. Then we started talking about 3D printing of stuff because there was. When I'm doing drive axles, I had a huge axle that I had to bring into class and it was pretty big and heavy. So then we started talking about how can we get these big things like even like an engine into the classroom because the doors are only so big. Yep. Okay. So we started talking about that and then we came down to the library here. And then we started speed balling with all that kind of stuff. Okay, then that started turning out really good. The printing was phenomenal. It was really great. And then all sudden we decided to talk about the VR stuff.

ERIC:

Yeah. So we'd, when I was first hired at the college, they took a tour through the library and they showed us some of the VR and some of the augmented reality stuff that was here and started being used. And I thought how neat would it be to have that virtual reality for the students in the classroom that they could maybe even access it at home. So actually gave that little project to Jessie and she ended up finding Wrench, the Wrench Program, and then we got that and started playing with that as well.

DAVE:

Then you get onto that one, and it's like you think you're only doing it for five minutes, but you've been there for 20 minutes to 45 minutes kind of thing. And it's actually pretty neat. The students got a hold of it too, and they really liked it. We actually had an open house one day where we actually set the thing up, the VR in a small, I would say like a 12 by 12 closet that we had. It was a perfect size for it. And it actually worked out really, really good. We had a lot of positives, a lot of students that were coming through and seeing what we were doing. They loved it. Some of them, we couldn't even get them out of the closet. They were in there playing that thing for quite a while. And a few other things that we had come up were, like I say, some of the students really liking it. Speed balling here.

ERIC:

We find that because the students that we have, they're used to doing stuff online, they're used to technology and stuff like that because one, it's their generation and then two, also because of what COVID had to do with just how things are delivered, lessons are delivered, how material is delivered. So we decided that there's no point in fighting it. Let's embrace it. Let's take that what we have and use it to our advantage. I know I have a 14-year-old son who has

the virtual reality Oculus headset and he absolutely loves it. And I kind of feel bad because I always used to get off that, get off that, get off that. Let's spend a little more time together. Then I've put on the VR headset for the Wrench Program. And I was blown away with how realistic it was. I remember picking up a clutch disc just in the demonstration of the intro to the game, turning it in my hand, and I just was amazed by the detail of it. So it was phenomenal. Yeah.

DAVE:

And like I say, even if you're torquing or a bolt in this, you actually feel the vibration happening with the little handsets that you have in your hand. And if you over torque, you can actually break the bolt in there too, which is something that students need to learn as well. A lot of the stuff that they want, the hands-on stuff and through with this COVID stuff, we had to figure out different ways of doing it. And so this is, we've slowly built on it and now we're taking off with it. It's actually coming up pretty good. [VIDEO ENDS]

DAREL:

That's Eric and Dave. They both wanted to be here, but they got caught in class. Got caught in class. Yeah, they did teaching the exact same class, so they couldn't even just send a representative, but they're super good, super good at getting filmed, I suppose. But so that was one of the ways, Jessie, talk about because Jessie was putting this together.

JESSIE:

Yeah. So the points that are on the slide right now build up on stuff that we've already been talking about. So I'll go a bit more into the side of how Eric and I started with trades. So Eric and Dave are in the mechanics program, and like you heard Eric and Dave talking about, they were originally just talking over lunch, saying, oh dang, how can we, how can we make this work? How can we make this stick more? They have one shop between all of them from my understanding. It's a decent sized space. But still that means that you're running into schedule issues of okay, well, heavy machinery is coming in, but we still need to have this time. So about this time last year actually, Eric came down and was just asking like, hey, is there any way that we could, he just came to the desk because we used to have our digital learning team just up at the front with the library, at least for part of the day. And sit at the library desk and then Chase, who Darel was mentioning before, was sitting at the DLT desk, and I was eavesdropping. I waddled on over. Because I am working everything. I come from a background with new media. I have a bachelor's degree and new media as well, focusing on game design and interactive technology. So I overheard them talking and just like is there VR opportunities? Is there AR opportunities? Could we make something? And right away I heard "Make," so I waddled over. And that's what got it all started was just that basic conversation of, hey, I've got a problem, and we're like, we probably have the solution. We can make the solution. And that started with a VR and we found the program and then it's been from there, Eric and Dave and the trades in general were the big proprietor for us as we started moving into our bigger space and having more options become available.

DAREL:

So if you want to pop over to the next slide, and I'll just talk over the video there. You get the live reaction of that when Erik turned the cylinder head. So we don't have the audio on this one, but he's trying to explain the things that he's seeing and he's pretty exuberant about it. Now, the thing about is that he was saying, this stuff is so amazingly accurate down to the scratch marks that they put onto the engine.

JESSIE:

Yeah, they had the texturing so well that there was, you can see the scuffs. You'd see some wear on where the bolts are going in.

DAREL:

So when we started talking to them about the ability to use things like 3D printing to create this stuff as well their eyes just lit up.

JESSIE:

They do almost every time Eric comes down he's like, so I know we're doing this, but what else can we do?

DAREL:

This is the thing. So, I would always suggest to have VR be part of not only the library, but if you're going to do a Makerspace, add it to the Makerspace because it's a wonderful gateway drug to get people addicted to the idea of having fun. And the program is, it's called the Wrench VR, WRENCH VR. They also offer it on desktop as well. So if you don't have access to VR opportunities, you can also just download it on your desktop. I don't know if it has to do with heavy duty. Do you know? I don't think it does heavy duty machinery.

JESSIE:

I'd have to look into that more, but from my understanding, it's just basic mechanics.

DAREL:

Just as but they are opening it up to modding. Yes. Oh, yeah. There will be opportunities that they have for that/

JESSIE:

They have a really, really big community online. And the creators are really open and honest with everybody in the community and they're open to modding and they're open to suggestions. So I can imagine it'll be like that eventually probably.

DAREL:

So I'm just having a look at time. Tim, can you just write in the chat? Are we done in 10 min? We still have. Okay, Speed run. Let's go to the next slide. We'll skip the question. Okay, so go to the next slide because we're going to start just give you a little story about this. So Jessie, talk a little bit about this particular idea here.

JESSIE:

Just go on general or yeah. Okay. So basically the skull was a proof of concept. So what had happened was we have a very good representative in our students association named Nikki. And we were in talks, We still are, were, are about developing our OERs. And initially there were just looking at, well, the usual, the online catalogue, the textbooks. But then we were like, hey, well we also have a 3D printer. So this guy right here, the more realistic looking skull, is one that we made in- house with proof of concept. She actually took it to her own seminar. Everybody lost their mind. Everybody still loses their mind. I basically, we just basically cranked it out in two weeks. I had two days to paint it and have the magnets set in there. So this guy does come apart into 18 separate pieces. And it's all just held together with magnets. So just once again building up on that, we have skulls in the library, but they only break apart into to three.

DAREL:

Yeah and doing this was actually cheaper than buying one of these cells here. Yeah, so if you pop over to the next slide here, Let's play this video real quick. And then we'll just rush through the next couple of slides here.

[VIDEO STARTS]

ERIC:

It's nice because when we're in the classroom, we have our learning modules and it's the old school paper. You're going through it. I have a digital copy that I present on the board. We have PowerPoints and things like that. But we have the classroom setting and then we have the shop setting. And I found that that digital, we found that that digital aspect of it is a nice medium between the two. A nice transition where you can go without putting the coveralls on, the boots on and getting out in the shop. But it's just, it's a nice medium point between the two.

DAVE:

We find the students, a lot of the students are also gamers as well. So they liked this VR stuff. Myself, I like it myself, but like I say, I'd rather have the actual real thing in front of me. But in order for the students to learn, this is one way to get it to them.

ERIC:

Especially if they're a little shy and a little intimidated by actually going in there and pulling the cylinder heads off of the vehicle, pulling a clutch apart, things like that. If they are a little more timid, it's a great intro.

DAVE:

Then also they end up with the 3D printing as well, we've also found a few things that we want to build. We like to build a scaled down engine with the working transmission, with drive shafts, differentials and everything. It's something that we can get into the classroom and they can actually see what we want to do. Sure, it's going to take a little bit time to get these things built, but trial and error, we're going to get it and it's going to be something that the students are really going to like it a lot, I'm pretty sure a lot of other instructors will like what we're doing as

well because it's then your hands-on. You just take them up. They're magnetic covers. You take them apart and you can see what's going on. There actually is a small motor on him turning everything as it goes and it works out really, really good.

ERIC:

All just a progression. There has been lots of fails, but with every fail, we learn what we should do different. It's been really good.

[VIDEO ENDS]

DAREL:

So Jessie, want to walk us through a couple of the failures?

JESSIE:

Yes. So a couple of minutes.

JESSIE:

So like Eric was saying, there have been other fails. But oh boy, we learned a lot. So we can just go through, so as you can see, this is one of our failures. Next. Well look, we failed again. Next. One more time we failed again. And this last one here, I still to this day, have no idea what happened. Just having a really bad day. It was, it was angry. But through that, it's that learning through failure, which is essential in teaching and learning in general. So if we go to the next slide, we can hear Eric. and Dave talk about it.

[VIDEO STARTS]

ERIC:

In the trade or our trade. I can't speak to other trades, but mechanically you have to make sure that you have things assembled properly in the right order, the right torque spec to things. You have to make sure that you are paying attention to all the details. Because when you get to the end of a job and you got a bucket of bolts and parts. Well, those came off of something, they have to go back onto something. And so it is a good, good way to look at. Okay, I can mess up on this 3D printed engine and forget something and then put it back together again. I accidentally broke something because I wasn't paying attention to how tight I was making something.

DAVE:

Not setting, even going back to the VR stuff. I know the torque wrench that is inside that VR program that you have to set the torque. So you don't set the torque and you're torquing one piece that is smaller versus then you go to the next one that has got another right torque. Then you still torque it to the smaller torque. But then you put it together and it doesn't work and something breaks. If it breaks in the VR. Great. Okay, We go in and find out why it broke. Then we go back and fix it and do it again. That way it works a lot better with the VR stuff, but it can, then they're not breaking actual stuff. But it is really neat how we could do that inside the VR.

ERIC:

Yeah, it gives you a point of attention to detail. Read all the words in the instructions. All of that. Very important.

[VIDEO ENDS]

JESSIE:

Awesome. So if we head to the next slide.

[INAUDIBLE VIDEO]

JESSIE:

Yeah, so as you can see, so here's some of the successes based on those pieces that I showed before that had failed. We took another crack at it. And this project has been really good for that because we are building an entirely 3D-printed engine. So yeah, it's been pretty fast-paced and learning as I go. So if we head to the next slide, problem-solving is the biggest thing that we've learned and that's the biggest thing we want students to learn and adapt to as well. And that's why we're working so hard on getting students and faculty involvement in the Makerspace as well. Next slide. Here's some more problem-solving and things that have been fixed and are being fixed. And another slide. And it may not work all the time, but we just keep winging it. Take another shot at it and change it a little different. See what works, see what doesn't. And this is what we have so far for our engine. We almost have all the pieces done. So it's pretty exciting. Next slide.

[VIDEO STARTS]

DAVE:

A lot of things that we can do is in smaller pieces, like say a piston. You have a piston that comes out of a motor. You've got your three ring lines inside there and what is in behind there, how the oil gets scraped off the cylinder walls and then brought back down to the bottom of the crank case. Those small things that you can do on the, in the 3D printing, you can still have that. Then you don't have a piston that's going around the class, you're scared it's going to drop, break or something like that. You can still use it that way. Another way is what we saw at another institution was the little differentials. How the little differentials go together and how they all work together. Okay. That kind of thing is, it's really neat how that felt like I was when I saw those items. I was, I want those because they are so neat. The colours that they have as well. It's not just your basic generic 50 shades of grey kind of thing. It's actual colours that we put them in there. And they actually, they actually turned out pretty good. And they also have small little pieces from inside of a transmission that is the same way. It's neat how everything fits together. You can take them apart. And if you change certain tolerances, you can make it so a shift collar doesn't work, and it grinds versus how it's actually supposed to work just by taking it slightly apart and putting it back together. It's very simple and very easy.

ERIC:

It's nice, you know, we talk about taking large items and scaling them down, but we can also do large, like smaller things and scale them up so that it's easier to see the finite details in all of those things. And it's all achieved through the 3D printing and the digital aspect of things. I

personally would want to say, don't be afraid to try new things. And if you try it and you fail, well, you just found out how not to do it and then try it a different way.

DAVE:

Fail first unlearning, first attempt in learning. Yeah, so we're attempting to do this. Yeah, we fail, we fail. We're going to learn it. We're going to get it. Yeah.

ERIC:

Because the whole using our phones is the Apple TV to show students. I mean, I'm trying to get underneath the dash of a vehicle and I can barely get under there to see what's underneath there. But trying to show five other students. That's a phenomenal win I would say.

DAVE:

We projected it up onto the TV on the wall, that works really good. Yeah. That kind of stuff is for large groups is great. More and more of this technology, this stuff that we're just starting to touch on. And we're just starting to see the potential that we have there. Even 3D printing, the VR, the Apple TV that we have in the shops. It's where it's actually I'm quite surprised that I'm an older guy, so I have a hard time trying to get with this, but then hanging out with this guy here, it's like, Holy cow, this stuff that we're coming up with is phenomenal.

ERIC:

It's a lot of fun.

[VIDEO ENDS]

DAREL:

So if we go to the next slide, We promise we're almost done. This is our last slide. And we were hoping to leave some time for questions, but we might have time for like one. But I'll finish up here by just talking briefly about OERs because early on we met with a couple of institutions here at the U of L, Olds College. And we've been working towards having some sort of shared file structure maybe where we can share projects, we can share files, Create an online database between the institutions, and really take, take OERs from just being an open textbook or something that to open educational resources, open pedagogy, and being able to bring stuff like this into that landscape as well. So what you see on this slide is a trophy that is, our environmental science folks cannot find this anywhere and it's a model of a spiky, he wanted us to make a trophy out of it. But essentially what Jessie did here was recreate this whole thing in Blender. Yeah. Yeah. And so it's recreated, but then, then the guy is like, Okay, we actually want to make some modifications to it because it doesn't quite fit what we need anymore. So all of a sudden we're taking a custom-made product, turning it into an OER, and then we'll be able to make that kind of thing available to faculty, to other institutions, other Makerspaces, to students.

JESSIE:

With some of the 3D models what we can do is also post them online. And your students will be able to pivot around it and interact with that way too. So it's an online resource as well, like

Darel was saying, with institutions, let's say somebody else is like, oh dang, we needed this plant model as well. I don't have time to make this. Boom. There you go. Just print it, go for it.

DAREL:

So we have run out of time as I can see here, but I did want to leave like a minute. Tim could we have a minute for any questions or comments or anything like that. If you pull up the next slide. There's also our Makerspace email for anybody who doesn't have the chance to ask us here, please feel free to just email us there and we'll get to you pretty quick.

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