

## The Ladder of Inference, Gr. 7

Teacher: **[00:00]** When I look at inquiry-based learning, I look at it as a way to foster innovation and creativity. You're really opening up the doors for students to examine real world problems, to look at real life examples, to really work together in peer-to-peer learning. And—and pushing the boundaries, and pushing the envelope, and you know, creating that environment where kids can take risks.

**[00:31]** We started a project, my colleagues and I, six months ago with our ICOM(?) students. And they're the homeroom teachers and I'm the tech teacher for these kids. And one of the challenges I had before this project was getting these kids engaged and really teaching them skills that we wanted them to learn. And I was looking up ideas online, and, you know, I'm a, I'm an aeros—I'm very passionate about aerospace and aviation, so those kinds of searches kind of led me to a *Toronto Star* article about two teens who had sent up a balloon to the stratosphere. And I thought to myself, "Well, if these two kids can do it, you know, why can't we bring that into the classroom?"

**[01:15]** So I presented this idea to send a balloon up to the stratosphere to my colleague, and that's where the idea had started. And we had no idea where to begin. We didn't know a single thing about helium, about, you know, how high this balloon's going to go. I mean, there was no idea how to get this going initially. So I connected with the amateur balloonists, and I did my own research because I needed to know before presenting this idea to the kids.

**[01:52]** And I know, I—through my research I found, "Yeah, it's possible, you know. I can learn with the kids. I don't necessarily have to be an expert. Why am I, you know, why am I doing all this work? I should be doing this with the kids." So that's when the journey started. We, we knew that we needed to raise money for this inquiry project to purchase materials. We calculated based on online research the kids had done that we needed about \$1500. We now need to be innovative in how we are going to raise the money. How are we now going to, you know, work as a team and, and come up with the funds for this project?

**[02:33]** So the kids came up with a business model to sell sunglasses. And they were titled, "Bring the Action Sunglasses". You know, they came up with the name themselves. They came up with a, a business plan, they worked on the marketing aspect, the advertising and the finance and accounting, you know, with teacher support, of course. But, but I like to say that it was mostly them. So they're selling these sunglasses and they raised \$1500. And during this time, you know, we're, we're still cover—we're still working on the project, on the design process, on the scientific process, and, you know, the structures and what not. Everything's still related to the curriculum. And on the side we have this massive business plan going along.

So this inquiry project kind of evolved as we were moving forward. And we were moving with the kids. I was moving with the kids. My two other colleagues were moving with the kids. And, you know, we saw the money starting to pile up. You know, we started—the kids started seeing some good profits. And, and during this time, I noticed their optimism levels went up, that, you know, they're becoming more optimistic and, you know, like, "Oh my god, this is going to happen!" That kind of

attitude, you know, that confidence, and—started going up and, you know, their risk taking, as well.

**[03:50]** You know, coming up with new ideas. “Maybe we should try this. Maybe we should try that.” You know, advertisements. We had to make advertisements for this, for this business plan. You know, that required the kids to go in front of a camera and, and you know, act, you know. So there was a bit of drama involved. They had to really come outside of their comfort zone.

**[04:13]** So once we finished the, the business model, the advertising, they raised \$1500 and, as I said before, you know, we were learning and we grossly underestimated how much money we needed for this project. So \$1500, we realized, “You know what? We need another, another \$1500.” So we reached out to, to the school again with popcorn sales. Again the kids took, took the lead and eventually we had raised the money that we needed to, to purchase all the materials. And you know, there’s a six-month process for this inquiry project. And the—the beauty of this inquiry project was, it, it evolved.

**[05:00]** You know, one thing I learned was that, you know, as teachers, we don’t need to be experts in the field. You know, I, I, I had mentioned this before, we need to be facilitators and really let the kids explore what they need to do. And, you know, you have this big idea, you start off with this general picture and you just fly. You, you let it go. You be open, and, and you’ll see that, you know, kids are innovative. They’re creative in what they come up with. And this inquiry project was a great opportunity to bring in real world problems from outside into the classroom.

**[05:41]** You know, when they get older, they’re going to be encountering challenges. You know, they might—in a business, for example, we need to raise money. How do we raise capital? Well, we covered that really well. The kids covered it really well. And that’s all, you know, in addition to the curriculum.

**[05:58]** Okay, now back to the launch. So on the day of the launch, we travelled to Mount Forest, Ontario. We connected with the Upper Grand District School Board, who were very much cooperative in, in providing a launch location for us. So we travelled up there to Mount Forest, and we, we picked a field at Wellington Heights Secondary School, which was a beautiful open field, you know, no obstructions, you know.

**[06:23]** The kids came, our expert from AI—Calgary came. We assembled everything, filled the balloon with helium. You know, we had the media out there, *Toronto Star*, CityTV, 200 kids. You know, the kids were excited, they had their uniforms, Ingleborough Space Agency. We filled this balloon and we had a countdown. T minus countdown from 10 seconds. And we let the balloon go.

**[06:52]** You know, everyone’s cheering and little did we realized we didn’t fill the balloon with enough helium. And the balloon just ended up floating sideways. And, wasn’t ascending, it was floating sideways. And it snagged into a branch on a tree, just, you know, I think couple hundred yards away. It was an unbelievable moment. Not because the balloon was caught in the tree. Not because it didn’t go up. It was because the kids had to problem-solve on the spot. They needed to work together as a team.

**[07:25]** Which is exactly what they did. They sprang right into action, no hesitation. You know, I—four of them ran, boys, towards the balloon. And I was running behind them. And the dialogue that I heard between them was, “How are we going to get this balloon down?” Working together on the spot. And again, another real world example of—of a problem-solving situation.

**[07:48]** So we ended up getting the balloon down, and again, another perfect learning opportunity for the kids: science doesn’t always go as planned. We brought the balloon back. We filled it up with more helium and it took off. It took off. It ascended to 90,069 feet into the atmosphere. It landed in Richmond Hill. And the whole purpose of this project was to collect data in terms of temperature and in a video. The camera—onboard camera that we had did not record a single second of video footage.

**[08:21]** But in one of the interviews with CBC, the kids had mentioned it was a success—successful failure. And one of the things we covered earlier on in the inquiry project with the kids was this whole idea of successful failures, that, you know, you have a mission objective, but nothing might not go as planned. And the—the first video I showed to the kids before starting this project was *Apollo 13*. We watched it right from start to end, and, you know, we examined the issues that the Apollo 13 crew encountered along their journey to the moon, and, you know, what needed to take place to bring them back. And the, the term was successful failure. That was the, the, the whole idea of this—of showing the movie.

**[09:06]** And, you know, we discussed how, you know, although they were destined to go to the moon, to land and bring back these moon rocks for further study, they didn’t land on the moon. Although the mission was a failure, they were successful in returning home safely and securely. So that’s something we explored earlier on, only because, you know, I couldn’t give them a guarantee that this project was going to be successful. I—I couldn’t give them that guarantee because, number one, it’s a, it’s a scientific project. We’re sending a balloon up 90,000 feet. You know, there’s so many factors involved. So, I wanted them to understand that first and foremost, and before starting this journey.

So coming back now to when we retrieved our balloon and there was no video footage, it was again a, a learning opportunity for them to, to connect back to that successful failure piece and ... That successful failure piece. And one of the kids said it well on the—one of the CBC interviews.

**[10:13]** So he understood that although we didn’t record the video, the mission was still a success. We were able to gather telemetry and, and, and temperature data. And the balloon had reached the altitude it was calculated to burst at. And we retrieved the payload.

So it wasn’t a disappointment for these kids. You know, they weren’t disappointed by that. In fact, they were very proud of what they had accomplished in this inquiry project. They, they were, you know, forced to go outside their comfort zone and really—and, you know, explore new avenues for doing things and, and thinking critically about things and, and, you know, examining problems that we encountered.

**[10:56]** We needed to track this balloon, and, and be able to see where it was going, how high it was going, how fast it was going, and where it was going to land. And,

you know, all those things, to be able to retrieve it. And in our research we found out, we discovered, that we needed to have a radio, a GPS receiver, a transcoder to convert that GPS signal from six satellites into a radio signal and send it to a ground base system where it would be fed through a laptop and put up on a—on a Google Maps screen, showing how it's, how it's plotted and where it's going.

**[11:31]** So all these technical things. No, we had all of that set up and there was a website that the kids accessed on the bus on the way back to school. And they were actually watching this balloon on their BYODs as it was trekking along the Ontario landscape and ascending to the heavens above. It was unbelievable. It's, it's called aprs.fi. And it basically—you know, as the balloon was sending radio signals back to us, those radio signals were being sent to this website on a, on a map. So the kids were able to see the balloon moving and seeing how high it was going.

**[12:10]** And we had the school in on it as well. So the school was part of this journey, and it was all done digitally, on Twitter. You know, I had sent emails to my former school as well, saying, "Hey, check out what we're doing. You can be part of this journey as well. You can involve your kids. Although you're not there, you can watch us as, as we, as we send this balloon up."

**[12:29]** And we were updating the Twitter account. I was taking photos so people who were not there physically could, could keep in touch. I know our superintendent couldn't come out, and he was watching through Twitter. One of the teachers here was on that website throughout the entire time. He was providing updates. It was unbelievable. So we were able to, to connect digitally with, with other schools and, and other, and other people in the community.

**[12:55]** So the next big idea is to, again, make it a real world project, but a club now, and to open it now to not just to one class to—but all the classes in the school. And to involve other schools as well. And to get into that collaborative competition piece. So that's where you get the creative juices flowing. To have now schools, you know, throw an idea at them, throw a problem out there, and have all these, these schools work on an—maybe not all the schools, but a few schools, start off small, work our way up, to have some sort of design competition.

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