

Sumo robot battles are some of my favourite lessons

By Simon Mutch, Casebrook Intermediate School

When I arrived at Casebrook Intermediate there was money in the budget to purchase some equipment and I spent the year looking around at what was available. It's paramount that in my classes the students are involved in creating, not just consuming, so that was the lens through which I viewed everything. In the end I decided on LEGO Spike as they were a replacement for the EV3s, which were always a robust technology and offered so much in the way of creativity.

The Spike app works on all platforms and has the option of block coding or Python, which was a big factor in my decision. There are a number of lessons in the app, with step-by-step instructions, and everything can be extended, offering natural differentiation.

One of the first activities I got the students involved in was building a 'hopper', a small robot that moves around on legs. We already had a sumo mat, so I thought it would be fun to take the hoppers and battle them in the ring. What appealed most was the way that sumo lends itself to the technology process of design, build, test, improve.

Hype and motivation

I have the Year 8s for two hours a week for 13 weeks. A good portion of this time is devoted to developing a sumo robot team. This involves a range of activities from composing music to designing a logo, to designing and testing their robots. At the end of the 13 weeks, each group gets a lesson to build, test, and battle their robots.

They work in teams and each team has their own kit. After each battle or couple of battles, there's time for the teams to make modifications. Each battle is an 'all in' affair with all robots in one battle and there are points awarded for the top three. At the end of the lesson, the team with the most points wins; at the end of the semester, the winners from each class do battle. The finale to the year is a battle of each semester winner.

The competition went really well. The nature of the activity leads to high motivation to redesign and improve the robots. No two robots are the same but there's a lot of 'borrowing' of ideas once a team sees something that works well.

It's not a quiet activity and there is a lot of



hype in the battles. It's not for everyone, of course, but it would probably capture 90 per cent of the students straight off, and usually the rest come round once they start to see some progress with their robot. There's a lot of laughter and excitement, and at times some angst. It is an activity that always rates highly when collecting student voice through exit surveys and semester overviews.

The activity covers many of the Progress Outcomes from the Digital Technology Curriculum through the coding and the identification of inputs and outputs, as well as the role each part plays. The best learning would have to be the conversations had between the students as they design and build. When they analyse a battle or discuss how to overcome another robot, the ideas really start to flow and it is wonderful to hear and see the learning happening when they discuss, trial, refine, and experiment with ideas.

Technical issues

Naturally, there are always challenges. While the robots are easy and intuitive there is still a bit of preparation before getting started. It's important to have some experience with the Spike kits and how they operate, so that when any issues arise you can be on to them quickly.

Another challenge was timing. Teams start off slow and methodical, and then, as time starts to run out, things get

frantic. I always feel bad ending the lesson as they don't want to stop and they definitely don't want to pull apart their masterpiece robot. Another issue is for the students who struggle to collaborate. As it can be quite an intense session, it's important to cater to those that don't work well with others.

Another issue would be equipment failure. Recently I've had a number of the motors fail. While LEGO has been happy to replace them, I have been waiting months to get them due to supply and delivery issues.

That's why one of the most important parts of this is having enough kits. We bought 10, and with class sizes generally of 18 to 20 and students choosing to usually work in threes or sometimes fours, there are enough kits to have spares when things go down.

Oh, and keeping the kits together and tidy is always a challenge! Inevitably at the end of a session a group will bring me a kit for checking and inexplicably it has seven wheels in it instead of four.

Personal learning

Now, I spend time researching and talking with my personal learning network to see what's around and what everyone's up to. I learn a lot from Scratch and working with my extension groups. Not everyone is a coder or has an interest in it, so I work to make things engaging and purposeful, hence the sumo battles. One of the things with block coding is that if

students are given the code to work with some of them are happy to just use it without bothering to read it through and develop the understanding of what it's doing or how it works. If they're told to drag this block and then put that block under it, they'll do it and it'll work but they don't gain the understanding of why or what they are actually telling the computer to do. That's where giving coding with an error is valuable as they have to work out what's wrong and fix it.

Favourite lessons

The sumo battles are some of my favourite lessons. It's exciting to watch the energy levels build as the lesson progresses and to listen to the students discuss and make decisions. I enjoy seeing the different robots they come up with and how they work to modify these after each battle. There's a lot of excitement around the battles and students will often cheer their robot on, having taken careful time to name their robot beforehand, of course!

The frantic nature of it all has been good

for me in learning the nuances of how the robots work and many things to try where there are issues.

I've found it to be a valuable experience with all of the classes that have been through it to date, so it will definitely be something to keep and develop further. The students get a one lesson taste of it in Year 7 and I may look to develop that further. I'm also interested in taking it wider to become an inter-school competition.

As it stands, I don't have any rules or limits on the size or shape of the robot so anything goes with the materials they have. I may look to put something in place there, as they do in the big leagues of sumo robotic competitions. Something simple like it must fit wholly inside the size of an A5 piece of paper.

There's a lot to setting it all up and it's obviously equipment intensive, but once you have the gear it basically runs itself. It's important to understand the kits and the coding to be able to facilitate the sessions, so it all runs smoothly. There's a lot to be learnt from the students and

there is a Facebook group to ask any Spike questions in general.

If there's anyone else doing anything similar, it would be good to trade ideas.

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