A makerspace where learners love to learn in Aotearoa

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CORE Education Dr Vince Ham
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Years 5-8

CORE EDUCATION
Tātai Aho Rau

Our background and context

In 2018 we were given the privilege of being recipients of a collaborative Dr Vince Ham eFellowship through CORE Education. This was the first time a CORE eFellowship had been awarded to co-teachers. We work in a medium-sized primary school with a roll of about 400. Our students come from a wide variety of learning backgrounds. Each of us had our own classes, Matua Rob was in a Year 3 and 4 class, and Whaea B was teaching in a Year 4, 5 and 6 class.

Driving this inquiry was our search for more joy and real learner-centred passion in the classroom. Seeing our students disengaged and struggling with classroom programmes that were focused on national testing led us to look at the fact that, for us, 'creating' and 'making' had almost disappeared from our teaching programmes.

We felt that a pedagogical jolt was needed to bring back the joy to primary school education. We found through listening to our teachers, students, and whānau that they were bored, they were unhappy with the way things were, and they wanted change. We wondered if doing something entirely new, like building a Makerspace, could provide the change we were looking for. We also wanted our Makerspace to have a uniquely Aotearoa flavour.

At the time of applying for the eFellowship, we had already gained some funding from the GrassRoots Trust to help us resurrect the old 3D printer that was gathering dust at our school. This had begun to lead us on a new journey as we looked into how to implement 3D printing in a primary school. Our own hands-on experience with this project gave us new understandings about the possibilities for real change using the learning through play and Makerspace movements.

All of this led to a genuine sense of excitement about the possibility of setting up our own Makerspace and eventually led us to develop our action research project with the support of the CORE Education eFellowship.

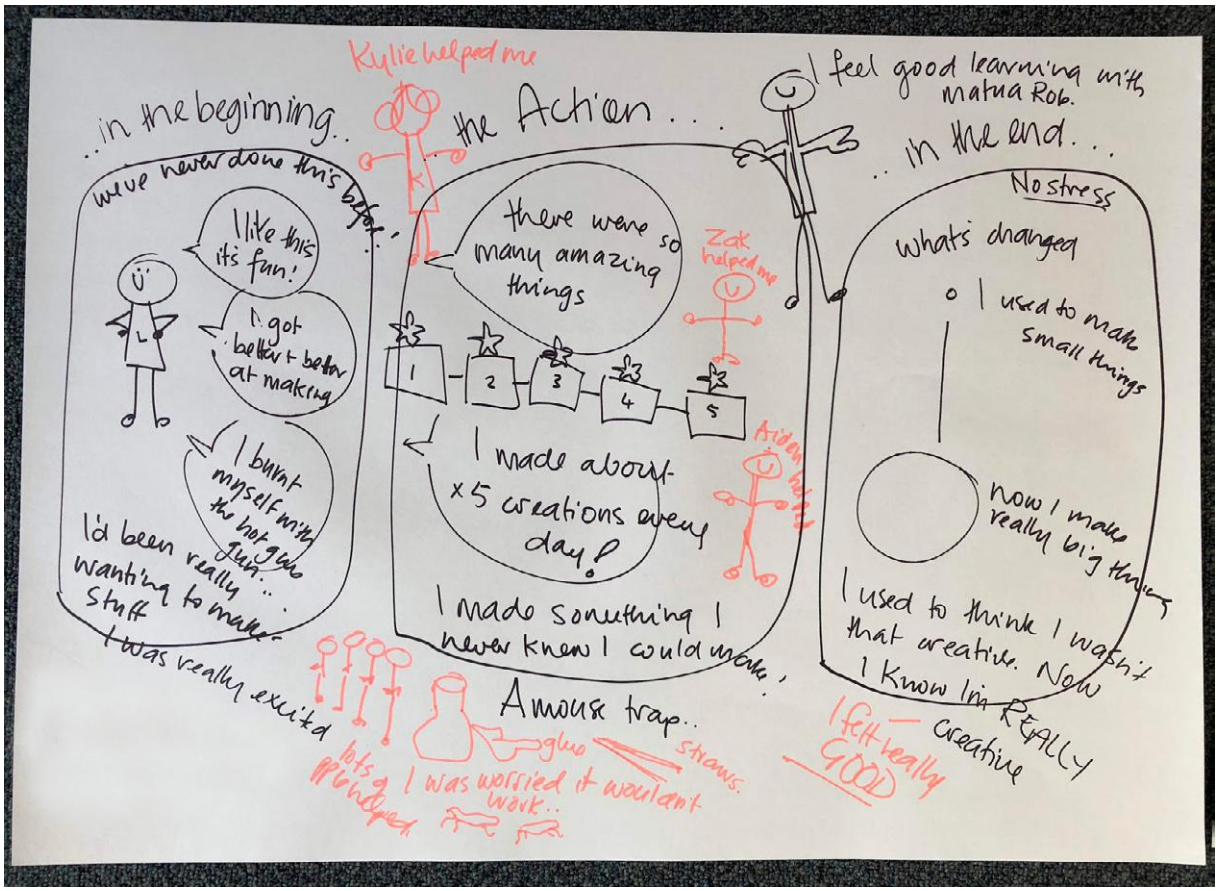
Below: These wireless USB-charged hot glue guns are the best thing we've bought for the Makerspace. The creativity at the craft table is always so impressive. Students create wonderful homes, creatures and inventions, and often take these back to class to use for writing or learning through play.

Method: how we went about our inquiry

The eFellowship programme involves undertaking cycles of action research. The first cycle of our inquiry, and the focus of this report, aimed to learn from the students and their families/whānau what changes there were to learning as they began working in a Makerspace. We were curious to find out what working in this way might do for our students' wellbeing. We also hoped to be able to identify some of the pedagogies, processes, and resources that were needed to enable valuable learning in a Makerspace.

While we wanted to learn from everything that happened in our Makerspace, we also randomly selected 12 students to observe closely. There were six from a year 3/4 class and six from a year 5/6 class. We explained the purpose of the inquiry to the students and their families/whānau, gained parent permission, and ethics approval. Our data gathering methods included collections of images showing the students working, ongoing journal notes recording our reflections or anecdotal conversations, and interviews with students and staff using Story Hui. We used Seesaw to communicate with parents and to pose questions for the students. Students were able to respond using an audio file or video message.

We analysed the data of our Story Hui sessions with our students and using student voice and UNESCO's Global Transversal Competencies for 21st Century Learning we were able to plot the data. This data gave us the evidence we needed to show that students were gaining the knowledge and skills that we had hoped they would gain and also so much more.



Above: A student's Story Hui, reflecting on the journey they had been on with Makerspace.

The setting

Our intention was to build a Makerspace within our school that could seamlessly follow on from the learning through play focus in our junior school. Our vision was to create this space for the whole school to use. To do this we needed to find a space, source resources and work out how we could run the Makerspace within an already busy school context.

We were lucky to have strong support from our principal, who was able to gain some funding for the initiative from the Board of Trustees. So, very quickly we were able to set up the Makerspace in our school hall where there was the facility for storage and side rooms for some of our technical equipment. The Board paid for a part-time teacher aide to facilitate alongside teachers and they also funded some exciting resources such as simple drones.

For three days a week, all classes from years 3 to 6 rotated through the Makerspace for sessions ranging from one and a half to two hours. This rotation was a way of introducing the idea across our school and encouraging teachers to jump on board, as this was a very foriegn concept and would need some pedagogical shifts from both staff and students. Not only did the students get exposed to the resources and the new possibilities for integrated learning, but it also meant that our teachers could come alongside the students and observe what was happening for them in a non-threatening and supportive way. Our intention was to move back from formal teaching, and to observe and encourage student learning through questioning. This was a big change for many of us.

Resources available in our Makerspace:

- small and large boxes, cardboard tubes, egg cartons, tape, and glue-guns
- wire, wool, toothpicks, cups, recycled plastic containers, feathers, pipe cleaners, and craft sticks
- lego, large building blocks, construction materials
- dremmels - carving tools
- art and craft materials, polystyrene
- fabric, recycled clothes, curtains, furnishing material, sewing equipment
- all sorts of discarded items, funnels, bits of kitchen equipment, racks, utensils
- screwdrivers, saws, pliers, hammers, and scissors
- old toys or small electronics to be taken apart to see how things work
- old TVs, computers, printers, phones, screens, remote controls
- iPads for making stop-frame movies, green screen
- computers, 3D printer and drones

What we found out as we worked with students, teachers, and whānau

1. Students gained a new sense of engagement which quickly became learner empowerment

For the students, the Makerspace seemed to be a great adventure. One student told us, “I never knew I could feel this much joy at school.”

Many students spoke about it being exciting. As they talked about their projects we could see that their confidence to communicate was improving quickly too. There was a growing sense of trust and respect between groups of students working together as well as improved teacher-student relationships.

All of the students, in some way, began to drive their own learning, gaining confidence that it was okay to experiment and explore.

2. Positive responses from parents

Some parents commented on the fact that their children’s wellbeing had noticeably improved. They said the children were so much happier about coming to school, and that they were excited about making things at home for the first time since starting school. These parents all mentioned that their children were happy and confident because they were experiencing success. Furthermore, the parents came to ask us about the Makerspace as their children had been going home full of excitement trying to explain to their parents what the Makerspace was!

3. Changes for teachers

Some teachers were surprised once they started working in the space how comfortable they were, how comfortable and engaged the students were, and how no one wanted to leave! Teachers commented on how much their class valued their

Right: We provided lots of different stations for the students to explore so that they could find out what they were interested in. These students are experimenting with circuits and are trying to make a ‘fridge’ circuit that has a light and a fan.

Makerspace time each week and that they looked forward to it. Teachers found it valuable to be able to link the school inquiry into Makerspace and use it as a tool for their students' learning: to get hands on experience with a concept or idea.

It wasn't all positive though. Some teachers initially saw the Makerspace as a place to drop off their class then go and do testing! Some used it as an unlimited supply of glue sticks and resources to take back to their class. Through getting together with our staff and talking about the fact that their students needed them there to support and encourage them, we started to gain a greater understanding of the fact that the the Makerspace was a valuable opportunity for observation, questioning and helping students move forward. We were trying to encourage our staff with the idea that this was potentially a great tool to be used in their teaching, rather than another "thing" placed on top of the already busy teacher demands. Teachers made the following comments:

"After a few sessions in the Makerspace, I felt so comfortable in that space with my students because I was able to observe their learning more holistically and learn things about them that I would have never learnt when I was busy trying to assess them and tick all the boxes." (Teacher)

"I observed a real change in wellbeing in a student who was struggling in all areas of school life, from self-belief, self-worth, confidence in his ideas, to showing empathy for others. This was a student who initially hated almost everything about school but who started to experience success and grew in confidence after seeing that he and his ideas were valued." (Teacher)

4. Changes for our whole school

Through these findings, we realised how crucial it was for us to try and integrate Makerspace into our school curriculum as much as possible. We needed the students to be able to connect what they were learning in class with what they could make in the Makerspace. This required a lot of support for our staff to see that the space was a tool they could use for supporting the teaching and learning they were undertaking in their classrooms.

When we analysed all our data, we began to understand the importance of a Makerspace and we could see that it might fulfill an important role in any school. We found that it provided students, teachers, and whānau with a place that they could connect, collaborate, learn to problem solve, and share their knowledge and culture.

Right: Students using the woodwork table.

We looked at our evidence to see what may have contributed to change

Our Makerspace was a catalyst for change for almost everybody involved. Three overarching themes of importance surfaced.

1. Changed space and opportunity

We could see that the physical space where there was freedom to move as well as a wide range of resources resulted in a very different mind frame for the students. There was a sense of anticipation and excitement. It opened up possibilities for students to demonstrate aspects of their own potential that we might never have seen in a more formal learning environment. The open Makerspace also provided a more informal and welcoming atmosphere for parents, whānau and community. They felt comfortable and were happy to contribute. For teachers as well, the open space encouraged us to behave differently. Because all of the students were engaged, we needed to do less monitoring of behaviour. This freed us up to sit alongside students observing and questioning. This changed the teacher-student relationship as we became co-learners.

2. Learning to value process over product

While students had many ideas, we found we needed to support them to think carefully about what 'process' meant, rather than focusing on the outcome or product. Alongside this came lots of learning around 'failing', and new understandings about 'failure' as being useful rather than bad. Students needed a lot of support to learn that within a making process when something breaks or 'fails', this is an important part of the gradual process towards creating something that is better or stronger. Understanding this helped them to persevere and address challenges in their work. It also resulted in them having more self-confidence to explain the process of their work.

Below: Students using Makersempire to design projects to be printed in the 3D printer.

All of our Makerspace materials were freely available to the learners and they were able to experiment, create and make in any way they chose. We didn't ask students to produce a plan of what they intended to make. Instead, they were encouraged to develop ideas and try them out, as well as collaborate with others. In this way, we placed more emphasis on the process than on the product.

3. Relationships with parents, whānau and community

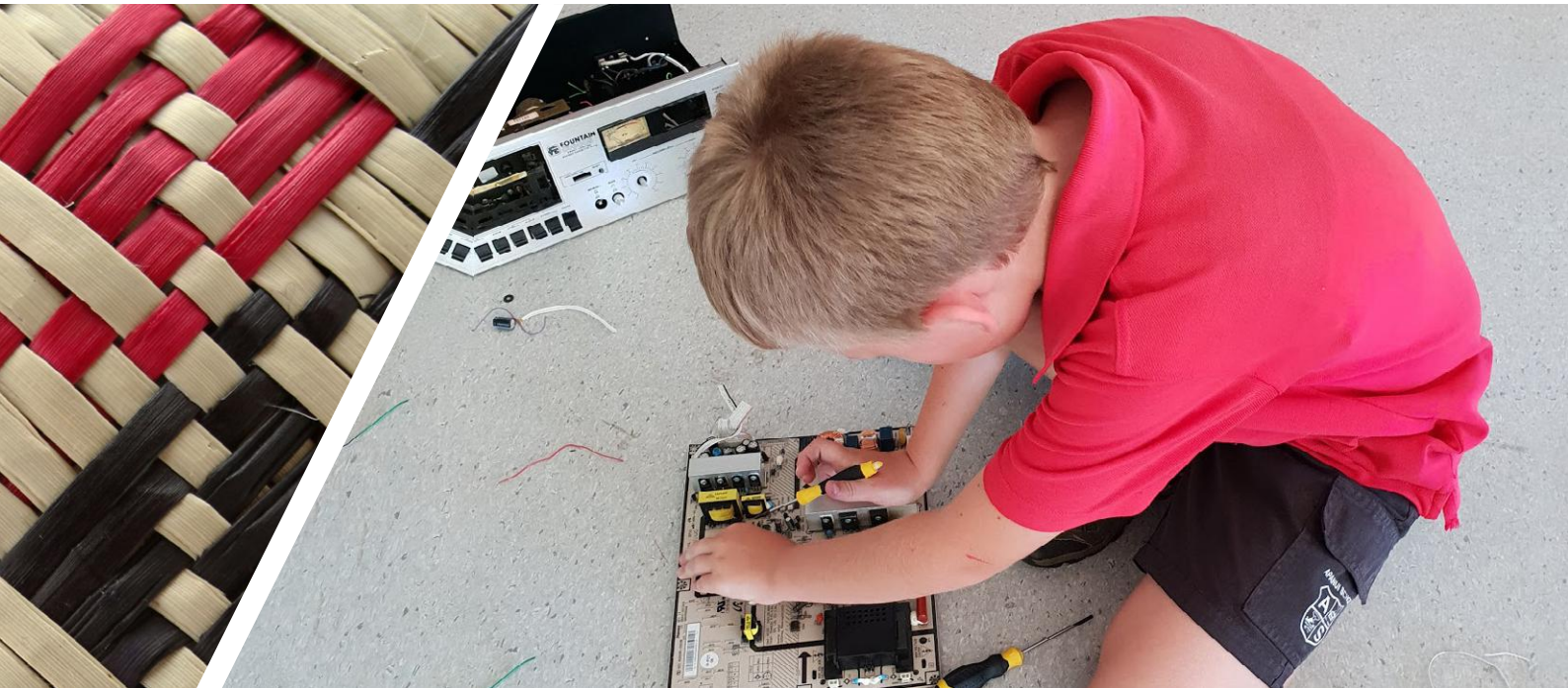
It was always intended that the students and whānau would be seen as partners in our inquiry. Our intention was to provide the Makerspace opportunity and support but that we should be hands off in terms of the direction it took. Whānau were immediately interested and offered to come in and run workshops on harakeke weaving, go-kart building, reusable shopping bag making, and many more topics. Very quickly, our connections with whānau increased: we saw them far more and our relationships grew stronger.

Individual parents took the opportunity to come in and informally meet with us to talk about the benefits and positive changes they were seeing in their children's behaviour, learning, and self-confidence.

Unexpected discoveries

Because our Makerspace is situated in the school hall, sometimes a competing event would result in a class session being cancelled. Because all participating classes were rostered in, there was very little flexibility in the bookings. We had reports from our teachers that when this happened students were devastated and would nag them relentlessly to go to the Makerspace. When we started hearing some of this feedback we realised that Maker culture was starting to be embedded in our school system and culture. For us, this started to happen a lot faster than we had anticipated. We were very happy to see that even some of our almost reluctant makers, both students and teachers, seemed to be warming to the idea.

Below: Our deconstruction table has been one of the most popular stations. We have been donated a lot of old electrical equipment which the students enjoy pulling apart and seeing how things work. They often use the parts to make something else or add them to another project.



Furthermore, teachers started to ask for specific materials to be available in the Makerspace. This lead to the idea that teachers were starting to see where the Makerspace could fit and extend what their students were focusing on within class time.

The Makerspace demonstrated whanaungatanga and for some of our whānau and community businesses the Makerspace opened a doorway to our school community. We were very encouraging to whānau to come and share skills that they could offer: sewing, harakeke weaving, making boomerang bags and running cooking workshops.

An Aotearoa NZ style Makerspace

When we looked at the features that had been most helpful in building our Makerspace, we could see that rather than being the physical aspects, or resources, the things mostly influencing success were the interpersonal and cultural aspects. Our school roll is made up of 45% Māori, 3% Pasifika and 52% European students. Te Reo Māori is embedded into everything we do, meaning that in all the classrooms you will hear Māori language being included as a natural part of teaching. This means there is a high level of inclusiveness and respect for all learners. This attitude of inclusiveness and respect for all learners is exactly what was needed in our Makerspace.

Whanaungatanga is about being a part of a wider group of people who share kinship, support, assistance, nurturing, guidance and direction. Interdependence and reliance on each other is the goal. It is the encouragement of cooperation and unity to achieve goals and objectives.

This concept of whanaungatanga is a very important part of our school culture. This aspect helped our teachers work easily together and openly share and learn from each others' experiences. Also, our culture of whanaungatanga allowed parents and whānau to feel comfortable about taking part in our activities. Our children gained a holistic learning experience from parents of their peers, teachers across the school, and each other as they had the chance to experiment and learn.

Right: This student found a passion in the Makerspace by creating habitats for all the creepy crawlies he loved. Each week we would see a different creature come to the session. In this image he is creating a safe home for his collection of snails. He would use different stations around the room to create objects for them to explore, exercise on, and take naps!

Conclusion

Well to say the words “in conclusion” has a rather, “that’s it, we’re all finished” feel to it. This could not be further from the truth. We have seen amazing changes from staff acceptance and making the most of having their Makerspace times, to a holistic growth in students, to whānau and our wider community feeling more welcomed into our school environment.

As you have read previously it wasn’t all butterflies and roses, their were some thorns and some challenging moments that we had to work our way through together. From teachers not understanding what Makerspace was for, to getting everyone on board and understanding the “why?” behind implementing the Makerspace.

The “why?” was entirely to reawaken our own passion for teaching, change our pedagogical thinking, and in turn awaken and strengthen the love of learning in a holistic manner with our students. Furthermore to reach out to our community and create a more inclusive school environment.

Although it would be nice to say “right that’s done and dusted”, we have learned along the way that this is and will continue to be a growing and learning system. There have already been many changes to how the Makerspace is run within our school, with a new Teacher aide, and the need of better resources, such as sewing machines and a much needed new 3D printer. We continue to trial, fail and figure out where the best spaces for different items are and we have created some challenge cards for those who do not know what to do while they are in the Makerspace. These were created to try and minimise the “floaters”. These challenge cards link to the inquiry we are undertaking as a school. For example, for ‘Ka Pai Kai’ the challenges were related to food science and healthy eating.

Below: This project took a number of weeks for one of our students to complete. It gave this student an authentic feeling of accomplishment as it was her idea to create a shelter with an organic roof which in turn was going to help our environment.

We now have excitement and almost a demand for the Makerspace times, and we also have some junior classes wanting to join in on the action. So I guess what we can say is that we have concluded the first chapter of this journey, and we are looking forward to what the rest may bring.

As with any learning programme, we believe that this process will continue to evolve and change as needed. Our hope is that in the future the Makerspace is set up and strong enough to continue on when we are no longer leading the initiative. Where others are able to come along, enjoy, change, trial and fail, explore and implement different ideas openly and freely. A place where community and whānau can feel safe and open to come in and share their expertise and love of learning. We believe that our Apanui Makerspace has brought back the love and creativity of learning for our tamariki and kaiako.

Above: A robot made in the Makerspace for a play this student was performing back in class.

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