Opening the door to games at Hutt Central School

The benefits of a syndicate-wide approach

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NZCER
Rangahau Mātauranga o Aotearoa

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GAMES FOR LEARNING
A RESEARCH PROJECT

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Introduction

INTERVIEWER:
What advice would you have for other teachers who maybe are thinking about bringing games or game design into their teaching practice, but don't really know where to start?

I think you've got to go into it committed to the idea. It is an idea that, with kids, picks up a lot of steam very quickly. What you do not want to do is open the door [to games] and then try to shut the door again. It may lead to some interesting places in terms of what you normally do … It's about getting 'beyond ready' to go into it, and using [students'] interests and their engagement as the fuel to keep going wherever it ends up going.
(ADAM, YEAR 5/6 BEGINNING TEACHER)

In term 2, 2017, four teachers at Hutt Central School initiated an inquiry into games across their Year 5/6 syndicate. The inquiry spiralled into a variety of learning opportunities, taking slightly different directions across the four classrooms according to the interests of each teacher and their students. The decision to focus on games (and game design) in term 2 proved to be so engaging and generative that it continued to "run in the background" for all four classes throughout the rest of the year, even when new inquiries and other planned school activities required time and attention.

This case study describes why and how the syndicate chose to sustain a focus on games and game design in 2017, and what the teachers and their students had to say about games for learning as they were nearing the end of the school year. The case study was undertaken as part of NZCER's exploratory Games for Learning research project, which aimed to investigate the role various kinds of games can play in supporting "transformative learning opportunities" for diverse learners in diverse New Zealand schools. The project aimed to better understand how learners and teachers think about games in relation to learning, what personal and pedagogical choices they make when games are used in learning environments, and what happens in the learning environment when games are part of the picture.

The project's findings are many and varied, and reported through a range of project outputs and channels.[1] We chose a case study approach for this report as being most appropriate to address the "what", "how", and "why" of a situation (Yin, 2003). The advantage of a case study approach is that it can provide the "force of example" (Flyvbjerg, 2006, p. 228), showing how particular ideas and theories play out in a richly-described practice context. Our work complements international literature that describes game-based learning praxis through the perspectives of teachers and learners in a diverse range of learning contexts (e.g. Beavis, Dezuanni, & O'Mara, 2017; Farber, 2018).

Why study Hutt Central School?

Hutt Central School was one of the last school sites we visited during the Games for Learning project, and the first example of a syndicate-wide approach that we were able to study in detail. We knew that the senior syndicate teachers at Hutt Central School were actively networking with other teachers around Wellington, including some teachers who were already participants in the Games for Learning *project. We were therefore interested in three particular questions:*

- To what extent did a syndicate-wide approach (and collaboration between teachers) make a difference?
- What impact did external connections and networks have on the practices at Hutt Central School?
- How were those practices similar or different to what we had seen in other game-using and game-designing primary classrooms?

Is a community of practice important for game-based learning?

The Hutt Central School case study offered an opportunity to examine an implicit theory or assumption that grew out of the early phase of the Games for Learning project. This theory is that game-based learning practice is enhanced when teachers (and others) can share, support, and mentor each other in a community of practice, rather than working in isolation. This assumption was based on early analyses of what other teachers in the project were saying about collegial support—or lack thereof. Some teachers had mentioned feeling somewhat isolated in their practices. They worried that some of their peers or senior colleagues might be suspicious about what they were doing with games, and found it hard to talk to other colleagues about what they were doing. A few game-using teachers confessed to niggling doubts or questions that came up in their own minds from time to time. These included whether they were getting "carried away" with games at the expense of learning, or focusing too much on fun and engagement without being able to "prove" that this would ultimately pay off for students' learning in the long term.

> **I am always thinking I have got to justify it, how would I justify it, what am I going to do if the principal walks in and we are doing this, you know? How do I say well here is my lesson plan, this is what we are learning and [to the principal] it looks like carnage.**
> (TEACHER, INTERVIEWED IN 2015)

1 For further information about the project and to read other reports, working papers, and blogs related to the study, see http://www.nzcer.org.nz/research/games-learning. The Games for Learning project was a 3-year exploratory project carried by NZCER with the support of a grant from the Ministry of Education.

The community-building agenda of the Games for Learning project

It is important to be transparent about ways in which the Games for Learning research project itself may have influenced, supported, or inspired some of the practices described in this case study. The Games for Learning project can be described as using a design-based research (DBR) approach. DBR recognises the inherent complexity of teaching and learning, and takes a clear stance on the question of how to link theory with practice. Namely, it seeks to "[inform] immediate practice while simultaneously continuing to develop theoretical understandings in the field of education" (Shah, Ensminger, & Thier, 2015, p. 152). DBR typically involves an intermingling of researchers and practitioners, resulting "in the co-construction of knowledge" providing "multiple benefits for both practitioners and scholars (Shah et al., 2015, p. 158).

The project had a community-building agenda from its inception. We set out to initiate and sustain a "community of interest" around the project when it commenced in late 2015 and continued to do so during the 2 years of the project. We convened workshops with "game-curious" educators to identify what questions were of interest to them, before undertaking initial fieldwork in schools. We committed to sharing emerging themes, findings, and our own emerging thinking about the project through the Games for Learning blog[2] and working papers.[3] The 2017 NZCER Games for Learning Conference was another facet of the community-building agenda, bringing together a diverse community of people, including some who had been part of the research project, some who had been following the project, and some who were simply curious about game-based learning and were looking to network and learn through the conference.

From 2015 to 2016, the focus of our research turned increasingly towards questions about what and how students could learn through game *design.* We began to test out some of our emerging understandings about learning through game design by developing and testing resources and workshop processes at conferences, breakfast seminars, and weekend meetups. Over time, these various activities were increasingly planned and undertaken in collaboration with teachers, researchers, and game designers who were part of a growing network/community of practice building up around the project.[4] The processes we engaged in to evolve the Games for Learning project increasingly took on the characteristics of a game design process—iterative, using rapid prototyping, testing things out, gathering feedback, and learning/improving/changing tack along the way.

When we approached Hutt Central School for this case study, some of the teachers from the senior syndicate were already part of the broader community of interest around Games for Learning through their connections into some of the activities described above. We were curious to see whether the teachers' experiences were similar to or different from the experiences of teachers who had been working on game-based learning approaches largely on their own. From outward appearances, the senior syndicate at Hutt Central School appeared to be approaching their unit on games and game design with enthusiasm and confidence. We wanted to know what underpinned this confidence, how the approach had played out in the syndicate from the perspectives of the teachers and their students, and what they had learned along the way.

2 See http://www.nzcer.org.nz/blogs/games-for-learning
3 See http://www.nzcer.org.nz/research/games-learning
4 We also provided advice and support to the 2016 NZTA Student Game Design competition and 2017 NZTA Future Transport competition, on the basis that supporting these initiatives would benefit learners and teachers as well as contributing new resources, and potentially research opportunities, to further support learning through game design in the New Zealand ecosystem.

2. Opening the door to games

This chapter looks at how the teachers at Hutt Central School, as Adam put it, "opened the door to games" and followed the learning opportunities that emerged from the games focus. It describes how ideas and emerging practices were shared between teachers in the syndicate, as well as the influence of external networks and resources for each teacher's practice.

The senior syndicate at Hutt Central School comprised two experienced teachers, Steph and Leanne, and two beginning teachers, Hayley and Adam. Adam and Leanne's classes were connected as one large learning environment, and they tended to collaborate in their teaching across the classes. Steph and Hayley were in two single-cell classrooms, but also tended to pair up, with Steph being Hayley's mentor teacher.

Each teacher was interviewed individually, giving their own account of how the games inquiry unfolded across the syndicate and in their own classroom.

The idea to focus on games takes shape

The idea to do something around games stemmed from a focus on students' engagement and motivation, which had been a focus for professional learning within the school.

> **Gaming has always been a topic of conversation, and we have some 'gamers' among us—both teachers and kids. We looked at the concepts we already have of gaming in our learning, and why we have them. A lot of it was [about] motivation and engagement.** (STEPH)

Leanne and Adam, both gamers, were keen for their students to do board game design. The syndicate agreed that they wanted to pursue the idea of games and gaming with their classes in 2017.

> Then it was a process of figuring out what exactly we wanted to do, the goal eventually was for [students] to make their own games. (Adam)

The teachers considered what resources they could access or bring in "to give it an intensive start". All four teachers attended a teacher-led weekend conference in term 1,[5] and heard teachers from other Wellington schools talk about their experiences learning with, and designing, games. The advice from these teachers was that

> you need to spend some time doing immersion and getting [students] to play games, otherwise at the end of it you're going to end up with 30 copies of Monopoly. (Adam)

They knew of a Wellington-based company that rented out board games to schools,[6] so in term 2 a giant box of games was ordered and remained in the school for about 8 weeks. The teachers intended to give students time to explore different kinds of games as a first step towards the goal of an overall inquiry guided by this question: "How can we make a game to entertain, challenge, share information, or tell a story"?

Immersing themselves in games

The inquiry process began with students selecting and playing games. Adam explained that the playing phase happened during class time, because "you actually assign value to things based on the amount of attention you give it".

> My position was if we said 'you can only play these at lunch time', we were saying actually it isn't real learning. That was a very quick conversation [amongst teachers], there wasn't much disagreement, but it was interesting to think about that. [Students] very quickly pick up on how [games are] perceived by the teachers, so by treating [the games] as learning tools, it does get them seeing it as learning. (Adam)

Some games were unfamiliar, and initially difficult for students to learn how to play.

> They found some of the rules hard to understand and we talked a little bit about that at the time. Some of them ended up just making up their own rules, as you do if you don't understand. (Leanne)

The teachers encouraged the students to notice things about different games, and figure out how to play them.

> **It was really obvious the soft skills and the key competencies were developing, right from the start. The first afternoon we sat down with them, we talked about how it was going to work, how they had some time to play and they were excited about that. [By] that afternoon at least two kids were in tears, because you know 'the rules didn't say that, and they weren't letting me do this', and 'not my turn', but as time went on and as they had more exposure, by the end they were sitting down and playing it, reading the rules. They were negotiating, establishing differences on the rules, and that was really obvious soft skill development.** (ADAM)

Using external networks to enrich the inquiry

The syndicate tapped into their external networks to bring people and ideas into the school to help them go deeper into games. Through a family connection, Steph was able to invite Morgan Davie, one of the developers of the Game of Awesome[7] card game, to visit the school and talk to students. Morgan

5 Educampwelly, a one-day "unconference" gathering convened by WellyED, "a group of Wellington educators interested in fostering a community which shares its innovative practice, and offers 'warm and demanding' support for one another". See https://wellyed.wordpress.com/
6 http://www.boardgamerentals.co.nz/
7 http://success-for-boys.tki.org.nz/Teaching-learning-resources/Game-of-Awesome

had devised an activity to get students to "hack" a simple game they all knew—Snakes and Ladders. The introduction of the concept of hacking was a revelation that was to have a significant ongoing impact for Hutt Central School (see Table 1).

> He introduced the word 'hack' within the first 10 minutes. The kids were like [gasp]. They thought 'Are you allowed to do that?' He asked 'What do you need to be good at to win snakes and ladders?' They were trying to guess what was in the adult's head. 'You have to be good at rolling the dice?' 'You have to be good at counting?' He said 'Does it involve any skill? Nah. It's just luck.' They hadn't really thought of that too much. He said 'So we're going to hack it.' (Steph)

Under Morgan's guidance, students formed their own groups and started to work on hacks, and "all of a sudden the game was developing differently all around the room". That there was no real skill involved in the original version of snakes and ladders was another important revelation to students. They wanted their own game designs to involve choice and strategy, rather than simply luck.

Around the same time, Steph introduced the "what's in a game" card resource,[8] also known as the "Gameful Praxis" cards (Figure 1). These were used across the syndicate to help students think more deeply about how different games worked, and what it was that made different games fun and enjoyable to different players.

> So looking at the different elements [of different games]: Does it contain journey? Has it got a time challenge? Is it about telling a story? Is it about acting? Does it involve numeracy? All those sorts of things, and we also went into what makes a game exciting. (Hayley)

Hayley later reflected that, with hindsight, a journey was beginning towards something more complex and interesting than she, or her students, may have initially thought.

> I think, starting the unit, we were maybe a bit naive, in that we didn't realise how in-depth and how 'abstract' thinking about games was, and that's been a real learning curve for all of us, actually just realising the level of thinking that is required to actually pull apart all the different elements of a game. (Hayley)

Steph's comments echoed this sentiment.

> By this time the kids were into it, they were super hooked. They loved the concept of gaming because it's like playing, it's not like learning. And games are cool, games are fun. [We] probably didn't realise at that stage how complex games could be—that came in the design phase. (Steph)

8 This free resource was an example of one of the Games for Learning project's "side activities" and a collaborative design/rapid prototyping process working with teachers who had been involved in the project in its first year. See http://gamefulpraxis.com/2017/09/11/whats-in-a-game-the-first-gameful-praxis-card-deck/

TABLE 1 Hacks, mods, and other rule-breaking as essential game design practices

Across time, and all communities, games of all kinds have been continuously modified, adapted, and tweaked to suit local norms, resources, worldviews, and the preferences of individuals or groups of players. Today, we might describe these practices as "hacking".

The term "hacking", together with other common gaming practices like "modding" (short for modifying) and "cheats" (finding ways to shortcut their way to success by playing in a way other than what the designer intended), might suggest that players are transgressing by "breaking the rules".

There are many contexts where rule-breaking is perceived negatively, and many ways in which rule-breaking can indeed be disruptive or destructive. However, certain kinds of "rule-breaking", including hacks and mods, are valuable learning experiences. And in fact they have long been a core feature of both contemporary and ancient gaming and game design practice. Katie Salen and Eric Zimmerman (2004) describe these forms of rule-breaking as "an attitude toward playing and designing games" and a "methodology" that is often driven by, and results in, the creation of "a deeper experience of play".

FIGURE 1 Gameful Praxis "What's in a game?" cards

Taking game design thinking in different directions

The syndicate started with an idea that perhaps each class could work on a game related to one of the school's values.[9] Some classes saw this idea through to completion, and others took their game design process in other directions. In Hayley's class, students worked collaboratively on the design of a game about "responsibility".

9 These are teamwork, respect, creativity, and responsibility.

> It was completely student-led so they came up with all the ideas themselves, and we broke off into little groups, so we had a group that was focused on designing the board, then there was a group that was focusing on designing different cards. It's a board game with choice cards and you move around, and we made everything down to the board itself, the cards, and the little pieces that you move around. (Hayley)

At the time of Hayley's interview, the finished game was being tested by students at another Wellington primary school. This was the result of a fortuitous exchange with other teachers on Twitter.

> [The teacher from the other school] had two boys in her class who had made this very, very simple game called *The Tennis Ball of Doom,* so it was an outside sort of sports-related game … it just slotted in really nicely with something that I was doing, and so I got [my students] to review it and reflect it. So then we ended up sending them 22 individual letters in the post, addressed to the two students, [giving] our feedback on their game. (Hayley)

Hayley described this as an "authentic writing opportunity" and very valuable for her students' thinking.

> [For example] looking into how can you give criticism that's constructive, and not just saying 'Oh that game's dumb, we didn't enjoy it', but actually looking at 'OK well what could we do, how could we hack it, to make it more interesting?' (Hayley)

The favour was returned when Hayley's class was able to send their completed responsibility game to Nicola's students, along with a feedback sheet they had devised.

> [We looked at] what did we want to find out, what feedback did we want to get, so that we could improve the game? And what questions did we need to ask to get that feedback? The kids went off into little groups, and thought about some questions, and then we came back together, looked at some questions that were similar and reworded them, created a sheet as a class, and sent that off with the game. (Hayley)

Authentic contexts for writing and reading

The other teachers also talked about how the games unit had provided a variety of authentic contexts to engage their students in writing and reading. For example, as the school was reaching the end date for the big box of rental games, students across the syndicate were told that the school would purchase two or three of the games. Students were invited to write a persuasive letter to Steph about which games she should purchase, and why.

> We got 50 kids writing letters and [Steph] read them, and then yeah they got a result out of it, so it was good for them to see that part of it as well. (Adam)

By this stage, the teachers were bringing games, game design thinking, and gamification into all sorts of aspects of their programme. Games like *Game of Awesome and Rory's Story Cubes*[10] were used to support writing, and Adam brought in his *Dungeons and Dragons* (D&D) player handbooks thinking that it might engage a group of boys who usually struggled to engage with writing.

> I thought [the D&D books] would be cool context for them to write about, you know, this has pictures of monsters, they have stats in them, you can imagine how they'd fight together, so they love it basically. That has been the single best decision I think I've made this year, and I don't say that lightly because they hooked on it really hard for at least a term and a half. (Adam)

After much pleading by the students, Adam ran a D&D game for them.

> I did not expect them to actually be interested in playing, I expected them to look at the photos and pictures and be like 'Cool!', but I did not expect them to [go as far as playing]. They learned a surprising amount of the rules. For kids that I don't think would describe themselves as liking to read for fun, reading a [text-heavy] book like this, that's a big deal. (Adam)

10 https://www.storycubes.com/

The students went on to design and play with their own D&D characters, and write about it.

> That measurably raised their writing level by—thinking of one particular boy—a full curriculum level, over the course of about two terms, because he was suddenly actually willing to write and didn't just sit there complaining that he didn't have any ideas. He wanted to write about this monster, and you know it's horribly violent and you know monsters killing other monsters and all that, but they got full stops in the right place so I can't complain! (Adam)

Letting students decide how far to take the game design process

Adam didn't want to limit his students' game design creativity, so didn't stick tightly to the idea of making a game about one of the school's values.

> I didn't want to basically step in on that and say you need to make a game about x, because one of the things I found really of value was the engagement with some of the kids who were a little bit more reluctant to be sitting down and writing. So I was very hesitant to actually go in and say 'You need to make a game about this', because I don't want to kill their creativity. (Adam)

To support the students' game design processes, Adam and Leanne created a template that students could use to outline a game idea that they wanted to make, including what the game's features would be, its goals, and how it would work.

> That was about as far as some of them got, and they're happy with that. Some of them went through to the next step and started prototyping, and drawing it out in their books. (Adam)

Students formed their own groups to work on their ideas, with some getting their games through to near completion of a playable prototype, and others sticking with various informal game ideas they had developed early on, such as role-playing games they played in their writing books.

> They still quite frequently use all the other kind of game aides we brought in around [the inquiry], so not many of them actually finished their game, and I don't necessarily think that's a bad thing. (Adam)

Adam's view was that all students gained something useful out of the deep exploration of games, whether or not they were able to succeed in making their own game.

> **It was really good for them to see the process and start thinking about well actually what is in a game, and also tying it back to what they play, you know 'I really like Minecraft' for example, 'What does Minecraft have in common with this board game that I really like?'**

The *Curiosity Connections* game

In Steph's classroom, the games inquiry took a unique direction. Steph was interested in developing a "curiosity" project, which at the time was possibly going to become one of the school's four values.

> **We realised at the beginning of the year that some of these kids weren't as engaged as they could have been. We needed to find something that would engage them. [Building their ability to explore] what are you curious about? And do you have the skills to dive down deep on your curiosity?** (STEPH)

Steph had been thinking about how to develop "T-shaped" learners, an idea that she had picked up from teachers at the educampwelly conference in term 1. The "T-shape" describes the ability of students to go "wide" in their learning (the top of the T), developing transferable skills, attitudes, and capabilities, as well as being able to go "deep" to develop expertise in particular areas of learning (the stem of the T).

> To me, that's what we want to give these kids. We want to give them a broad sense but when they find something they're really curious about, allow them to go deep. But if they get to the hard stuff and can't go any deeper, then they actually need to build the skill set and key competencies around it. Perseverance, getting creative, trying to find a different way around [the problem]. (Steph)

Although curiosity did not end up becoming one of the school's values, Steph decided to pursue the idea of a curiosity project anyway. The school already had a relationship with a resource provider called School Kit, and in conversation with them it came up that School Kit was undertaking a resource project about curiosity. This seemed like a perfect opportunity to integrate gaming and game design.

> So that started a conversation. I said I'm absolutely into this gaming, and curiosity has got to come into it, we're not quite into the depths of the design yet, but it's heading that way. The kids are going to have to be curious and develop a whole lot of skills to design, and hack, and design, and keep doing that process until they create something that's really awesome. (Steph)

Part of the arrangement with School Kit was that they would come in to make a documentary about the process within the school.

> I had said to [the principal] we are going to do a curiosity project but it means they will be coming to do a documentary about it. He said fine but how are you going to hook the kids in? I thought 'I've got it—games.' (Steph)

She and the students had made a start on the idea of developing a curiosity game, but got a bit stuck.

> We were up to deciding which of the elements of these games [using the Gameful Praxis cards] we would take into a curiosity game. So they got into their groups and started to mock up what it might look like. We didn't actually get that far because we realised how complex it was. How do you articulate or define what curiosity is, or how it looks? Is it a good thing? And if it is, how do you develop it more? And we kind of stopped … it got too hard, and it needed some scaffolding. (Steph)

Around that time, Steph attended the 2017 Games for Learning conference, and the weekend after the conference was considering how to move forward. An idea had taken shape that the curiosity game would be a "real" game; that is, set in a real-world context, and based around an archival photo of a class of students from Hutt Central School in 1983. She felt that the students needed support to develop some of the skills and capabilities they would need to find and pursue their curiosity. This led her to the idea of designing a game herself.

> So, on the kitchen table that weekend I developed a board game for the kids, to scaffold them. My own kids who are 10 and 15 helped me. (Steph)

Sitting down to try to make a game herself was an eye-opening experience for Steph.

> **It was pivotal for me in [understanding] how complex and challenging making a game is. If I could say anything [to other teachers, it would be], if you're going to teach kids how to do gaming, always make one yourself. Which is [going to be] challenging to you. Because that's what you're asking kids to do [when you do game design in the classroom].** (STEPH)

Steph's prototype board game was called *Who Knows Who,* featuring pictures of people cut out of magazines, and a series of cards that encouraged students to practise their questioning skills. The game design was partly influenced by a "question matrix" that Steph had learned about from Danielle, a teacher from Hobsonville Point Secondary School (see Table 2).

TABLE 2 The question matrix: An idea shared through teacher networks

The question matrix is a simple grid designed to prompt students to generate useful questions to pursue in an inquiry. The way it came to influence and support Steph's game design process is a good illustration of teacher-sharing networks. Danielle was part Steph's networks on Twitter, and had also attended the Games for Learning conference. Danielle had picked up the question matrix from Cindy, a colleague at her school. Steve, one of Cindy and Danielle's colleagues, blogged[11] about and how he had used the matrix as a part of a process to scaffold his secondary social studies students' capabilities in the development of good questions. Danielle had added her own spin to the use of the matrix by "gamifying" it—based on her observation that her students were often reluctant to create their own questions "but when things are gamified it seems to remove some of the risk of putting our own thoughts out there".[12] Danielle had trialled the gamified questioning approach—"Question race"—with her own secondary students, and shared her approach via Google slides[13] and via Twitter. Steph showed her Year 5 and 6 students photos of Danielle's secondary students playing the question matrix game, which impressed the young students and helped to strengthen their understanding that gaming and gamification was "everywhere, all around us", including in "big kids" learning.

From board game to real-world game

Having made her own first attempt at designing the *Who Knows Who* board game, Steph introduced it to her class, aware that the game was flawed.

> When my own kids were playing it, they said 'Mum, this isn't going to work.' I said, 'No, but let's just leave it in there. There have to be aspects of the game that don't work so the students can identify that and hack it.' So I knew there were a few [flaws] in there, but there's more than I thought! [laughs] (Steph)

Steph was open with the students about the effort she'd put into the game design, but explained to the students that she was inviting them to pick it apart, hack it, and improve on it. Once they'd played it, they went into smaller groups to "hack" the game.

Once the class was familiar with the game, Steph asked the class what they thought about trying to apply the game's process to find out about real people. It was at this point that she introduced the 1983 class photo from the school's archives—which she had strategically chosen because it did not include anyone's names.

> I let a day or two pass and then said 'Look I've found this photo. I think we could play that game to find out about the people in this photo.' I said 'I'm going to tell you one thing. I know something about that teacher in the photo.' They said 'What's her name?' I said 'I'm not going to tell you, your curiosities are going to have to drive this.' (Steph)

The students recognised the teacher in the photo looked like a woman who volunteered in the school. Steph challenged the students about how they could verify this, and this led to a process where students

11 See https://stevemouldey.wordpress.com/2015/10/16/agency-and-ownership/
12 Danielle Myburgh, personal communication.
13 See https://docs.google.com/presentation/d/117BLBXypNhy0Y3OImZ3oSkKEzd3HkO1U7cBjwlxgcfA/edit#slide=id.p

had to practise how to introduce themselves and ask questions. This eventually led to the students getting the mystery teacher's name and phone number from the school office, and role-playing how they would make a phone call to someone who didn't know them.

> **I've got some footage of them pretending to ring, and explain what they're doing, and me playing the teacher going 'What? I'm not—I don't know who you are!' [and hanging up the phone].** (STEPH)

This practice helped the students to become more confident and able to articulate what they were trying to find out.

The students finally reached the teacher from the 1983 photograph—not by phone, but through an email—and this led to the beginning of an ongoing real-world game where the aim was to find out the identities and some information about every person in the picture from 1983. Each person in the photograph was numbered and a giant copy of the picture was pinned up on the classroom wall (Figure 2). She and the class decided the game of finding out about these people required some levels of achievement (Table 3).

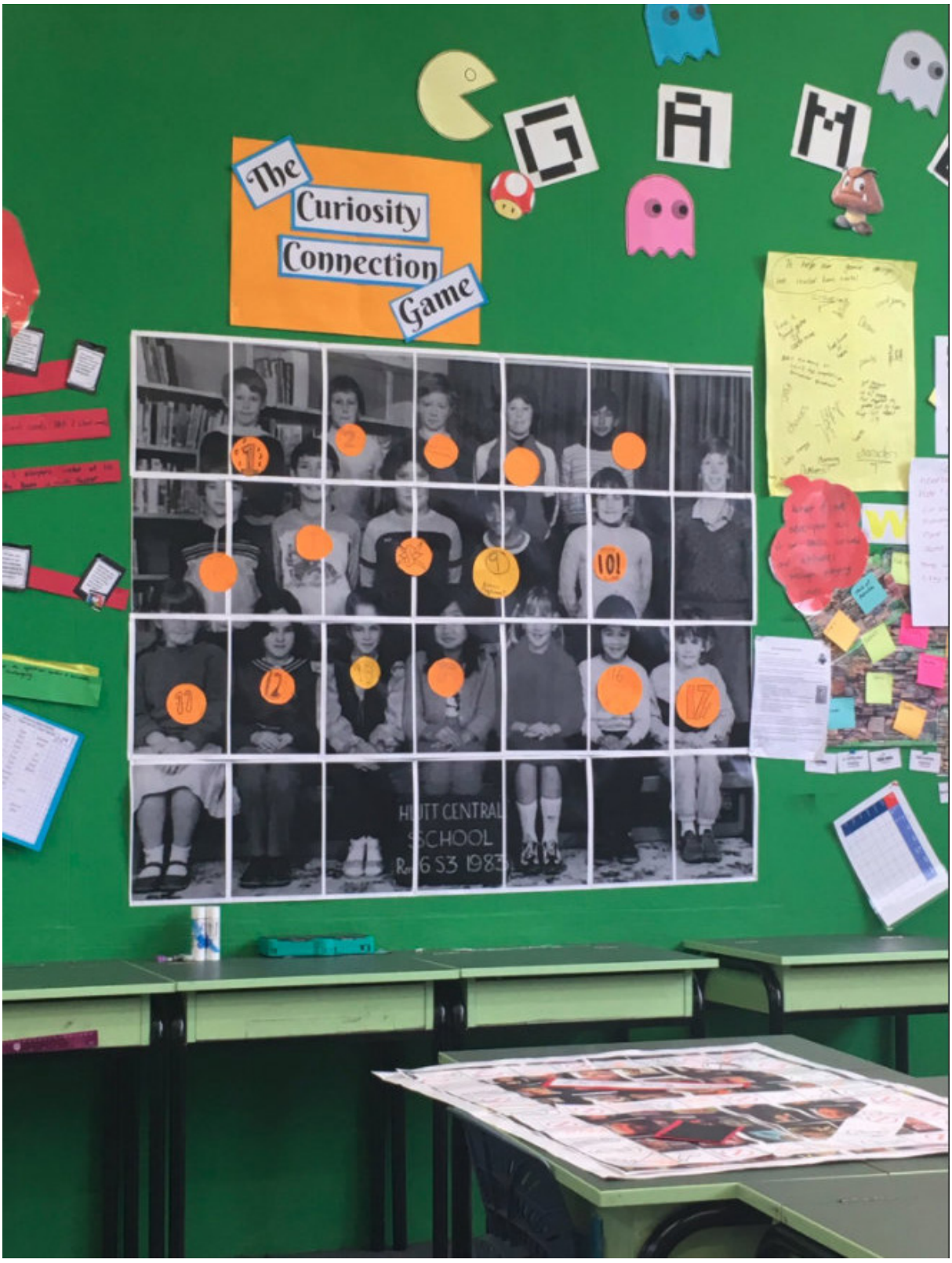
TABLE 3 Levels of achievement in the *Curiosity Connections* game

Level 1	Know the person's name
Level 2	Get contact details for them
Level 3	Get a response from them
Level 4	Get a learning memory from them about their time at Hutt Central School

Students were randomly assigned one of the people in the photo as their "clients" and set about trying to find out information about that person. They determined 10 questions that they would ask of/about the person, and created a large 10 x 17 table so they could collate all the "data" about the people in the picture in one place.

The photo was shared on the school's Facebook page, and immediately people in the wider community began to post and tag in the names of people they recognised. One of the pictured students, now a local real estate agent, asked to come into the school to talk about his memories of the school. The process of identifying the students in the photos was still continuing at the time of this case study. In some cases this had been easy, and in other cases students had hit dead ends or had to try to find another way around that.

FIGURE 2 The *Curiosity Connections* game



> Just last week I'd put another post on Facebook to say 'desperately seeking the _____twins', because that's all we knew about them. Then someone said, 'They're my step brother and sister' and tagged them in. And over the weekend they sent me messages and all of a sudden they're back in, we've got all their 10 questions because the students' letters were there all ready to send off to them. (Steph)

The school had some protocols in place to filter the communication between students and the general public. For example, students couldn't send emails directly out of the school. Instead, they composed emails that were sent out via a teacher's account. Teacher discretion was used to filter certain information that was not deemed appropriate to share with the children, but by and large the students seemed to appreciate the "realness" brought by some of the now-adult people from the photograph.

> We've tried to tap into the gaming aspect of it and keep pushing it out to other things. This has taken the kids outside of their context, taken them wider than they would have taken themselves I think. (Steph)

Getting as far as they had to date had been quite time-consuming, but worthwhile from Steph's perspective.

> **It's been crazy, and it does take a lot of time, but when I look through all the things we've covered, it's been massive. We talked about the wonderful stuff about social media, and the stuff we can't do [online], and why. There's been heaps of digital citizenship. The whole community has come along.** (STEPH)

The *Curiosity Connections* game was documented by School Kit and NZStory[14] shortly before this case study.

14 To watch the video, see https://youtu.be/SaS2XplFGGc

3.
What did the students say about learning through games?

We interviewed small groups of students from each of the four classes, totalling 35 students altogether across the syndicate. All the students we spoke to were enthusiastic about what they had done in their classrooms. We asked students to tell us about their activities related to games and game design, what they'd learned, and any advice they would give their teachers for future game-based learning.

The *Curiosity Connections* game

The students from Steph's class talked about many things they'd learned through the *Curiosity Connections* game, including "what things were like ages ago, before we were born, and how school was like back in the day". They described various things they had learned about the people in the photo from 1983, as well as "how to stay safe on the internet", and "politeness" from their endeavours to track down people in their community who could help them identify the people in the photograph. As to why they were doing a "games" focus in the first place, students had a few different ideas.

> **I think we're designing games to help our curiosity to expand.**
> (STUDENT)

It's 'out there'. It's something different, and more creative. (Student)

Learning through game design

Speaking more generally about learning through games and game design, students across all four classes talked about a wide range of things they learned, including copyright, strategising, hacking, persuasion, collaboration, creativity, and "all kinds of skills".

> Designing stuff is a good way to get your brain working! (Student)

Students described making games as "pretty challenging".

> **It's hard to come up with an original idea, because there are already so many games out there.** (STUDENTS)

> Just inventing the game, making up all the whole entire thing and how it's going to work [is hard]. (Students)

Students talked about the benefits of collaborating with others, including combining ideas.

> When you're on your own you just have your own ideas, and sometimes you need some buddies' ideas so you can combine them to make an amazing game. (Students)

They felt they had learned things about themselves and each other through playing games and designing games with their classmates.

> **It's made the class stronger—different groups get to know each other more.** (STUDENT)

Playtesting early and often

Some students had encountered various design challenges with the physical construction of their games, some of which were three-dimensional and had complex design features. Writing player instructions for their games also proved surprisingly difficult. Earlier in the year, Leanne and Adam's students were challenged to write basic instructions for simple tasks such as making a sandwich or tying shoelaces, which would be followed literally by a teacher. This helped the students see how hard it could be to write clear and unambiguous instructions.

> It was really hard. We had to keep moving things around, there was always something to change or fix to make it a lot easier. Because if a 5-year-old was reading it they wouldn't understand—you need to put it in words that are easy to understand. (Students)

In some cases, students asked groups of their classmates to test-play their games while the designers watched.

> It's daunting watching other people playing your game, you just want them to like it. (Students)

> Even if they struggle you cannot say anything. You have to watch and see what you have to work on. (Students)

Students expressed pride where they had managed to finish writing workable instructions for their games, even if the games themselves were still a work in progress.

Managing creative differences and using mistakes as opportunities to improve

Students talked about having to work through their own group dynamics and disagreements during game design.

> **You have to learn to listen to other people's opinions. Not everyone likes what you like. You have to trust them on their ideas.** (STUDENTS)

They also talked about the value of understanding learning from "mistakes" and recognising the opportunity to hack and change things if they weren't working.

> When you're designing a game you have to learn never to give up. And when something goes wrong, you can fix it. (Student)

Students said in game design it was important to be "persistent" and "resilient".

> I think it changes our mindsets. (Student)

Having the opportunity to exercise creative control over their projects

Students particularly liked having more control over the design and direction of their own games, the opportunity to create, and be creative. Some compared this with other school learning where they felt they had less choice and control, and were therefore less motivated and engaged.

> Schoolwork sometimes limits your choices. Say your teacher says you have to write about a school trip you've just been on, but you have to do it in a certain way; you don't have the choice so it kind of brings your motivation down. (Student)

They thought their teachers had been able to see "what a curious bunch [of people] we are", "that we challenge each other", that "we can work as a team and take responsibility", and "that we're really creative and we don't give up".

> The teachers didn't know, and maybe I didn't even know how curious I was about all these things until we started. (Student)
>
> We're good at communicating with each other. They [teachers] don't really need to give us help, we know what we need to do. (Students)

Realising the complexity involved in games

Some students—like some of the teachers—said they'd realised there was a lot more to games than they had previously considered.

> **I've learned that playing, making, and talking about games is not as easy as you think! Because some games can be so complex and hard to play, and [hard to] talk about.** (STUDENT)

> Before we did this I had games at home and thought 'Oh yeah games', but now that we've like gone into games it really just makes my curiosity spark. I'm always curious about games now, and how many kinds there are. (Student)

Advice for teachers

Students thought it would be good if their teachers continued to include a games focus in their future teaching. They could see many aspects of learning that could be supported through game play and game design.

> It can help you in your writing, it can help you with your maths. (Students)

> **You're learning in a different way, [even though] you might not realise you're learning … [but] you end up seeing stuff differently.** (STUDENT)

> If you have fun while learning you'll find it's easier to learn, because you relax. (Student)

The students appreciated the opportunity they had had to play and explore a wide range of games. They also valued the advice they had received from Morgan Davie. As someone who had designed real games, his advice had credibility, and they recommended teachers continue to seek out game design experts to come into the classroom and work with students.

> He kind of told us you don't just give up, you have to keep trying and stuff, don't worry if your game takes a while. (Students)

> He knows the basics and what you have to work on [to design a game]. (Students)

Their final words of advice to their teachers were to keep giving students space and time to be creative and have control over their work.

> **Let your students drive it. Let them be creative. You need some limits but not too close—you need to let them do what they want to do.** (STUDENTS)

> Give two slots in the day for it—I found that we needed more time. (Students)

4.

Teachers' reflections on game-based learning

We asked the teachers what they'd learned from their experimentation with game-based learning, what they had noticed in their students, and what advice they would give to other teachers just getting started with games in the classroom.

Integrating games to build key competencies across the curriculum

The syndicate's approach was to weave the curriculum around games and vice versa. Rather than attaching games to particular learning areas, the focus was on building key competencies and capabilities such as collaboration and problem solving.

> In the past, we have made board games that fit specifically (e.g., 'We are not very good at our multiplication so let's make a board game so we can practise.') This time is was more key competency-based. (Leanne)

The teachers went into the unit expecting that opportunities to build learners' capabilities would emerge from their interactions both as the players of games, and as the designers of games.

> **A game is linking in all aspects of the curriculum ... it's getting kids to communicate, it's teaching them about sharing by having to use all of the key competencies of thinking, participating, managing self, they have to wait their turn, they've got to be creative in the way that they think about what they're doing and use strategies, and you've got numeracy games, you've got oral language skills, so without even trying it's bringing in all of those different elements.** (HAYLEY)

> They got to choose how they structured their board game and what their board game was about, so it was more about relationships and managing themselves, problem solving. There was a lot of signs, symbols, and text going into everything to do with the board game. (Leanne)

The teachers also used games and game design to strategically address areas they wanted to develop in their students. For example, identifying that students were struggling with vocabulary, spelling, and

sentence structure, Leanne's class "hacked" the *Game of Awesome* to make their own card-based game to help improve their writing.

> So we are trying to build games into our curriculum … and use games to help build our weaknesses. (Leanne)

Hayley had also collaborated with her students to design and hack all sorts of learning games that became part of the normal routine of classroom learning.

> We've developed quite a few games in regard to their learning, and we've developed them as a class, even though the 'run write' [game] was originally my idea, I've really valued the input from all of the children, and they now feel like they have ownership of that game as well. (Hayley)

Expanded perspectives on how games can contribute to learning

The teachers had found more ways to weave learning in through games and game design than they had expected. Hayley's enthusiasm about games by the end of the term was notable, since she had started out without much personal interest in games.

> **I don't like sitting down and playing a board game, it just doesn't interest me … So I came in [to the unit] with absolutely nothing basically, and went 'Oh yeah this will be something fun, kids like playing games.' I guess I had my blinkers up, I couldn't see how it could be that beneficial, until I experienced it for myself.** (HAYLEY)

Looking back, she described that as "my limited thinking … my lack of understanding or knowledge of games".

> Now I see that you can hack [games] and you can make them suit your needs, and do what you want to do. I think just the idea of hacking has been eye opening for both me and the kids, and we often talk about 'How could we hack this?', and it might not even be a game [but any aspect of our learning]. (Hayley)

Planning in a more open-ended way

Hayley noted that game-based learning had required her to take a different approach to planning. She contrasted it to a conventional approach to planning reading groups with table activities in rotations, where

> you know exactly what they're going to be learning, exactly how it's going to be taught, and exactly the activity that they're going to do and what they're going to come away [with] from that at the end. (Hayley)

Hayley "liked to be organised" but realised and accepted that she needed to think about planning in a different way with the game-based learning.

> If I had my way I would plan on a Thursday for my entire next week. With gaming I have found that … you can't plan too far ahead, because you don't know what's going to happen … I can't actually get resources ready, I can't know exactly how that lesson is going to go, until we've actually played the game and we've had feedback, and we've done the hacking. (Hayley)

Rather than trying to plan everything in advance, she had to think carefully about what learning she was aiming for, set up the conditions in the classroom, and introduce an idea or a game-based approach to students. Then she needed to be responsive to whatever happened, and this included the students

themselves helping to decide what was working or not working, and how to "hack" it to make it better. Hayley debated whether this was more work or less work for her as a teacher. In one way, it was a lot of work to plan on her feet and be responsive,

> but then I want to contradict that and say that it's less work, because a lot of it is coming from the kids, so from that point, they're doing a lot of the thinking. (Hayley)

Allowing time for game-based learning

The game-related learning ended up carrying on beyond the one term originally planned. Most students' game designs needed more time to reach a playable prototype level. Teachers were finding time for students to carry on with their game work where possible, but the school was a "busy place" and there were already other events and activities scheduled for the new term.

> **I think trying to do [the games focus] in [only one] term was overly ambitious—I think it is something that needs at least two terms.** (LEANNE)

The teachers had talked about starting with games at the beginning of the following year and having it as "an underlying project that runs right through the year".

> We would have liked to have spread it wider and get other classes and possibly parents to play [the students' games] and celebrate what they have been working on. (Leanne)

Having clear pedagogical intentions and strategies around the games

Having clear pedagogical intentions and strategies to support the play and design of games was important.

> You can't just expect to dump a bunch of board games into a classroom, and for games for learning to happen, there does have to be a guided kind of structure behind it. (Adam)

Teachers encouraged classroom conversations that helped students to reflect on their gameplay and recognise how this connected with learning. These kinds of conversations helped students to "realise they are learning more than they realise", and to attend to the features of different games and how they "work".

> **We're not just playing a game for the sake of playing it, we're thinking 'Why do we like this game? What are the parts of the game? What is the game making us do? What do I need to do to be good at this game?' [It might be] teamwork dynamics, or I need to be really good at lying, so what does that tell us about the nature of the game?** (ADAM)

Recognising creative and collaborative learning opportunities through games

Both game play and game design provided opportunities to foster students' capabilities to work collaboratively to solve problems.

> [They're] thinking critically and creatively, because they're having to talk more with others. The games are requiring them to work collaboratively, they're starting to think more outside the box, and on a deeper level. (Hayley)

Some of the teachers noted that the game-based learning was providing more inclusive opportunities for students who often struggled to fit in with groups.

> There have been some surprises of kids getting out of their box and working better as a team. (Leanne)

Working as a syndicate

The teachers said it was beneficial to be able to work as a syndicate.

> I think it is really important because you are not going to get the best outcome doing things on your own. (Leanne)

The four teachers had been able to share ideas while also having the autonomy to take things in different directions in each of their classrooms.

> Each teacher has diverged—we aren't doing the same thing, which is good because different classes need different aspects to work on too. So we have probably had the best of both [worlds]. We can communicate and get our ideas together but we can still diverge and do what our classes need, or what our passion is and where we are coming from. (Leanne)
>
> We've all sort of been learning together, we were all really quite open and had very similar struggles. (Hayley)

Advice for other teachers

The teachers' key advice for other teachers interested in bringing a game-based learning focus into their classrooms was:

- Give it a try, and do so with an open mind.
- Focus on creating conditions that allow for planned and unanticipated learning opportunities to arise from "opening the door to games".
- Allow space for students' ideas and interests to emerge and be followed through.

They were all in strong agreement that it was a worthwhile thing to do.

> You've got to find enjoyment in it yourself to be able to bring it into the classroom, so that the kids feed off your enthusiasm. (Hayley)

> **The advice would be do it. The advice would be to try and integrate it as much as you can into your programmes, have a structured plan before you start, and give it a lot more time than you think.** (LEANNE)

> If you're not familiar with games, you'd want to do some research or get some ideas of how games can help [learning], but once you've decided you want to do it, go for it, don't try and hold back. The best thing it's given me is engagement and motivation, that only came through to its full potential where [the students] were allowed to go as far as they wanted. (Adam)

5.
Discussion

Many of the insights that teachers and students at Hutt Central School shared about learning through games and game design align with what we have heard from other teachers and students in the Games for Learning project. Along with previous case studies (see Bolstad, 2017), the Hutt Central case study illustrates several of the major themes arising from our research, which in turn resonate with themes in international game-based learning literature.

Games and game design in complex classroom ecologies

Like other researchers of game-based learning (Salen, 2008; Young & Slota, 2017) we see games and game design in the classroom as complex ecologies[15] for learning. The complexity of interactions and possibilities associated with games and game design in the classroom stems from several sources of diversity.

First, there is the diverse nature of games, and the varying kinds of interactions and learning opportunities afforded by particular games or game genres. Teachers and students at Hutt Central School gave themselves time and space to explore and unpack games. They engaged in conversations that explicitly positioned games *as learning*. They used a variety of strategies to dig down into different kinds of games to consider how different kinds of game "work", what it takes to be good at playing different games, and what it takes to design a good game. Consequently, teachers and students expressed their own revelations and insights about the complex nature of games (and game design), and their potentially wide-ranging contributions to learning.

People are another source of diversity in the game-using classroom. As Salen expresses it, games can't provide a standardised context for learning, because *players are not standardised*.

> ... the individual, social, and cultural motivations of any player effect what is experienced through play, and no two players ever experience the 'same' game. (Salen, 2008, p. 10)

Conversations in Hutt Central classrooms included discussing who liked which kinds of games, why particular games appealed to some players and not to others, what knowledge, skills, and dispositions different games required, and who revealed themselves to be particularly good at playing different kinds of games. In some cases, teachers observed that games could hook in students who sometimes struggled

15 Ecology refers to the branch of biology that deals with the relations and interactions between organisms and their environment, including other organisms, but it can also be used in a more generic sense to describe the set of relationships existing between any complex system and its surroundings or environment.

to engage with their learning, or to engage socially in the classroom. The game design process further elicited recognition of the diverse interests and strengths of individuals, as groups of students worked out how to combine their ideas, solve problems, and learn/recover from small failures as they developed and began to test their games with players.

A further source of diversity stems from the myriad of ways games and game design can be woven into curriculum and pedagogy. At Hutt Central School, teachers entered their games unit with a variety of clear curriculum purposes. This included a focus on the development of key competencies, and many other curriculum-linked learning goals including literacy goals (in particular, writing), art and technology, and digital literacies. However, the teachers also created and enabled the conditions for *emergent* learning opportunities, by being willing and able to respond to students' ideas, interests, and unexpected opportunities that cropped up along the way. In these complex game-using classrooms, teachers and students showed that they could learn from failures, and "think on their feet".

Games and game design as conduits between classroom learning and real-world contexts

The *Curiosity Connections* game modelled one way that a game can be contextualised in a real-world focus. It could be described as an alternate reality game or augmented reality game (ARG)—a genre "in which players collaboratively hunt for clues, make sense of disparate information, and solve puzzles to advance an ever-changing narrative that is woven into the fabric of the real world" (Bonsignore, Hansen, Kraus, & Ruppel, 2013, p. 25). Bonsignore et al. argue that ARGs are particularly powerful in cultivating seven capabilities (or "21st century literacies") within player communities (see Table 4). At Hutt Central School, aspects of these literacies in action could be seen not only amongst the class that played the Curiosity Connections game, but also across all the classes in the processes of game design, and "hacking" the classroom to gamify other parts of their learning.

TABLE 4 Seven 21st century literacies associated with ARGs, as described by Bonsignore et al. (2013)

Gather	The ability to locate, access, or discover appropriate sources and appraise them for a given information need.
Make sense	The ability to make sense of information through analysis, synthesis, and interpretation; and to aggregate dispersed components into a coherent framework.
Manage	The ability to carefully organise, document, curate, and archive personal and community artefacts and interactions for immediate and long-term use.
Solve	The ability to innovate and experiment to creatively solve problems and reach goals.
Create	The ability to meaningfully produce and remix artefacts and resources to express new understandings and insights.
Respect	The ability to honour diverse opinions, identities, and behaviours; and to act within ethical and legal frameworks.
Collaborate	The ability to effectively collaborate, network, and communicate across time and space.

Utilising networks outside the school to expand possibilities

As well as the teachers' own drive and creativity, the Hutt Central School case study was influenced and supported by the teachers utilising a range of networks beyond the school. This included:

- ideas, inspiration, and specific resources picked up from attending conferences and hearing from other game-using teachers
- using social media to engage the wider community in the quest to locate and identify the 1983 school photo for the *Curiosity Connections* game
- exchanging ideas, classroom practices, and game prototypes with teachers and students in other schools
- inviting a game designer to come into the school to run a workshop with students.

These connections to the resources, knowledge, expertise, and ideas of people outside the school often provided pivotal and unexpected "aha" moments for teachers and students. For example, the revelations about the power of hacking (from Morgan Davie).

Another example was the unexpected insights into the life experiences of others. Steph and her students talked about some of the personal and emotional stories that former students (now adults) in the *Curiosity Connections* game photograph shared with them, both about their time at school, and some of the positive and less positive things that had happened in their lives beyond school. This provided opportunities to cultivate students' capacity for empathy, by talking about some of the things that can make people's lives hard, and understanding that people can grow and change.

A third example was the opportunity in Hayley's class to exchange games with another school for test-play, giving students an authentic and meaningful reason to give, as well as request, considerate and constructive feedback from students they did not know. All of these examples suggest the power of games and game design to provide learning opportunities that are "authentic" on a number of levels.

There are many other rich themes woven into the Hutt Central School case study. We hope the three highlighted here provide useful insights for other teachers interested in opening the door to games and exploring what they have to offer. As has been the case with our other case studies, and our ongoing work with learners, teachers, and researchers in game-based learning space, the possibilities abound.

6.
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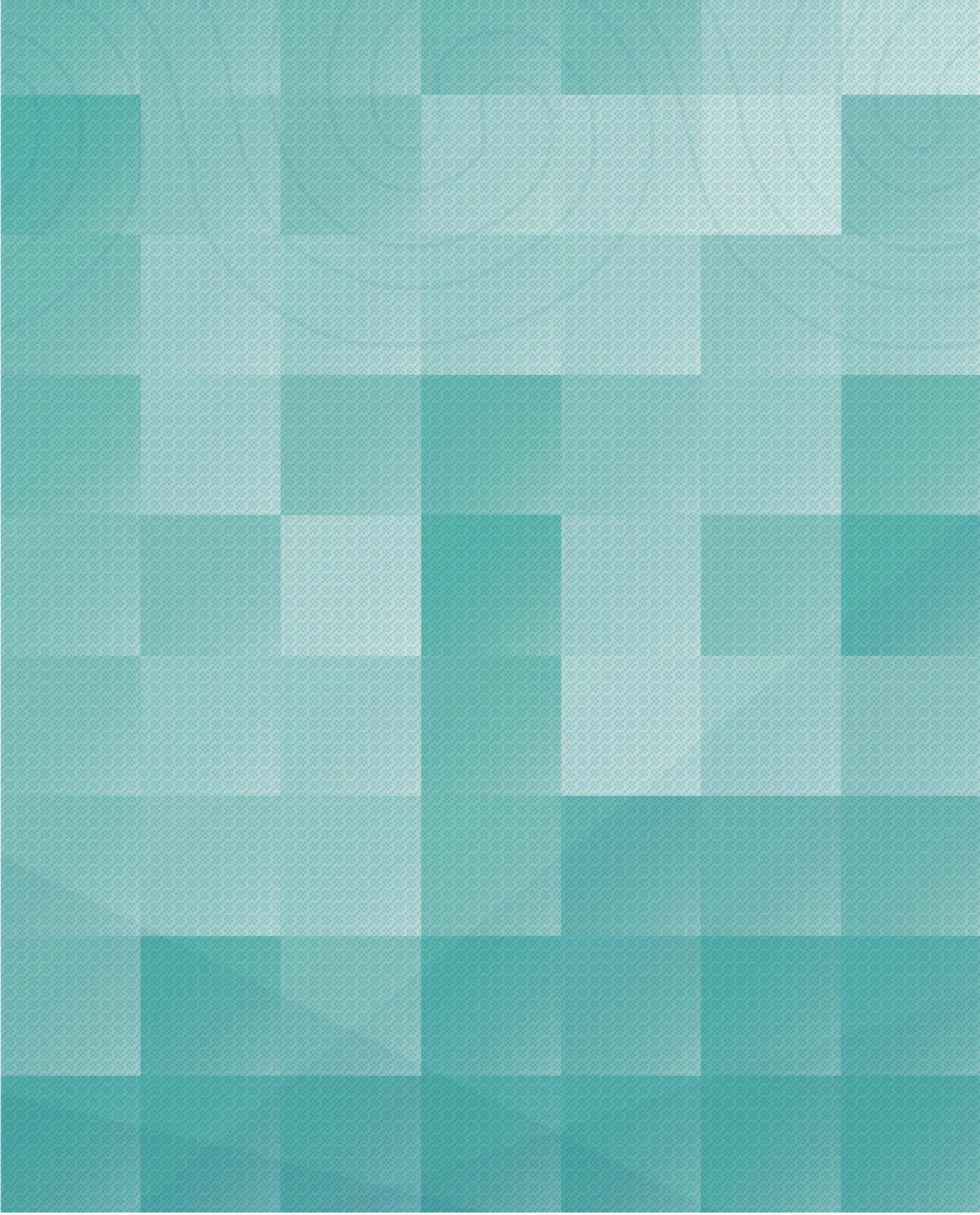

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