The art of turning science, technology and maths learning into a game

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The state government has joined with the Australian Centre for the Moving Image on a three-year project to develop students' science, technology, engineering, art and maths skills via the creation of computer-based games.

Improving Australia's maths and science skills is becoming a national obsession, from the Prime Minister down, but in Victoria it also involves fine art and a challenging game, thanks to an innovative program teaching video games-making to secondary school students.

Bendigo schoolgirl Dakota Poole is one who has taken up the challenge. Last year, when in year 10, she was one of four students from her school who participated in a video games-making pilot program at the Australian Centre for the Moving Image.

Meeting of minds: students' love of gaming is being channelled into design in the hope of boosting STEAM skills. *SIMON LETCH*

Poole initially earned selection in the Games Net program for her art and design skills but developing her space-themed platform game also meant a step up in the coding, maths and science skills that underpin video games.

In December, Poole attended ACMI for a showcase event where her game was screened alongside those of other participants in front of industry mentors, educators and peers.

"I usually keep a lot of things to myself but it felt good seeing other people enjoying my work and sharing it with other people."

[Games Net](#) is a collaboration and networking of primary and secondary students focused on the end goal of making a video game. After its 2015 pilot it has now been funded for three years, as part of the Victorian Government Strategic Partnerships Program - through the department of education and training.

Its debut abuts the Turnbull Government's recent $1 billion

innovation package announcement, which allocates $51 million for coding programs for Years 5 to 7, skilling teachers and targeting STEM (science, technology, engineering and maths) learning programs.

Victoria University is conducting research into the program to explore its efficacy as a model for teaching digital technologies, design, art and games-making remotely and collaboratively.

Australian Centre for the Moving Image (ACMI) director and CEO Katrina Sedgwick says Games Net is focused on engaging school students in STEAM-based (science, technology, engineering, arts and maths) educational experiences, rather than just STEM.

"That convergence of technology and art making, I think that's where we're offering something very special," says Sedgwick. "It's about those technical skills and where they meet those creative skills. It's about coding but it's also about story telling.

"I think that's an immensely valuable way to approach both areas."

Game Training director Jeff Ayling operates another video games-making education program called Game Training RoadShow (gametraining.com.au), which aims to engage Australian school students in software development by teaching them how to write code and create commercial-quality video games.

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He also endorses video games development as a means of engaging students in STEAM learning experiences.

"If you just do it with the STEM approach, it's incredibly boring, and that's why there's a huge decline in the number of kids who take up coding in schools," he says.

The Victorian education department's 2011 report, Innovating with Technology and Games-Based Learning Research Trials, sought to examine the impact of game development on teaching and learning practice.

The 12 Victorian schools involved in the research trials reported that their participation enabled them to identify the potential of video game development at school to develop their skills, knowledge, confidence, independence and creativity in using ICT.

Participating students, teachers, mentors and parents involved in Games Net's 2015 trials provided initial feedback that the program's strong points are the quality of support ACMI provides students, the level of student engagement in creating games, student team work and collaboration, mentorship quality and the outlet the program provides for students to use existing skills and develop new ones.

Poole says participating in Games Net deepened her appreciation for the diverse layers of experience she could involve herself in to design and produce video games.

"Going further into making the game, I wanted to learn how to code; I wanted to learn how to make all the images and do all the music so I could contribute to a lot of the things that were going on," she says.

Game developer and second-year computer science student Josh Caratelli partnered with University of Melbourne physics student Liam McLachlan to win the inaugural Australian STEM Video Game Challenge in 2014 (while they were completing year 12 at Elwood Secondary College) for their environmentally conscious video game, Smog Game, which they launched last year.

Caratelli says the experience meant he was required to use a diverse suite of technologies across various areas such as communications and collaboration, programming, image editing and 3D modelling.

He discovered new things about himself too. "There's a really distinct correlation between when I started game development and when my interest in maths and science started expanding and when my grade average shot up."

Australian school students are learning how to make video games in a variety of formal and informal ways inside and outside the school setting. Video games development skills - such as computational thinking - are embedded in the AusVELS curriculum; some schools have their own in-house games development programs; other students participate in workshops and programs provided by external providers and students also learn about video games development through participation in competitions such as the Great Victorian Coding Challenge.

According to Dr Chad Habel, director of mobile video game party business Game Truck Australia and an Adelaide University academic

with research interests in game-based learning, a vast proliferation of games development platforms including Game Star Mechanic, Unity and Scratch are making games development experiences increasingly accessible to primary and secondary-aged school students.

He adds that the coding and programming skills students acquire through game development have a real-world currency well beyond the school computer labs of yesteryear.

"It's not just something a computer teacher does in their little computer room any more. It's something that has to be school-wide.

"You can't live in the world we have now without reading or writing and nobody will be able to function effectively in the world in 20 or 30 years' time if they don't at least have some sort of basic facility with all of that sort of stuff."

If coding and programming skills are forecast to be indispensable to future 21st century living and functionality however, students of all abilities will need to acquire them.

Ayling says he's seeing his share of schools with major deficits in their capacity to teach coding.

He proposed cancelling one of his school workshops where the turnout was the lowest he had all year (six students signed up for the session) but the principal was insistent it go ahead.

"She said, 'But these kids need to know this for their major work they're doing next year. If you don't come in and do it then they're not going to be able to complete their major work.'

"And I was thinking, 'How can the success of these kids' major work be determined by a third-party company coming in to the school to teach them?'

"The schools don't really have systems in place that we see that will get them up and running to be able to write code."

Ron Curry, CEO of the Interactive Games and Entertainment Association (IGEA), says there's an unsystematic variance between schools in the games development learning experiences they make available.

"The downside is that I think it's all being done on a bespoke basis and a bit of an ad hoc basis rather than a wider systematic approach to how we do this across the curriculum or across a school or across the zone," he says.

Steffen Walz, senior research fellow in RMIT's school of media and communication, says it's a mistake to think of video games as a panacea for education. Some students are inevitably more cut out for coding and programming than others, he adds.

"It really requires people to be invested," says Walz. "If you want to teach someone to play the piano, they have to have a passion....

"Like with everything; some are not meant to be even mediocre musicians. They're just not."

The students who participated in Games Net's trial last year went to metropolitan, outer-metropolitan and regional schools. Identified as gifted and talented, many of them didn't necessarily have access to accelerated programs for learning.

An overarching objective of Games Net is to enable gifted and

talented students to engage with the accelerated learning they need.

But Sedgwick adds that as the program matures and evolves, it has the potential to expand to accommodate students of mixed abilities on a national scale.

"The reality is that there is a real hunger for kids and a real desire more broadly to embed those technical digital coding skills throughout learning in primary and secondary schools.

"How do we do that and how do we fast track that, given we have a whole range of fabulous teachers who are really eager to engage with that but haven't had that training themselves?"

[Games Net](#)