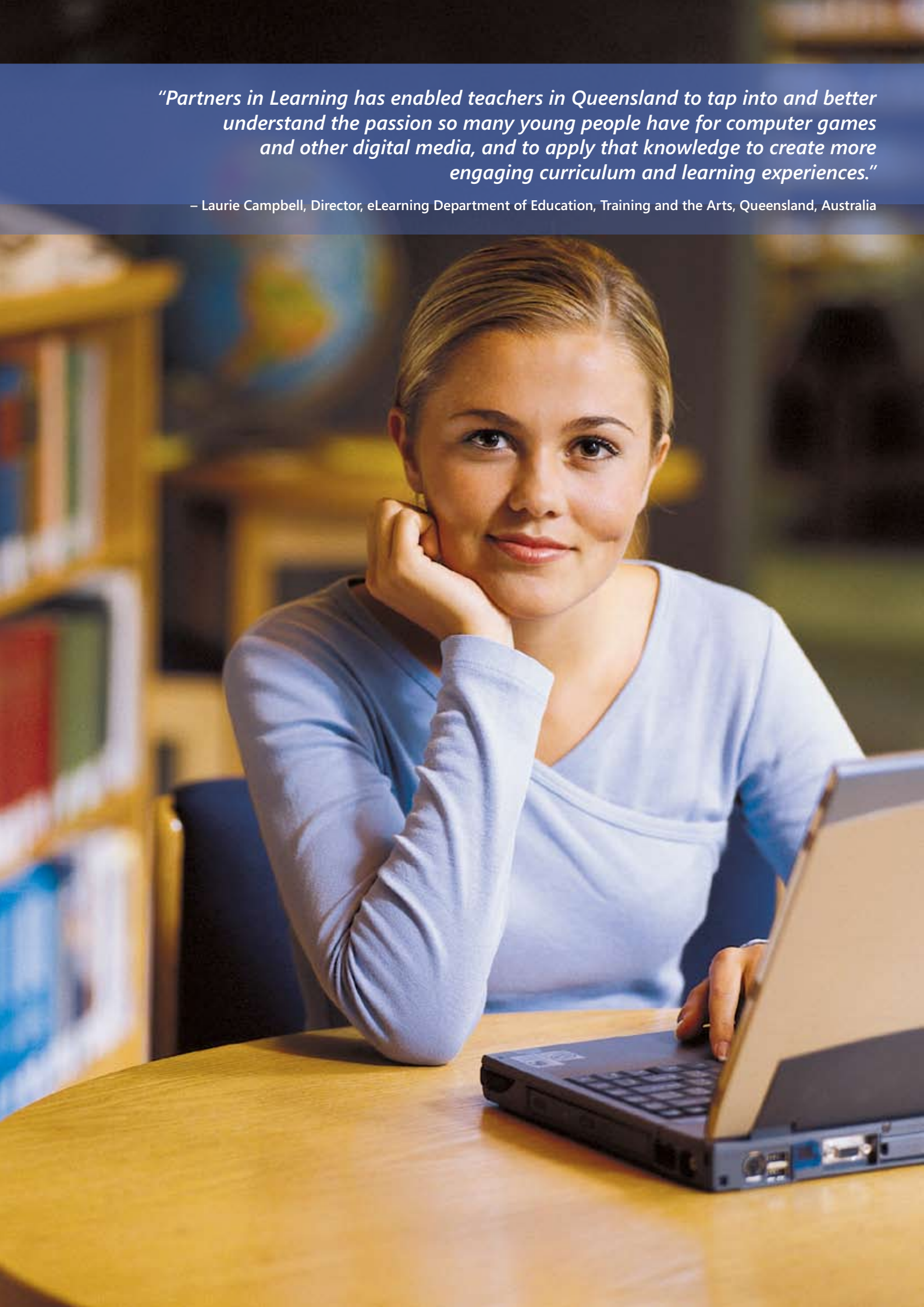

"Partners in Learning has enabled teachers in Queensland to tap into and better understand the passion so many young people have for computer games and other digital media, and to apply that knowledge to create more engaging curriculum and learning experiences."

– Laurie Campbell, Director, eLearning Department of Education, Training and the Arts, Queensland, Australia

Australia

Ready. Aim. Fire! Learning with Games in Australia

Educators in Australia's eastern state of Queensland are at the vanguard of efforts to understand how computer games, spatial technologies, and other digital innovations can enrich teaching and learning, particularly with students who don't respond well to traditional teaching methods. Through a partnership with Queensland's Department of Education, Training and the Arts, Partners in Learning is funding programs that bridge the gap between education that is relevant and learning activities that are fun and engaging.

Ken Brady has the sharp-eyed focus and quick-witted strategic skills of a Royal Australian Air Force fighter pilot, which he used to be. But these days, Brady has traded his wings for a battle of another kind—winning the hearts and minds of at-risk students at Gympie State High School on Australia's Sunshine Coast.

Brady is among a growing number of teachers in the country's eastern state of Queensland who are exploring the use and creation of computer games as a teaching and learning tool. To traditionalist educators, this may seem one step short of declaring every school day a holiday, but to people like Brady, it's a golden opportunity to leverage a younger generation's curiosity about the magic of software to actively engage them across a range of subjects.

The community from which Gympie State High School draws its student population may be at the lower end of the economic strata on the tropical and touristy Sunshine Coast, but the challenges Brady faces in getting disenfranchised teenagers excited about learning are familiar to educators everywhere.

"These kids annoy the heck out of the library because they come in and play games," says Brady. "They annoy the heck out of their other teachers because they don't want to type up their English assignment. They're the ones who draw graffiti all over their desks, but they draw beauti-

KEY IMPACTS OF PiL IN AUSTRALIA

- Due to the distributed nature of education in Australia, Microsoft has supported a variety of initiatives tailored to the needs and interests of each state and territory.
- In Queensland, the state education department has partnered with Microsoft since 2004 on programs to explore the efficacy of games in learning, introduce students and teachers to the rapidly emerging field of spatial technologies, and help teachers create educationally rich and engaging digital content.
- Programs in other states and territories focus on innovative approaches to teacher professional learning, innovation in curriculum, and systemic issues in pedagogy.

fully—they create these amazing pictures. I thought, let's tap into the things they like doing."

Recognizing the potential of games and other emerging technologies to stimulate and personalize learning, Microsoft formed a partnership in 2004 with Queensland's Department of Education, Training and the Arts to fund three programs through the department's ICT Learning Innovation Centre (LIC):

- **Games in Learning** explores the learning potential of games through initiatives focused on game study (design), game making, game play, and game innovation.
- **Spatial Technologies in Schools** introduces students and teachers to the rapidly emerging and relevant field of spatial technologies, including geographic information systems (GIS) and the Global Positioning System (GPS).
- **Thinking Digitally** offers mentoring and coaching to teachers to help them design, create, and incorporate educationally rich and engaging digital content in their classrooms.

Games Help Students Grasp Concepts and Think Strategically

An avid gamer himself, Brady first became interested in games as a learning tool in 1998, when he used a simple multiplayer game to introduce concepts in a high school computer networking class.

"I had their attention from that day on," says Brady, who quickly saw the power of games to motivate students, help them grasp complex concepts, and learn how to work collaboratively.

Recognizing the potential of games and other emerging technologies to stimulate and personalize learning, Microsoft partnered with Queensland's Department of Education, Training and the Arts to explore the potential of games and spatial technologies in learning.

A few years later, while teaching on remote Thursday Island, Brady engaged his students, many of whom were struggling with basic literacy skills, by having them conceptualize a game revolving around an imaginary character and write a script describing what happens to the character in the game.

"Before you knew it, the kids were writing whole paragraphs, and then whole pages. Sure, the spelling and punctuation needed work, but they had original, creative content of their own which they were keen to get correct," says Brady.

From there, Brady had students create a simple maze-style game where students become treasure hunters, identifying the correct letters in words to get closer to finding their stolen bounty.

"It snowballed, and before I knew it, I had students coming from everywhere wanting to learn how to make their own games," he says.

Drawing on these experiences, Brady offered a class in game design and development when he moved to Gympie State High School in early 2006. Soon

a single class mushroomed into three, and once again, it was obvious that Brady was on to something, particularly with several students who had been struggling in school.

"I was just getting bored with all my other classes," says one of Brady's students, Thomas, who believes that the game-making classes "got me through the year. It definitely wasn't boring, and I enjoyed it heaps."

Initially, Thomas's mom was skeptical. "She asked if this was just something to do to get out of other classes. I had to explain it to her and show her the stuff on my laptop. At first, she didn't understand, but now she sees that I can get somewhere. I didn't think I was going to the university before this."

Thomas says the game-making classes challenged him to think strategically, work collaboratively with other people, improve his math and English skills, and become proficient in new subjects, from animation to photography to writing software.

While many of the students in Brady's classes have played games since they were young, Olivia had never played a computer game in her life before taking the class. "It opened up a whole new world," she says. "You start off with nothing, create something in your mind, and end up making something that other people can play with."

Another student, Joshua, says the class taught him perseverance and "opened my mind to looking at things in different ways. The way you want something to happen isn't always the way it's going to be," he says.

His peer, Ethan, agreed, adding that he also gained confidence in his problem-solving abilities. "One of the main things I learned is patience and being able to troubleshoot. In game making, you have to get every single little bit right. Otherwise, it won't work. It helped me learn how to solve lots of problems that I never would have been able to solve before."

In November 2006, 10 of Brady's students attended a three-day Microsoft-sponsored School of Games at the ICT Learning Innovation Centre, where they learned how to design, build, and test their own games; create graphics, animation sequences, and soundtracks; and explore potential careers in the games software industry.

For his next act, Brady will introduce a three-year secondary school course that will give students a certificate in Interactive Entertainment. Students who graduate with the certificate are all but guaranteed an opportunity to pursue further studies at university or jobs with companies in Brisbane's fast-growing games software industry. Were it not for the personal connections Brady made at an industry conference he was able to attend with financial support from the Partners in Learning grant, the certification program probably never would have been created.

To encourage girls, in particular, to explore the frontiers of technology,

AUSTRALIA QUICK FACTS

- **Population:** 20.4 million
- **Education System:** 6,902 government schools serving 2.3 million students in six states and two territories
- **Challenges:** Increasing demands on school budgets and staff time make it difficult for teachers to get the professional development they need. In addition, a maturing teacher population—with many educators retiring over the next five years—will leave a gap in school leadership.

To encourage girls to explore the frontiers of technology, Partners in Learning sponsors workshops where young women can develop ICT skills and knowledge in computer programming, graphic design, animation, and game development.

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The LIC also offers professional development opportunities for P–12 teachers in developing games, learning objects, and "machinima"—short movies created using 3-D computer games such as Halo. An annual Interactive Games and Learning Conference brings together teachers from across Queensland to discuss opportunities and developments in the use of games in teaching and learning, and the LIC is also helping create a self-sustaining network of teacher mentors and other educators interested in the use of games as teaching tools.

"Game making has really taken off throughout Queensland, thanks to the PiL program," says Kristine Kopelke, project officer for Games in Learning at the LIC. "The PiL funding has helped us create links and relationships between teachers, provide professional development resources, and bring people together so teachers are not trying to figure something out and feeling isolated in their classroom."

Cultivating Real Skills in Virtual Gardens

Down the road a few hundred kilometers from Gympie, at Kurwongbah State School, students in a mixed class of 10- to 12-year-olds are playing Viva Piñata, a Microsoft Xbox 360 game, as part of a learning unit on the environment. Through exploration of the virtual gardens of Piñata Island, which is inhabited by "wild piñatas" such as Fergy Hedgehog, Hudson Horstachio, and Franklin Fizzlybear, students are not only learning about the impacts of various activities on the environment but also developing a wide range of critical thinking skills, say Denise Tarlinton, a curriculum support teacher, and Heather Wessling, a classroom teacher.

Individually and together, students use the game to create their own garden environment and attract, protect, and nurture various animals. Through reflective journaling based on their gaming experience, the students "have to make connections between what changes they've made to the environment on their island and how that has attracted more piñatas, and interactions between flora and fauna and food chains," says Tarlinton.

According to Tarlinton, the students' play stimulates higher-order thinking through exercises in problem solving, decision making, planning, and organiza-

tion, and encourages development of social skills by requiring students to listen, share, clarify, and negotiate as they work together creating gardens.

"The perception by a lot of adults—particularly parents, but even educators—is that playing a game is a solo thing: You tune out, you stare at a screen, and there's no educational value," says Marie Leech, one of the multi-age teachers.

But when Leech and her colleagues observed the kinds of conversations that were happening between students playing the game together, they saw that "they were verbalizing and communicating with each other and helping each other to reach decisions," says Leech. "One of the things I like about the students collaborating is that they have to put their case forward and negotiate. To me, this is really fantastic. It's not just looking at a screen and pressing buttons."

One of the issues educators face in incorporating games into the classroom is that students don't always respond well to those designed specifically for educational purposes.

"When the game makers have an educational agenda, that's very obvious," says Tarlinton. "The beauty of having a commercial, off-the-shelf game is that you can tell the difference, and so can the kids. The challenge is to take the things that were designed to be a popular cultural device and see what we can do with that."

And that's exactly what the teachers—and students—at Kurwongbah are doing. On a recent morning, one student was working on a board game that he conceptualized, combining the best of Viva Piñata and Monopoly. Aptly named Viva Piñopoly, the project required the student to search the Internet for design elements to incorporate into the game. On his own initiative, he figured out how to design the layout of Viva Piñopoly using Microsoft Excel.

The ability of games to tap critical thinking and generate self-sustaining enthusiasm, especially among boys, has been a surprising and welcome discovery by the teaching staff at Kurwongbah State School.

"I would never have thought of using Excel to build a board game," says Tarlinton, who noted that when she reflected on why the student chose that application, it became clear that he had really thought through that it was the most practical approach. "I would have been building little text boxes and copying and pasting and lining them all up."

The ability of games to tap this kind of critical thinking and self-sustaining enthusiasm, especially among boys, has been a surprising and welcome discovery by the teaching staff at Kurwongbah.

"Honestly, some of these boys who are sitting down and creating a (Viva Piñata) poster or something like that—these are not normally the kinds of things boys do," says Tarlinton. "It's not like we're trying to force something onto them. They are totally engaged. We just try to find the educational links to take advantage of that engagement."

The next step, says Tarlinton, is for educators to figure out how to harness students' passions in music, games, the Internet, and other aspects of popular culture and deeply integrate that into teaching and learning tools.

"It is just seeing the potential of something, seeing the engagement level of students, and doing something constructive with it," she says.

Exploring the World—Virtually—with Spatial Technologies

For teenagers living in and around Coolum Beach, water sports are a big deal—so big, in fact, that Coolum State High School recently offered a course called Surfing Excellence. Not only do the nearby beaches provide young people with limitless opportunities for outdoor activities, but they also are the foundation on which the area's tourism economy and many of the region's jobs are based.

So it didn't take much to engage the students in Sally Vellar's ninth-grade geography class as they used spatial technologies to investigate pollution of a local swimming hole—Stumers Creek—that crosses a popular stretch of sandy beach before emptying into the ocean.

Spatial technologies such as geographic information systems (GIS) and the Global Positioning System (GPS) are being used by governments and industry to map, navigate, collect, analyze, and model geographic information.

At Coolum State High School and other schools in Queensland, spatial technologies are being used as an exciting new learning tool to engage students in learning about the world around them, including their local communities.

"Since everything is 'somewhere' on the earth's surface, spatial technology has a broad range of uses across industry and education," says Meegan Maguire, project officer for the Spatial Technologies in Schools project managed by the ICT Learning Innovation Centre and co-sponsored by Microsoft.

Applied across a range of subjects, including geography, math, business, and the sciences, spatial technologies enable students "to become active citizens investigating community issues, including water quality, environmental hazards, and proposed development projects," says Maguire. "Through this process, students apply higher-order thinking skills to synthesize, analyze, and hypothesize information in ways that help them become lifelong learners."

For example, the students at Coolum used GIS to undertake a virtual field trip to Stumers Creek, conducting a spatial analysis of human impact and an assessment of various indicators of poor water quality. Eventually, they concluded that the creek was unsafe for swimming. Using GPS data from various testing locations, the students were able to develop a set of proposed strategies for improving the water quality, which were presented to and adopted by the local Maroochy Shire Council. Today the creek is once again swimmable.

"As students, we can affect what's going on in our environment, and using GIS, we can make a difference," says a student who participated in the research effort.

Subsequent classes taught by Vellar have continued to monitor water quality in Stumers Creek; examined the impacts of a proposed shopping center, movie studio, and industrial park; and conducted a transportation and traffic study.

Incorporating the use of computers, the Internet, and spatial technology software into her geography classes has enabled "really powerful engagement with kids," says Vellar. "Some students who had been disengaged from learning and were presenting with behavior issues all of a sudden were doing things they knew how to do really well, so they could teach the class and they could teach me. It's so cool when you see it happen and the kids actually grow."

Spatial technologies have been incorporated into curriculum and educational programs throughout Queensland. For example:

- **Trinity Bay State High School** students used GIS software and data to assess the susceptibility of local roads to erosion using criteria such as rainfall, geology, and vegetation, and the information was submitted to a local agency for consideration as a recommended maintenance plan.
- **Pimlico State High School** used GIS to work with the Townsville City Council on an assessment of water quality in the city's major waterways.
- **The North Keppel Island Environmental Education Centre (EEC)** applied GPS to the mapping of coral around the island and used that information to discuss reef ecosystems, including potential positive and negative human influences, long-term predictions for the biodiversity of the reef, and strategies for protecting the reef.
- **The Boyne Island EEC** used geocaching activities (treasure hunts using GPS to find hidden objects) to increase student interest in exploring the island and learn about the environment.

"The implementation of spatial technologies enables worthwhile learning experiences for students, motivates teachers to try new teaching methods, and provides students with career pathway opportunities into a rapidly growing field that is always looking for qualified people," says Maguire.

Conclusion

There is still much to learn about integrating games and new technologies into the classroom, but the unique partnership between Queensland's ICT Learning Innovation Centre and Microsoft underscores that educators don't have to make a choice between education that is relevant and meaningful and learning activities that are fun. Indeed, the Games in Learning and Spatial Technologies in Schools projects seem to suggest that at least in some instances, the more fun learning activities are, the more relevant and meaningful they can be.