Uncertainty, a gift and a challenge

How best can we prepare our students for 2040?

The National Initiatives and Performance Directorate, which sits within the External Affairs and Regulation Division, develops cross-divisional policy proposals and strategic projects and pursues opportunities to leverage national policy reform. The work of the National Initiatives and Performance Directorate aims to position NSW as a national leader in education, including through the Education for a Changing World project.

Introduction

The NSW Department of Education challenged a consortium of University of Sydney academics, led by Professor John Buchanan, to consider the important question: what will today's kindergarten students need to not just survive, but thrive, in the 21st century? This research project forms part of the department's Education for a Changing World initiative, which is considering the predicted changes that artificial intelligence (AI) and other developing technologies could bring to Australia's economy, workplace and community, and the implications of this for school education.

> What will today's kindergarten students need, to not just survive, but thrive, in the 21st century?

The University of Sydney's report, 'Preparing for the Best and Worst of Times', draws on the expertise of scholars from faculties across the university, including engineering, health, business and education. The report encompasses a range of themes that are thought-provoking and challenging for both educators and the broader community.

Future Frontiers: education for 2040 panel discussion (1 hr, 27 mins, 53 secs), moderated by Leslie Loble, Deputy Secretary, External Affairs and Regulation, was introduced by Mark Scott, Secretary of the Department, and featured a panel of academics, practitioners and business personalities discussed the implications for education of the current artificial intelligence and other emerging trends.

engineering and applied labour economics provides evidence for the argument that having specific knowledge is important. Gaining 'generic' skills or, more accurately, learning dispositions which embrace, for example, collaboration and problem solving, may be most effectively acquired in the context of mastering specific disciplinary, trade or professional expertise. In other words, content matters when it comes to developing and utilising the capacity to solve real-world problems, and contribute to the collective effort to tackle complex challenges. These arguments from the report were recently endorsed by Dr Alan Finkel (2018, PDF 630KB) at the Australian Science Teachers Association Annual Conference.

4. *Are current approaches to gaining specialised knowledge providing students with well-developed learning dispositions?*

   The mainstream academic curriculum focuses on fairly abstract analytical skills, and is perceived by many students as 'too academic' and irrelevant to real-world situations. In contrast, the focus of vocational education and training is viewed by many as 'too narrow' and overly focussed on the immediate needs of any one job. In fact, academic disciplines should better highlight their broader application to diverse problems beyond those traditionally encountered in the labour market; and vocational education would benefit from broadening existing domain definitions to allow greater job role flexibility. In developing broad capacity by bringing together the academic and the applied, we may be upskilling students to better cope with uncertainty and change.

Implications for schooling

The report's authors argue that there needs to be greater engagement with AI by educators, including formal documentation such as the curriculum. For the authors, this means much more than teaching students how to code. Rather, students need to be provided with opportunities to learn about and apply 'digital fluency' – the ability to reflect on both the 'covert' and 'amplifying' impact of AI – to real-life scenarios, including the changing requirements of the future workforce.

They further argue the challenges associated with AI require more than marginal adjustments to established arrangements. Education, like most social domains, benefits from engagement from the private and public sectors, community organisations and the broader community. But stronger partnerships are needed to deliver the education experience that young people will need to prepare them for the future. While many schools are endeavouring to do this, the authors contend that quality engagement from the business sector has been limited.

Central to these stronger partnerships will be teachers, who will remain the custodians of pedagogy, and the guardians of how best to educate for the flourishing citizens of tomorrow.

References and further reading

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Education for a changing world. (2018).

Finkel, A. (2018, July). *Raising Twenty-First century citizens*. Keynote address presented at the Australian Science Teachers Association Annual Conference (CONASTA 67), University of Sydney.

How to cite – National Initiatives and Performance Directorate, NSW Department of Education. (2018). Uncertainty, a gift and a challenge: how best can we prepare our students for 2040? *Scan, 37*(8).

About artificial Intelligence

While exactly how far AI can and will develop remains contested, consensus exists that it will have an increasing and substantive effect on our future work, lives and communities. This influence is predicted to extend to the job types and roles available to our children, and the structures and processes we use to connect socially and make decisions. Most importantly, perhaps, AI is predicted to amplify and accelerate societal change, including through its intersection with other factors such as labour market fragmentation, globalisation, social and economic inequality, and climate change.

Exactly how these changes will manifest is, of course, a great unknown. Yet it is this shifting landscape that the report's authors identify as the core challenge for today's educators, raising the question: how can we best prepare our students for uncertainty and a rapidly changing future?

How best can we prepare our students for uncertainty?

The report advocates that any effective educational approach, serious about preparing students for uncertainty, must grapple with the following four questions:

1. *What types of pupils do we want to develop: highly flexible 'labour' or flourishing, productive citizens?*

   Many prescriptions in the current 'future of work' literature are predominantly concerned with developing what may be described as the ultra-flexible worker. That is, people able to meet ever-changing market requirements. In contrast, the health, humanities and social science disciplines highlight the importance of investing in, and educating for, human purpose beyond the individual's employability or skill-set relevant to industry.

2. *How can education contribute to people flourishing over their life course?*

   Human development is a complex, multi-dimensional process. The early school years are critical for developing people's 'learner identity' or disposition, which can be understood as the propensity for curiosity, ability to concentrate, resilience in the face of challenge, and the capacity to develop learning relationships that support them in their learning journey. Ideally, a well nurtured learning identity can result in people who are empowered to, and are ultimately excited by, learning.

3. *What is the relationship between developing general learning dispositions and developing specialist expertise?*

   Literature from disciplines as diverse as cognitive psychology, education, philosophy,

Through a tunnel darkly

Learners' behaviours, attitudes and preferences should all be considered when designing a learning space ? formal or informal. However, why not engage learners at the very beginning of the design process to reveal what young people consider are the absolutely essential ingredients in the design and features of a contemporary, informal learning space?

This article by Megan Perry, Manager of Learning at the State Library of NSW, reveals the story of powerful conversations, inclusive workshops and the process that informed the design, building and opening of the John B Fairfax Learning Centre in the historic Mitchell Library building at the State Library of NSW.

Thoughtfully designed learning spaces

Research tells us that institutions which have learning at the heart of their organisational mission and have prominent, well designed, inclusive learning spaces that cater for learners with additional needs have positioned themselves well within their communities and are aiming for the highest order of engagement and enjoyment. Thoughtfully designed learning spaces, separate from galleries, reading rooms or other defined spaces, are essential for the promotion of meaningful learning and allow for a greater range of learning design, engagement and experience, with the potential to connect with the widest possible audience (The Clore Duffield Foundation, 2015, p. 2).

The atmosphere and the environment in which we construct new knowledge also has an impact on what, when and how we learn.

In 2003, Susan Groundwater-Smith and Lynda Kelly, advocates of student voice, conducted a research project at the Australian Museum where they asked school students what helped and what hindered their learning. Four categories were identified:

- 'Cognitive: when they know how things work, have opportunities to ask questions, seek information from varied sources, and are stimulated through various senses
- Physical: when safe and comfortable, able to move easily, space is well lit, and the scale is appropriate

  Social; when learning with friends, a satisfying social occasion

- Emotional: when connected to their interests but not when emotionally confronted' (Groundwater-Smith and Kelly, 2003, p. 4).

Understanding the skills required for the contemporary learner in a constantly changing world, and the powerful messages of children, the Learning Services team at the State Library of NSW had been engaging in student voice research since 2011. Young people had also been involved in exhibition design, program development and program evaluation. As Marcus and Trustram (2009, p. 4) highlight:

> Consultation with children and young people has a moral and pragmatic basis. Their entitlement to be heard is a basic human right. But in principle consultation results in activities and services that better suit their needs and wishes, while helping them develop as responsible citizens and contribute to society.

Valuing consultation

In mid-2016, the State Library of NSW received a generous philanthropic donation from Mr John B Fairfax for the building of a new learning centre and family room that would sit within the fabric of the historic Mitchell Library building. The new area would be adjacent to the world-famous Mitchell Reading Room. It would be built at the same time as the major gallery expansion that was being planned, although would remain a separate project with its own architect.

Seeing an opportunity to further embed student voice and engage audience research, the Learning Services team quickly developed a framework to involve the people who would primarily be using the space - school students and teachers - in its design.

A consultation workshop was planned for September 2016 and six schools from a range of socio economic areas were invited to participate. Additionally, university lecturers, teachers, teacher librarians, school ICT staff, and staff from the five branches of the State Library were invited to a half day consultation facilitated by the Manager of Learning Services and the Senior Education Officer.

After an icebreaker activity and an introduction to the project, participants visited the site of the new learning space. In the mid 1970s, a mezzanine floor had been installed to house collections and this floor transected the space, cutting in half the beautiful arched windows and making it quite difficult for participants to imagine what the removal of the floor would reveal.

Workshop participants were then introduced to the Library's learning audience through personas. The audience profiles included David the artist, a Year 2 excursion group, an Elder from Walgett, third year students from the University of Western Sydney, a Year 9 history excursion group, a group of pre-service teachers, a group of teacher librarians, a retired nurse with an interest in family history, the Cheng family, Josh the gamer, a resident from an aged care facility and, finally, Sam a 4 year old preschooler.

Personas were distributed to each mixed group, and brainstorming focused on what each persona might like in a learning space and what they would absolutely require. An educator from the Learning Services team facilitated each group. Participants investigated questions such as:

- what could happen in this space?

- what would you need in the space in terms of physical or virtual materials to allow it to happen?
- what equipment and physicals aids would assist?
- what should the mood or atmosphere be in the space?

Common themes were grouped together. After much discussion and moving of Post-it notes, participants were asked to include something spectacular, unusual or inspiring that could be included.

A lively discussion about what constituted the perfect learning environment ensued. A blank plan was issued to each group and participants collaborated on a design. Participant feedback was shared and ideas circulated. The final word of the day came from the students who responded to the question: 'what is important for a knowledge institution like the State Library of NSW to remember during this design process?'

Informed by the first consultation and a schedule of visits to other libraries, cultural centres and schools in Australia, England and New Zealand, an extensive brief was developed, as was a vision statement and some grand objectives:

> The learning centre will be a light, bright, flexible, exciting, engaging, digitally rich, hands on learning environment for children and families, school students and young people. Its primary clients will be children and young people catered for by a range of onsite programs for schools and less formal programs for holidays and weekends. The centre will also include an unstaffed drop in family space.

'The Learning Centre will:

- position the State Library of NSW as an excellent learning destination
- highlight our world-renowned collection through innovative learning programs
- place the Library as a leading, innovative cultural institution pushing boundaries in the delivery of outstanding learning programs and events
- attract national and international recognition.'

In March 2017, after architects were appointed and several design meetings held, a second consultation workshop was held with the same schools that had participated previously. By this time, a physical mock-up of the space had been constructed by the architects. This was used to inspire further conversations about what could happen in the space and what was needed to create a rich learning environment that was fun and engaging for a wide range of learners.

In the second consultation, students gave the architects and the Library excellent feedback on what not to forget when they were designing the space. Keywords that echoed from the first consultation included flexible, fun, inviting, surprising, relaxing, engaging, inspiring, challenging, accessible and thought provoking. These themes were consequently picked up by the architects as they proceeded to the design phase.

Key space requirements

A consequence of the workshops and consultation were clear messages around the absolutes which the Learning Services staff could reinforce in design meetings.

The space must include:

- a large open area that can accommodate students and teachers engaged in learning programs
- children's holiday programs, such as art and craft making, Minecraft, photography workshops
- performances to massed audiences, such as music and theatre performances
- a small high-end IT lab for young people to collaborate around data and visualisation, 3D and 4D replicators
- display space for large and small replica item collection and learning participants' works - written, art, craft, digital
- flexible space for artist/writer in residence or other creative to work
- space for school groups to eat
- space for bag storage facilities
- a bathroom with single accessible toilet.

The family space - adjacent to but not accessible from the main learning space - must offer an unstaffed drop-in space for families to engage in activities such as reading, craft and art making.

The space will feature:

- a high impact, visually stimulating environment (as per the current Glasshouse) which elicits a 'WOW' response from participants - **and bears no resemblance to a school classroom**
- dramatic use of high ceiling space and large feature windows which should provide as much light as possible. The design should be considerate of heritage features and not fight against it.
- a connection to the rest of the newly renovated Library spaces
- flexible, visible artefact displays
- extensive use of large LCDs, and other digital display.

The final design

The results are amazing. Entry to the space is through a door hidden behind a 98 inch colour portrait digital screen on the wall. The hidden door currently shows a beautiful rendition of the Major Taylor Panorama (Panoramic views of Port Jackson, ca. 1821 / drawn by Major James Taylor, engraved by R. Havell and sons) from the Library's exquisite collections. This screen can be personalised to welcome school groups into the Library's learning space. The screen may feature a beautiful artefact or manuscript from the Library's collection, an event poster or a directional sign or message, whilst giving children and young people a magical entry to a fascinating space designed for and by them.

Visitors enter via a door hidden behind a 98 inch colour portrait digital screen

Entering through the door, learners head down a four metre long tunnel with circular cut-outs on each side wall which reveal artefacts that can be touched and manipulated. Artefacts such as a rare Mercedes typewriter, a vellum skin on a wood stretcher, a marquette of Trim, Matthew Flinders' cat, and many other enticing objects line the walkway.

The entry tunnel features circular cut-outs containing artefacts that can be touched and manipulated

At the end of the tunnel, the enormous curved windows facing the Domain and the Botanic Gardens illuminate the open space with light streaming across a natural cork floor. Four central columns have been activated with iPads, pull-down paper rolls, mirrors, and whiteboard surfaces. Writeable wall surfaces, acoustic panelling and ply feature in the modern and appealing space, with informal break-out areas and comfortable soft furnishings. An accessible toilet provides for the comfort and inclusion of people with additional needs.

Grand windows flood the space with natural light.

Two large screens display collections or stream experiments from the Library's DX Lab, or can be used in teaching and learning. A green screen, data projector, activated floor projection device, and large presentation screen and camera (capable of video conferencing teacher events, presentations, performances and the like) are all available in the space. A fully functioning kitchen with dishwasher, washing machine and dryer, convection microwave, art sinks at different heights, refrigerator and, importantly, a coffee maker feature in a sleek, fold-away design.

Green screen

A small lab called the DEN (Digital Engagement Nest) houses high end Mac and highly specked PC computers, a 3D printer, display screen and a view over the Domain.

Perhaps one of the nicest additions for the Library is a dedicated space for families as they pause between exhibitions, or just relax in a quiet child-friendly space as they gather their thoughts before engaging in a learning activity. The family space is located next to the Learning Centre. Young children can see through the wall into the entry tunnel, relax in a circular wall seat, read from an array of books or explore the various toys and hidden drawers.

The family space offers a circular wall seat, hidden drawers, and a view into the entry tunnel

The State Library of NSW has rethought how it engages with children, families, young people, teachers and students. It has actively engaged with the audience of the present and the future and worked to ensure that the voice of young people is not only heard but actively listened to.

Rather than relying solely on input from Library staff and architects, consultation with the main users of the new space - children and young people - has ensured that the John B Fairfax Learning Centre is a far more effective and exciting learning space.

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How to cite this article – Perry, M. (2018). Through a tunnel darkly. *Scan 37*(8).

Last updated: 24-Apr-2020

Technology for learning leader in robotics

Jennifer Riley, Relieving Principal of Melrose Park Public School, explores how robotics can help support student engagement, learning and skills development.

Melrose Park Public School is a small school of 212 students situated in the area of West Ryde. The school endeavours to empower all students to be successful, engaged learners who employ critical and creative thinking skills to persevere in learning. Robotics is one such way that students build their confidence, teamwork and problem solving skills.

To prepare students to be critical and creative thinkers, Melrose Park Public School implements a range of innovative and future focused practices designed to ensure their students are equipped with problem solving capabilities and strong collaborative skills.

Contributing to this focus, the school's Innovation and Engagement Team, under the leadership of Mrs Pam Grover, builds the capacity of classroom teachers to integrate information and communication technology (ICT), including robotics, into their teaching and learning activities.

Kindy kids learning coding

Extra-curricular programs in robotics

The robotics programs began in 2012 as an extra-curricular activity where students were invited to attend lunch time sessions. Despite having only a small number of Lego RCX robots, participation and interest in the robotics program was high. Over time, a formal Robotics Club was developed and some Lego EV3 robots purchased. The club enabled students to develop their programming, building and coding skills. The school established its own robotics competitions where students showcased their learning to peers and the wider community.

As student confidence and skills developed, the school entered teams in RoboCup Junior, an educational competition for students in Years 3 to 12. This competition is a project-oriented educational initiative that addresses social development by encouraging sportsmanship, sharing, teamwork, cooperation, organisational skills and understanding of differences between individuals. In 2016, a Year 6 robotics dance team achieved the amazing feat of coming 2nd in both regional and state competitions and 5th in the national competition.

Over time, classroom teacher interest in robotics peaked as teachers witnessed high levels of student engagement in the Robotics Club and in the competitions. A genuine desire began to develop among staff to participate in professional learning in robotics.

Integration of robotics across the curriculum

As part of school planning over the last two years, robotics has been identified as an area for integration across the curriculum. Pam Grover collaborated with classroom teachers to integrate robotics effectively in the classroom and led whole school professional learning sessions to build these teacher capabilities.

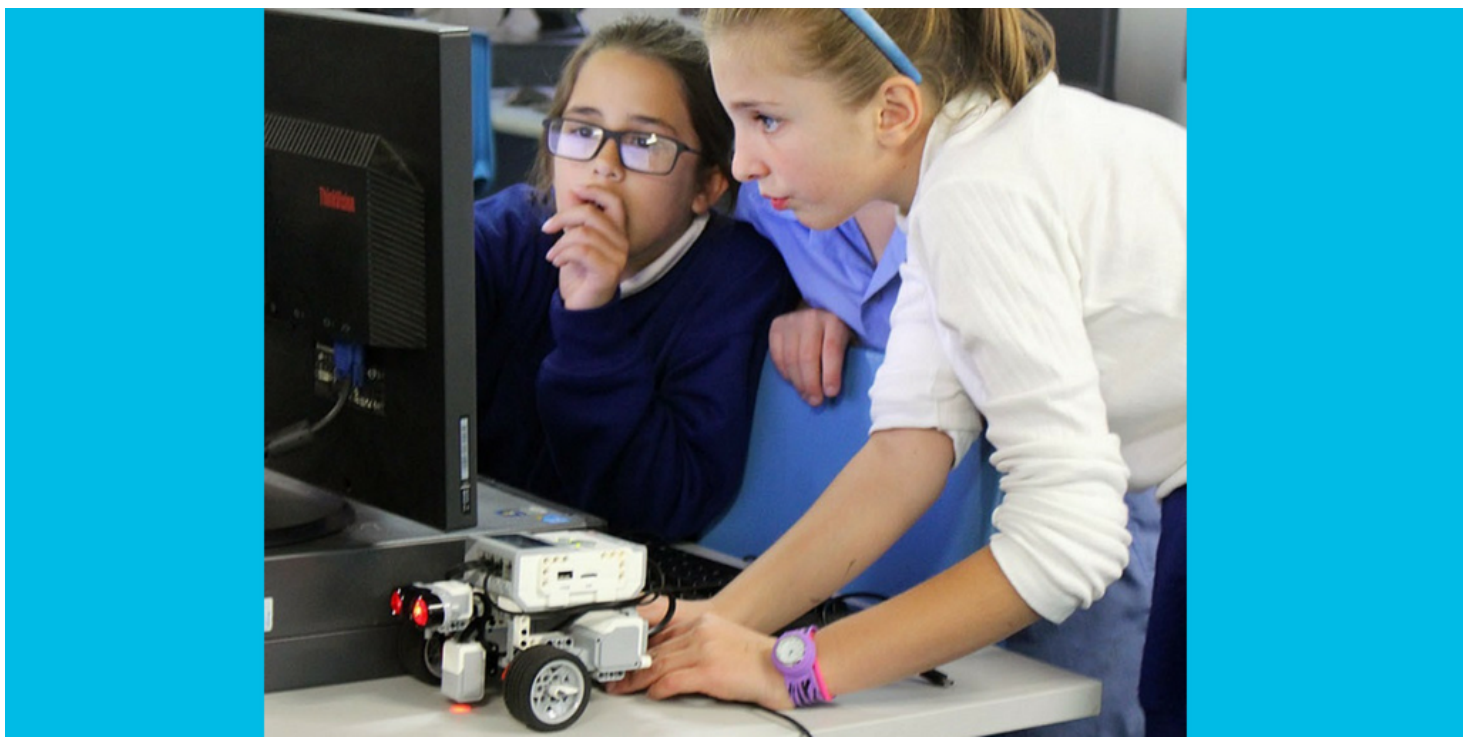
Alongside a growing teacher skill set and confidence, robotics began to find its way into classrooms. In Kindergarten, Year 1 and Year 2, BeeBots were being used to explore the concept of 'position' including navigating to locations on local and world maps.

BeeBot map

Year 2 students enjoyed a STEM unit where they coded a dance sequence in Scratch Junior then programmed dances for Dash robots and Ozobots. Year 3 students enjoyed experimenting with programming the Dash and Dot robots, Ozobots and a drone robot.

Dash with Year 4

Year 4 were introduced to programming Lego EV3 robots. In Years 5 and 6, EV3 robots were integrated into science lessons on light. Teachers were inspired to utilise the tool in their lessons resulting in more motivated students who actively participated, finding these learning tasks engaging and innovative.



Robotics in the classroom

In 2018, the focus on innovation and embedding robotics into the curriculum has continued and while Pam Grover is heavily involved in leading robotics initiatives, other teachers across the school are supporting their colleagues in the integration of robots into teaching and learning activities. Robotics has become culturally engrained and student interest continues to grow. Melrose Park Public School recently had the opportunity to share its robotics journey through the NSW Department of Education Technology for Learning (T4L) competition. The video submission, MPPS robotics program by Pamela Grover (3 min: 1 sec), demonstrates aspects of the school's robotics journey.

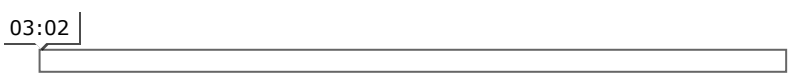
Cosmo

How to cite this article - Riley, J. (2018). Technology for learning leader in robotics. *Scan, 37*(8).

Last updated: 06-Feb-2020

MPPS Robotics program

from **Pamela Grover**



The school community was delighted to be announced ET4L Award Winner Leader in Robotics and to be able to showcase its robotics programs to NSW public schools.

Robocup 2018

The use of robotics in building effective learners

Not only have robotics programs contributed to engaging our students, the programs have also enabled them to develop effective learner dispositions. Through robotics, students are required to think critically, problem solve and collaborate.

Robotics has encouraged students' design thinking skills and sharpened their computational thinking. They have learned to reflect on their design and programming processes and continually evaluate steps and methods to make improvements.

The school believes wholeheartedly in developing capable, global citizens. Robotics has contributed to this by making a positive impact across the school with staff seeing high levels of student engagement and the creation of more resilient learners.

SPaRK – SIX Maps

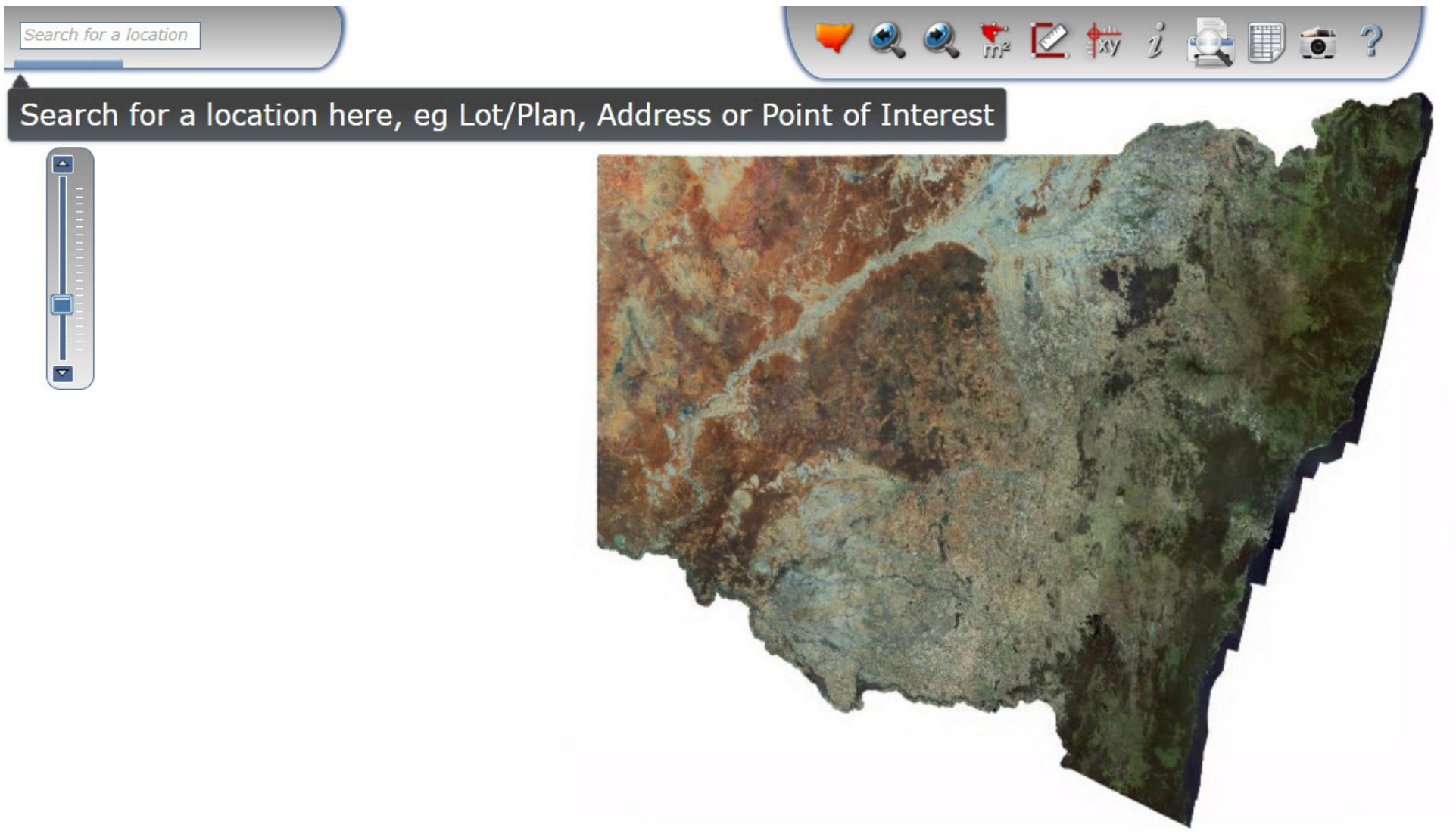
Engaging students in HSIE using maps and spatial technologies.

By Prue Sommer - teacher and HSIE coordinator at Murray Farm Public School.

Resource overview

A Shared Practice and Resource Kit (SPaRK) for geography and history Years 1-10.

SIX Maps by NSW Department of Finance, Services and Innovation (DFSI) Spatial Services (2018).



SIX Maps

Part of the DFSI Spatial Services portal, SIX Maps is a free online mapping tool, well suited to supporting students' historical and geographical inquiry. SIX is an acronym for Spatial Information eXchange. Accessible on computers and tablets, the SIX Maps viewer provides access to a range of

NSW primary spatial data through an intuitive public interface. Content available through SIX Maps (and its companion tools) includes:

- cadastral maps - showing the extent, value and ownership of land
- topographic maps - detailed, accurate graphic representations of features that appear on the earth's surface, such as relief and contour lines
- imagery - satellite, road, historical photographs
- place names - suburbs, cities, regions
- addressing data - private and commercial addresses.

The interface opens with a large-scale satellite image of NSW. A menu across the top of the screen includes tools for measuring area and distance, identifying coordinates, zooming in and out, printing, and dropping CSV files or images onto the map. On the right, 'Map contents' and 'Basemaps' offer a range of drop-down boxes. These enable users to select the map's desired graphic layers (such as flood footprint or flood imagery), map layers (such as lot labels, survey marks and lot boundaries), and basemaps (such as topographic map, NSW road map, satellite imagery and historical imagery from Sydney in 1943).

The DFSI Spatial Services portal also contains a range of other spatial and cadastral services, which may support learning in geography, particularly in Stages 3, 4 and 5. These include:

- NSW Globe
- NSW Spatial Data Catalogue
- CORSnet, Spatial Web Services
- NORNS, Surveyor General's Directions
- Clip and Ship
- Map Store
- Imagery and elevation programs
- Imperial to metric conversion tools
- Survey Mark Sketches

Educational significance

SIX Maps has the capacity to engage and inform students in both history and geography - though it has a greater depth of functionality for the latter. Once demonstrated, students can gather geographical and historical information about their local area or state. This versatile resource could be used in its simplest capacity with a Stage 1 HSIE class or, by utilising all the geographical tools available, could deepen skill acquisition in Stage 5 geography.

Geography

The Geography K-10 Syllabus aims 'to stimulate students' interest in and engagement with the world. Through geographical inquiry, students develop an understanding of the interactions between people, places and environments across a range of scales in order to become informed, responsible and active citizens' (NESA, 2015).

One of the important differences of the new syllabus is a more specific focus on geographical skills and tools, including map and spatial technologies. This is where SIX Maps becomes invaluable, supporting mandatory skill outcomes and geographical tool use.

History

The History K-10 Syllabus aims 'to stimulate students' interest in and enjoyment of exploring the past, to develop a critical understanding of the past and its impact on the present, to develop the critical skills of historical inquiry and to enable students to participate as active informed and responsible citizens' (NESA, 2012). In this syllabus, there is a more specific integration of historical concepts such as 'change and continuity' and 'cause and effect'. There is also an emphasis on historical skills such as sequencing of time, source analysis and historical perspectives.

SIX Maps supports students' exploration of these skills and concepts. For example, students can investigate an area of land, historical site or environment, and map the changes that have occurred over a period of time. Overlaying the lot boundaries and labels enables students to trace changes in ownership and land use over time, assisting the process of historical inquiry.

Suggestions for using this text

When introducing SIX Maps, each student should ideally have access to a computer or tablet. This provides the opportunity and time for students to independently explore the available tools, building their confidence before undertaking historical or geographical inquiries. Guided instruction would also be beneficial if an interactive board is available.

Teaching activities

Case study - Stage 1 History - The past in the present

Students at Murray Farm Public School use SIX Maps in a local area study of St Paul's Anglican Cemetery (Carlingford).

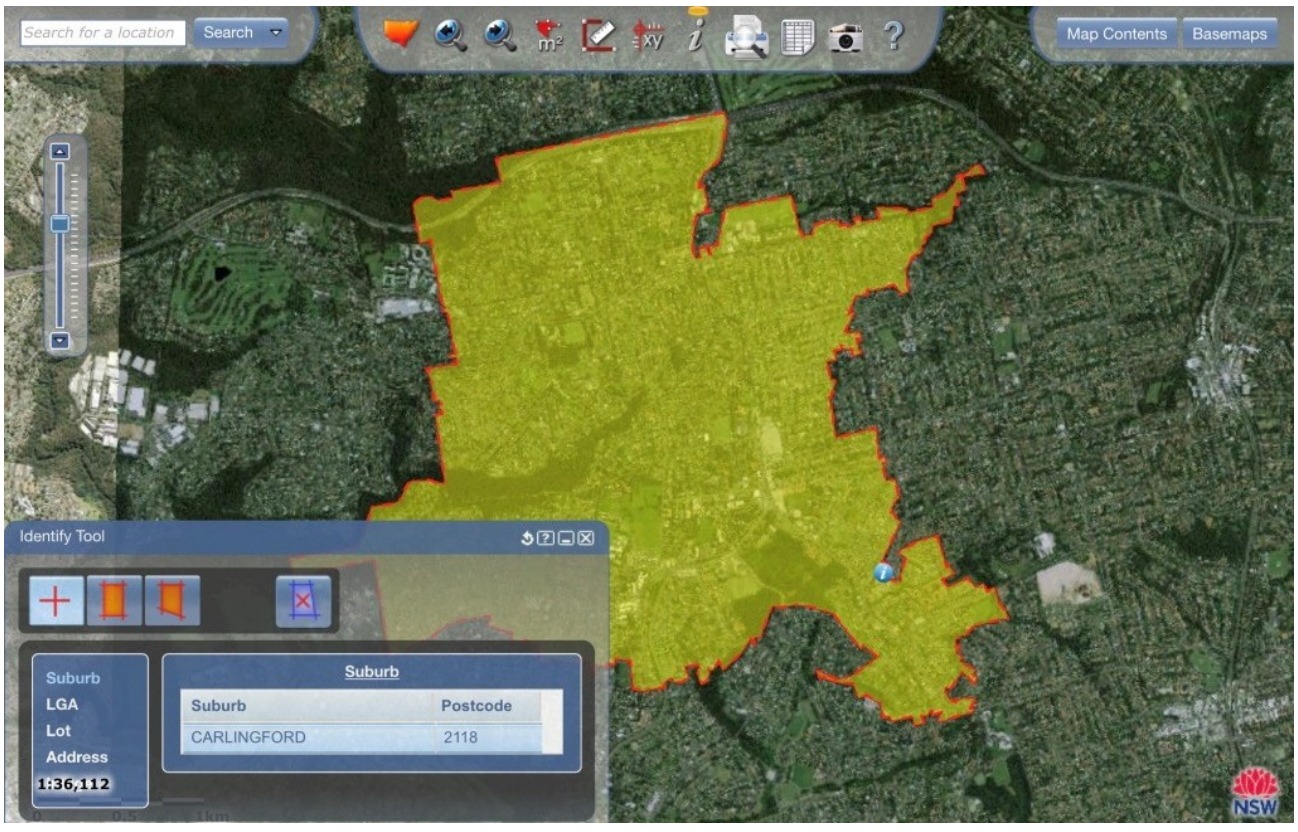
One of several resources used in this historical inquiry, SIX Maps stimulated students' interest in exploring the history of their local area. Students drew conclusions about their local historical site using primary source aerial photos to compare and contrast. They observed change and continuity in their historical site and the surrounding area of their community. Consequently, students were able to discuss concepts such as cause and effect in relation to the data they collected and understand the significance of the cemetery and its value to the community. Many of the local community's original early settlers are buried in the cemetery, including the school's name sake, Andrew Murray.

Inquiry questions

- What remains of the past can you find in Carlingford?
- What do they tell us about Carlingford?
- Are the remains of the past (cemetery) important to the community?
- Should we preserve St Paul's Anglican Cemetery?

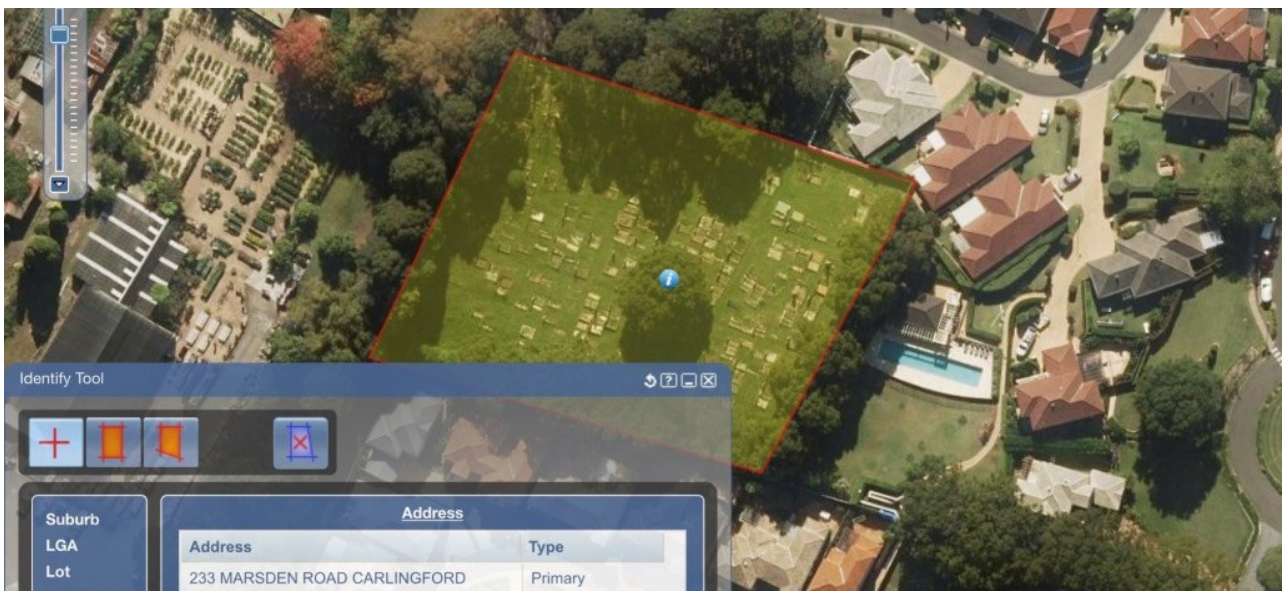
Using SIX Maps

1. Students used SIX Maps on iPads and laptops to do a general search of the suburb of Carlingford.



2. Students completed an advanced search of the cemetery's address, which they had already found during a previous inquiry using other sources.

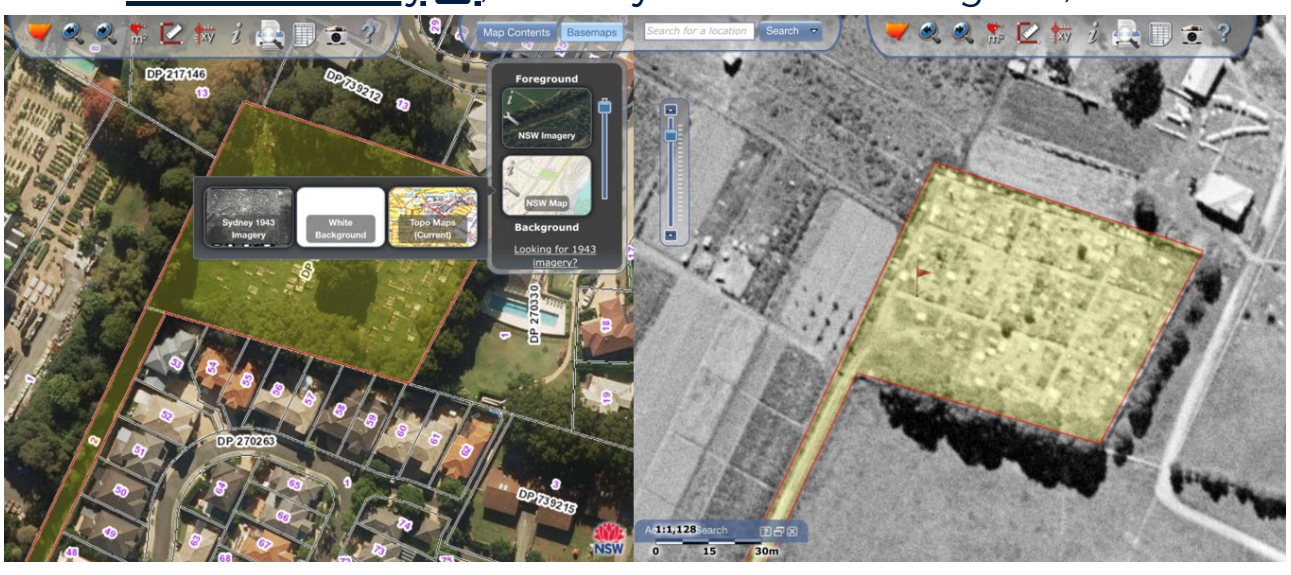
3. Students used the zoom in tool to see a closer bird's eye view of the cemetery, then marked its location using the identify tool.



4. Students selected 'Map contents' to mark out the lot boundaries and add lot labels, so they could ascertain who owns the visible pieces of land - particularly the cemetery - to determine who should be maintaining and preserving it. Students could then write letters persuading the local council or Anglican church to take better care of the cemetery and preserve it as a local

historical site, even though it is no longer an active burial site.

5. Finally, students were ready to see changes to the land and land use over time, so they selected the 'Basemaps' drop-down and chose 'Sydney 1943 imagery'. They then used the slide bar to reveal how the land had changed from 1943 to the present day. Using the zoom in tool, students took a closer look at the cemetery and the changing headstones. Using SIX Maps, together with the Australian Cemeteries Index, students were able to locate where and when Andrew Murray, an early settler of Carlingford, was buried.



Other teaching activities - Geography

Outcome	Geographical tools available in SIX Maps	Suggested activities

Outcome	Geographical tools available in SIX Maps	Suggested activities
A student communicates geographical information and uses geographical tools for inquiry GE1-3	Maps – M Large-scale maps. Spatial technologies – ST Virtual maps, satellite images. Visual representation – VR Photographs, multimedia, web tools. Note: Also see NSW Globe.	**Area of inquiry – local shops** Students use the advanced search tool to locate their local shops using 'Basemaps' – NSW road, satellite and 1943 imagery. Students use 'Map contents' to add lot labels and boundaries, adjusting the overlayed transparency on their local shops map. Students use the print to PDF tool to copy the original map of the local shops, as well as the version overlayed with lot boundaries and labels. Using these maps, students create an interactive book via apps such as Book Creator, showing how the land use has changed over time.
A student communicates geographical information and uses geographical tools for inquiry GE2-4	Maps – M Large-scale maps. Maps to identify location, direction, distance, map references, spatial distribution and patterns. Spatial technologies – ST Virtual maps, satellite images, global positioning systems (GPS). Visual representation – VR Photographs, multimedia, web tools. Note: Also see NSW Globe.	**Area of inquiry – local wooded area** Students use the search tool to locate a local wooded area using 'Basemaps' – NSW road, satellite maps and 1943 imagery. Students use the distance tool, area tool and coordinate tool to collect data of their local wooded area. Students use the print to PDF tool to record their wooded area across various basemaps and add these maps to their geographical inquiry. Using the image dropper, students can drag and drop images taken from their fieldwork onto the map. Using the identify tool, students add information about the wooded area.

Outcome	Geographical tools available in SIX Maps	Suggested activities
A student acquires, processes and communicates geographical information and using geographical tools for inquiry GE3-4	Maps – M Large-scale maps, small-scale maps, topographical maps. Maps to identify location, latitude, distance, map references, spatial distributions and patterns. Spatial technologies – ST Virtual maps, satellite images, global positioning systems (GPS). Visual representation – VR Photographs, aerial photographs, multimedia, web tools. Note: Also see other Spatial Services tools and services, including NSW Globe.	**Area of inquiry – State forest conservation** Students use the advanced search tool to locate a State forest they wish to investigate using 'Basemaps' – NSW road, satellite, topographical maps and 1943 imagery. Students use the distance tool, area tool and coordinate tool to collect data about their selected State forest. Using the image dropper tool, students can add images taken from their fieldwork, if possible, or collected from other sources. Note: Within 'Basemaps', a blend of 'NSW imagery' and 'Topo maps (current)' looks the same as Garmin's Bird'sEye service. More detailed topographical maps from your selected area can be downloaded (PDF) or purchased (hard copy) from the Spatial Services Map Store.

Outcome	Geographical tools available in SIX Maps	Suggested activities
A student acquires and processes geographical information by selecting and using geographical tools for inquiry GE4-7	Maps – M Relief maps, topographic maps, choropleth maps, isoline maps, précis maps, cartograms. Maps to identify direction, scale and distance, area and grid references, latitude and longitude, altitude, area, contour lines, gradient, local relief. Spatial technologies – ST Virtual maps, satellite images, global positioning systems (GPS), geographic information systems (GIS). Visual representations – VR Photographs, aerial photographs, multimedia, web tools. Note: Also see other Spatial Services tools and maps.	**Area of inquiry – Landscapes and landforms** Students perform an advanced search to locate a significant landscape or landform, such as The Three Sisters. View this location using 'Basemaps' – NSW road, satellite, topographical maps and 1943 imagery. Students select appropriate tools to collect relevant data about their landform study (for example, using the coordinate tool to determine latitude and longitude). Students use the image dropper tool to drag and drop images (taken personally or sourced from the internet) of their landscape or landform onto the map. Note: Within 'Basemaps', a blend of 'NSW imagery' and 'Topo maps (current)' looks the same as Garmin's Bird'sEye service. More detailed topographical maps from your selected area can be downloaded (PDF) or purchased (hard copy) from the Spatial Services Map Store.

Outcome	Geographical tools available in SIX Maps	Suggested activities
A student acquires and processes geographical information by selecting and using appropriate and relevant geographical tools for inquiry GE5-7	Maps – M Relief maps, topographic maps, cadastral maps, thematic maps, isoline maps, land use maps, special-purpose maps, maps to identify direction, scale and distance, area and grid references, degrees and minutes of latitude and longitude, bearings, aspect, altitude, area, density, contour lines, gradient, local relief. Spatial technologies – ST Virtual maps, satellite images, global positioning systems (GPS), geographic information systems (GIS), remote sensing data, augmented reality. Visual representations – VR Photographs, aerial photographs, illustrations, multimedia, web tools. Note: Also see other Spatial Services tools and maps.	**Area of inquiry – Environmental change and management – Moving to NSW** Students use the advanced search tool to locate a new place of residence in NSW using 'Basemaps' – NSW road, satellite, topographical maps and 1943 imagery. Students select the appropriate tools to collect relevant data about their new address and the surrounding environment. Note: Within 'Basemaps', a blend of 'NSW imagery' and 'Topo maps (current)' looks the same as Garmin's Bird'sEye service. More detailed topographical maps from your selected area can be downloaded (PDF) or purchased (hard copy) from the Spatial Services Map Store.

Experimenting

HSIE

Students could use the SIX Maps tools to locate, select and annotate the natural and human features of their school property, tracking changes over time. For example, the class could compare and contrast the size of the grassed and concreted areas and how the use of these spaces has evolved over time. Students could focus their attention on the number of portable buildings on the site and their impacts on the local environment.

A two-fold 'cause and effect' inquiry could follow:

1. Consider the resulting reduction of play areas. What are the possible impacts for students' physical activity?
2. Consider fluctuations in student population through changing birth rates and/or migration into the school zone.

Creative Arts

Students could use the satellite or road maps on SIX Maps as a basis to create their own bird's-eye view of a chosen land area, either built or natural. Natural fibres and objects could be used to create the artwork. Different artworks could be created side-by-side to show changes over time.

Digital Technologies

Students could print out a satellite or road map of a chosen location via the SIX Maps printing tool. Using computational thought and language, they could then program Ozobots, Spheros or Beebots to navigate around the printed map.

References and further reading

Evans, J. (2017, February 25). SIX Maps.

Geography K–10 Syllabus © NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales, 2015.

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