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Engaging girls in STEM

It seems recently that everywhere we turn we read about girls and science, girls and technology, and girls' career choices. It is a popular theme in the media, which extends also to social media. A search of Twitter on the hashtag #stem reveals a high proportion of photos and links that relate to girls and women. From the Chief Scientist to executives in the gaming industry the message is 'where are the girls in STEM?' Increasingly this concern is broadening to encompass all students, as overall engagement in science, mathematics and technology falls.

In August, as we celebrated National Science Week and Children's Book Week, we were prompted to consider what role the school library could have in igniting interest in science and technology, particularly amongst girls. While the Book Week theme 'Books light up our world' linked neatly to this year's International Year of Light (www.light2015.org), can libraries

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build on this, and develop services that support school, system and national STEM priorities?

What is STEM?

STEM is used as an umbrella term to refer to Science, Technology, Engineering, and Mathematics. It became a trend early in the 21st century and provides a convenient hook to hold together the non-arts and humanities disciplines. The Science and Mathematics parts of STEM need little explanation. Technology in STEM encompasses both the Technologies learning area and Information and Communication Technology (ICT) capability. While there is no subject called Engineering in most school curriculum frameworks, its central pillars of problem solving, research, planning, designing, and building are readily recognised through other learning areas. A search of the Australian Curriculum for 'engineering' returns relevant results in Technologies (24), Science (17), and Mathematics (1).

There is a wealth of literature and resources available about STEM education. One key point is that for most writers STEM is about integration of these four disciplines in an interdisciplinary approach. There is also a movement that advocates the inclusion of Arts in the mix, preferring the idea of 'STEAM'. Whatever the line, this theme has ignited an enormous range of initiatives, funded by governments, commercial giants, philanthropics and grassroots organisations, all looking to solve a perceived problem.

Where is the research?

Given the amount of material published about STEM education, and the frequent references to the under-representation of girls and women across a range of endeavours, it is surprising how little in-depth research there has been in Australia in recent years. Library staff at ACER recently reviewed research in the Australian education literature from 2011 onwards to find research into ICT and gender, looking to identify any policies, practices, and programmes in Australia that focus on ICT, education, women, and/or girls. While this search was specifically about ICT in education, it is a useful place to start as the literature on STEM in Australian education is more limited. Two Australian reports are reviewed here.

ICT Skills and Training Development: a state of play paper by the Australian Information Industry Association (2012) addresses issues at different levels of education related to lack of females in the industry. The statistics it presents make for disheartening reading (p.8). The report suggests that there may be 'a branding problem', related to how ICT is packaged within education and training (p.7).

The *Digital Divas* project was a 2009-2011 ARC Linkage project conducted in schools by researchers from Monash, Swinburne, and Deakin Universities. The final project report (2012) suggested multiple contributing factors to the low participation by females in ICT. At the individual level many girls lacked confidence, knowledge of careers, game playing experience, and parental advice. In their educational institutions it was often regarded as atypical for girls to be interested in these subjects, and both the curriculum and teachers were identified as potential factors. The public image of the ICT profession was an issue, seen as having an alienating culture, involving constant change and being somewhat unstable as a career option (p.6). Digital Divas course materials are available online for re-use by schools: http://digitaldivasclub.org/vic.

What does testing tell us?

In the 2015 paper *Australian students in a digital world* (http://research.acer.edu.au/policyinsights/3), Dr Sue Thomson summarises the findings related to gender from several large scale assessment programs. She concludes that, 'despite their obvious aptitude, female students in Australia reported significantly lower levels of interest and enjoyment in using computers than male students' (p.15).

Where to from here?

There is research that confirms the state of affairs concerning girls and technology in particular, and STEM in general. There have been many billions invested in programs looking to change the situation. The real challenge is to go beyond studies of what is happening, to determine *why* girls are opting out. This appears to be one of those 'wicked problems' for which there is no quick fix. If a solution existed, surely one of these studies or programmes would have found it.

However, this conclusion is no excuse for giving up on the goal of better representation of girls in STEM endeavours. Campbell (1996) writing about engineering education in the tertiary sector concludes 'that failure to solve the attrition problem stems partially from an overemphasis on the student deficit model and under emphasis on institutional deficiencies.' So rather than looking at girls as the problem, let's look at what we are offering girls in terms of STEM.

Seven STEM steps for school libraries

After reading this research, we suggest a number of areas where school libraries might contribute to their school's STEM programmes.

1. Prioritise STEM

Science, Mathematics, and Technologies are significant learning areas in most current curriculum frameworks. However, they probably do not attract equal time and attention in library programmes throughout a child's schooling compared to Arts, Language, Literacy, Humanities and Social Sciences. The Chief Scientist is understandably forthright in what is required, including 'a core STEM education for all students–encompassing inspirational teaching, inquiry-based learning and critical thinking–placing science literacy alongside numeracy and language proficiency as a priority' (Chubb, 2014, p.23).

2. Prepare for Technologies curriculum

Through their expertise in information literacy, school libraries have been closely connected to the ICT general capability. Now the Australian Curriculum: Technologies is available, and implementation is imminent—or underway in some places—it represents an opportunity for school libraries. Teacher librarians can work with technology specialists, skilling up in this area, and preparing to support the teaching of the Digital Technologies and Design and Technology subjects.

3. Source STEM resources

An obvious role for the library is to ensure access to resources that support STEM curriculum and extension initiatives. Subscriptions to quality publications for students and teacher reference are essential in this fast moving area. Genres such as science fiction and steampunk are a starting point, and checking the SCIS Catalogue for STEM-related subject headings with a fiction subdivision can provide ideas for building the collection.

Visual resources are useful for engineering-related topics, including photographs, plans, and video of objects in natural and built environments. Accommodating learning activities and assessment that go beyond text production will involve researching software that is accessible for students to use for brainstorming, designing, drawing, and developing flowcharts.

4. Build partnerships

STEM is an area where local industry partnerships can be invaluable, providing opportunities for mentoring, work experience, parent education and community support programs. Role models and mentoring are acknowledged as success factors in the research, addressing issues such as self-confidence and knowledge about careers. One strategy is a living library program where students can interview women who are successful in roles involving science, technology, engineering and mathematics, and are comfortable sharing their own story.

5. Promote STEM careers

While STEM education is about more than girls choosing careers in this area, it is nevertheless a highly visible measure of success, and is a goal of many programs. *Myfuture* lists 269 results for ICT related careers and over 1,500 results related to computers or computing. Using the Bullseye poster for computing (http://myfuture.edu.au/tools-and-resources/learning-tools-for-secondary-students/bullseye-posters-explore-occupations-by-school-subject/computing) is an easy first step in starting discussion on the range of options that STEM opens up.

Career resources are one strategy, but research shows that post Year 9 is too late to start changing girls' perceptions. Openness to STEM careers for girls needs attention much younger than traditional career education units. This is an excellent opportunity for primary libraries. The library can host after school or school holiday STEM or coding programs with male and female tutors, such as the one run by Victorian-based organisation *Invent the World* (inventtheworld.com.au). This allows girls to have female role models actively working in STEM.

6. Make space for STEM

Maker spaces are one increasingly popular response to involving children of all ages in planning, designing and building. In an increasingly virtual world, the hands-on, tactile experience has become a novelty and thus a powerful tool for engagement. There is a need for caution however; as with ICT initiatives, it is the learning and curriculum that must drive these programs, not the novelty or convenience of a particular commercial package.

There are inexpensive initiatives in which school libraries can encourage student involvement, such as the Australian STEM Video Game Challenge (http://www.stemgames.org.au/resources) which invites students to create an original video game based on STEM themes and concepts as a strategy for growing the interest and participation. This is based on research from both education and neuroscience that video games enhance a range of cognitive functions and generate responses in the brain associated with attention and learning. Resources such as *Scratch* (scratch.mit.edu) and *Code* (code.org) make it possible to establish a school-based coding club.

7. Read and research STEM

In a field such as STEM it is essential to be reading, debating and updating our knowledge and resources. The free online publication *Teacher* (http://www.teachermagazine.com.au) has independent, evidence-based articles that are practical and easy to read. STEM is one of their regular themes. A school subscription to the Digital Education Research Network (DERN) will give all teachers access to a weekly newsletters and research reviews. Check out the full list of reviews on Girls in ICT (https://dern.acer.edu.au/dern/category/180).

Finally, if you undertake a successful STEM activity or some action research into STEM and technology at your school, please consider publishing your findings in *Connections* or *Teacher* so others can build on your work.

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Transmedia storytelling: narratives like real life

What is Transmedia Storytelling? Prof. Henry Jenkins, M.I.T. 2003.

"a process where integral elements of a fiction get dispersed systematically across multiple delivery channels for the purpose of creating a unified and coordinated entertainment experience."

http://www.pil-network.ie/blog/transmedia-storytelling/

In 2012, the show I watched more than any other on free-to-air television was a small web series called *The Lizzie Bennet Diaries*. At the time it was a modernised adaptation of *Pride and Prejudice*, where Elizabeth (Lizzie) Bennet was a vlogging graduate student and Darcy an executive at an internet company, Pemberley Digital (which is also the name of the company who produced the show). This may not sound like much to a dyed-in-the-wool Jane Austen fan but the series worked, and worked well. The show won a Primetime Emmy Award for Outstanding Creative Achievement in Interactive Media, and when a Kickstarter campaign for the DVD was announced, over 7,000 people subscribed, raising 700% more than the required budget. I received my DVD in the mail and I can't wait to watch it again.

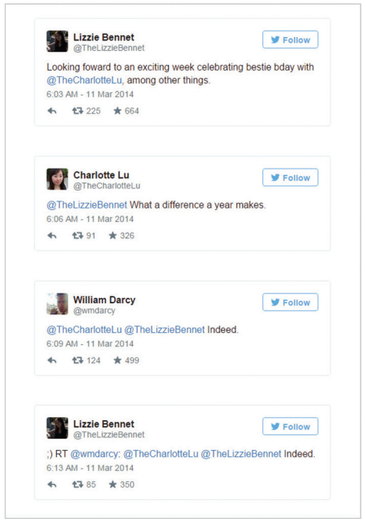
Screen shot of Tumblr from *The Lizzie Bennet Diaries*

Part of the adaptation's appeal was its transmedia platform. You didn't just subscribe on YouTube and watch an episode every 3 days; you also followed on Tumblr to view photographs of the fashions, and on Twitter you could read conversations between the characters. It was a cross-internet series that could also be interactive. There were Q&A videos where the characters answered questions sent in via Twitter or Facebook, and some characters even had their own spin-offs; 'Better Living with Collins and Collins' is highly recommended.

Pemberley Digital has followed this on with more web series, including *Emma Approved*—where life coach Emma Woodhouse tries to fix everyone's life—which won several Streamy Awards. The adaptation and cross-platform approach is clearly working. I have managed to get a few teachers and students addicted to the shows, even watching interviews with the actors talking about the adaptations.

Their latest offering is based on the often studied text *Frankenstein* by Mary Shelley. The gender-swapped *Frankenstein M.D.* will be a change to most, but it also presents a much easier entry into Gothic horror for our students. The literary traditionalists can still have their debates in the comment sections, or watch Iggy (think Igor), Victoria Frankenstein's much put upon lab partner, question if they should be messing with the forces of life itself.

This type of series is full immersion storytelling, the likes of which no television channel has yet got right, and it is freely accessible to anyone with the internet. It is well done, open to debate, produced in a medium that people use daily, and available on demand. Don't be surprised if you see Pemberley Digital Studios popping up on traditional television soon, and be disappointed if they are not part of your school's English syllabus even sooner.



Screen shot of Twitter from *The Lizzie Bennet Diaries*

The only example of transmedia storytelling I have seen on Australian television to date is ABC's *Q&A*. Viewers are encouraged to propose questions for the panel in advance, and to 'join the discussion' via a live Twitter feed, which scrolls along the bottom of the screen as the show is broadcast. These Twitter interactions can provide real-time consequences on the show, and often cause debates in the next day's newspapers or radio shows, which are then responded to in press releases by the ABC on all of its platforms. Some sport shows also offer these interactions but no dramatic narrative has managed to cross over to the transmedia space.

Q&A works well as a transmedia platform, because real life is transmedia. When a story happens in real time, we can view news updates on television, hear them on the radio, watch them fill our Facebook feeds, and then read serious commentary in the newspaper. Students are used to this now, and so it is very effective when done well, because students engage both with the texts and with each other.

Teachers have always experimented with cross media learning. Almost every year I help students in the library who are creating a newspaper article based on a novel they are reading in class, or proofread letters they have written from a character's point of view. However, this type of work does not provide a complete transmedia experience. The students are appropriating and recreating, but the content is not part of the narrative itself, and does not encourage students to interact with each other.

Recently some films have attempted to create their own internal transmedia experience. For example in the *Spiderman* films, we see newspaper headlines criticising the hero while television interviews of people praise him, but we don't have the full transmedia effect because the narrative is all in the one place. The benefit of transmedia narrative is that you are not just going to the story, it comes to you. You choose when to watch the video, but a conversation between characters can occur on your Twitter feed. You have no say over when this conversation occurs, but it brings the story back to you, and you then have more information when you go back to the story. Furthermore, you can also see viewers or students commenting on the action in their own feeds.

Imagine a class studying Jane Austen's *Pride and Prejudice* through the YouTube episodes of *The Lizzie Bennet Diaries*. The teacher could set up a Twitter account (in accordance with the school's social media policy, of course); play each episode in class, or set them as homework; and then retweet the original tweets from the series to the class at the appropriate intervals. Students with Twitter would then regularly read part of the story in their own feeds, as if the conversations were happening between people they followed.

This could be done by any teacher or library staff member for any book read with a class: read chapter by chapter, then create Twitter accounts for the characters, and have them converse this way based on details from the text; or create Tumblr posts offering photographs of the characters fashion and meal choices. Students would be encouraged to follow, ask questions of the characters, and even create their own fan art or fan fiction.

There are already a number of blogs and books available to interested parties, but to truly understand transmedia storytelling I recommend that you find some examples online—start with Pemberley Digital (www.pemberleydigital.com/)—and then explore.

Elements of Transmedia storytelling.

1. Pervasive: the story is available on multiple devices, anytime and anywhere. Reality and fiction are blurred.
2. Persistent: the story evolves even if the author isn't engaged with it. Audience activity and real world factors shape the story development.
3. Participation: the audience is able to interact with story characters, locations and each other.
4. Personalised: the audience can personalise their experience with the characters and environment.
5. Connected: a seamless, integrated experience is available to the audience.
6. Inclusive: the experience is available across a range of devices and engagement styles so that it is not just confined to expensive smartphones or tablets.
7. Cloud-based: the experience is managed from the cloud to permit the other 6 stands to function in real time

(from the storyteller Blog, http://www.tstoryteller.com/blog)

Where has it been done?

Liverpool Girls High developed a pilot programme in 2013 and presented their project at the Inspire Innovate Conference.

The slideshow can be viewed here: http://www.slideshare.net/cathieh/rethinking-literacy-through-transmedia-storytelling-final?ref=http://macict.edu.au/blog/2013/04/beyond-the-page-cross-platform-storytelling/

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Computational thinking as the 'new literacy': professional development opportunities

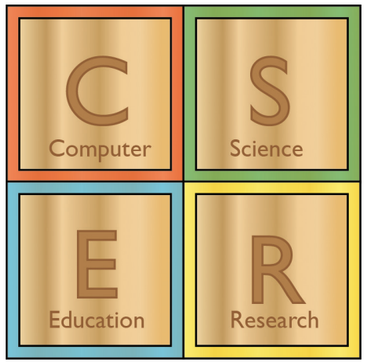
Children not only need to learn about how digital technology works and how to use it, but also how to create it by understanding the language of computers. Here, we describe our experiences in providing the Computer Science Education Research (CSER) Digital Technologies MOOC–an open, online course designed to support teachers in the new Digital Technologies learning area.

Why is this essential?

A decade ago, Information and Communications Technology (ICT) education generally focused on ICT as a tool, to be understood through the development of digital literacy. Areas such as Computer Science (CS) or Computational Thinking (CT) were typically isolated into senior secondary programs, with a focus on programming and algorithm development, when they were considered at all.

More recently, a drive to include computing in the school curriculum has arisen, proposing that all children should have an opportunity to develop CT skills, and have opportunities to be creators of digital technologies (Gander et al., 2013; The Royal Society, 2012). New curricula introduced in England (Department for Education, 2013), Australia (ACARA, 2012), New Zealand, and the new Association for Computing Machinery CS standards in the United States (Seehorn et al 2011), have identified the need to educate for both digital literacy and CS, and the need to promote both learning areas from the commencement of schooling through to high school, to support the future generation of digital creators and increase international competitiveness.

This is a significant milestone, yet it also raises a number of challenges, including the preparation of teachers and development of resources to support the success of implementation at a national scale.



The CSER Digital Technologies MOOC

In December 2014, the CSER Group at the University of Adelaide, with the support of Google, launched the CSER Digital Technologies MOOC. This open, online course, freely available to teachers and the broader community, was designed primarily to support teachers from Foundation to Year 6 in teaching the new Digital Technologies learning area of the Australian Curriculum. It offered teachers suggestions on how coding can be integrated into their lessons; during the course participants prepared a portfolio of resources and classroom activities for potential use in their own and other classrooms.

In response to existing research findings, the learning and teaching opportunities in the course were designed to be tool-independent, and focused on deep learning (Black et al, 2013, Meerbum-Salant et al, 2011).The course was also designed to reduce teacher workload by providing exemplars of activities that were already integrated with existing knowledge areas in the curriculum (Settle et al, 2012). In preparing the course we drew on and adapted existing lesson ideas from organisations and initiatives such as CS Unplugged and Code.org, and also drew on lesson ideas and approaches from education texts in other learning areas, such as mathematics, science and literacy, and with examples from teaching themes commonly used within Foundation to Year 6.

Being online, the course provided professional development opportunities at a time and in a location that suited the individual. At the same time, we were conscious of the need to develop a sense of community and sustainability in sharing resources. To support this, a significant aspect of our online course structure was the introduction of a Google+ Community. In this community participants shared their ideas for learning activities in response to their weekly assignments.

We have just completed our second offering of the CSER Digital Technologies MOOC. To date, over 3,000 teachers have undertaken the MOOC, with approximately 200 teachers requesting and receiving professional development certification for their participation. Over 1,100 teachers have participated in developing the online community, supporting the discussion of pedagogy and learning activity ideas for Digital Technologies, while also providing an online resource for brainstorming and sparking ideas.

In our discussions with this growing community, several key considerations have emerged. It has become very clear that, as a new learning area, Digital Technologies is a source of anxiety for many teachers. However, once concepts such as 'algorithms' and 'iteration' are de-mystified, teachers become far more comfortable with the new curriculum. As one teacher said to us, 'nearly all the modules were new in name but as I started to go through the MOOC I realised there was so much that I already did and understood'.

The importance of a sustainable community cannot be emphasised enough in the success of this course. Some teachers have initially felt hesitant to share their ideas, but these fears have soon broken down, and the sharing of ideas has become a great source of motivation and inspiration.

As we worked together through our first offering of the course, it quickly became apparent that those most engaged in course materials were also the ones most strongly supported by their peers in face-to-face contact. It has now become common for teachers to study the course in small groups, and in some cases these groups have been facilitated by schools. More detail on the analysis of our first offering of the course is available elsewhere (Vivian, Falkner & Falkner, 2014).

Where to next?

The CSER Group, with the support of Digital Careers and Google, has launched a second MOOC in support of teachers. The CSER Next Steps MOOC is designed to support teachers of Years 7 and 8, and takes a more project-based approach. The course is divided into several streams that cover a range of contexts, including robotics, mobile app development, maker spaces, data visualisation, and making digital games. The streams are designed to support a range of background experience: some build upon visual programming languages and are well suited to those with little prior experience, while other streams explore general-purpose programming languages.

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From the desk of a SCIS cataloguer

The SCIS cataloguing team regularly source, receive, and catalogue a range of print and electronic resources suitable for use in school libraries. Electronic resources include websites, apps, and ebooks, and are available for SCIS subscribers as easily downloadable files using the Special Order Files page of our website. We often receive questions about how websites are catalogued by the SCIS team, which we have endeavoured to answer for you here.

Frequently asked questions about website cataloguing

Where does SCIS source websites from?

The SCIS cataloguing team only catalogues websites that are curriculum-related, have been through a quality control process, or have been published in reviews or listed in appropriate educational sources such as *ABC Splash*, *Connections*, *Scan*, or Education Department evaluations.

We only catalogue websites with expiry dates if they are of a popular topical subject–for example, the Olympic Games.

If your school requires specific websites to be catalogued, you are invited to contact your cataloguing agency, or email the details to: catinfo@esa.edu.au.

> These websites will only be catalogued after they have been checked for their suitability.

How do we choose a title for the record?

The title we use for a website record is taken from the home page of the website itself, which is our preferred source of information.

The most prominent form of the title on the home page is used, with added title entries recorded for other forms, if required. Added titles may include preliminary page titles or source page titles that are displayed by the web browser in the title bar at the top of the screen. A note is given for variant titles, for example:

Title: *Digital learning network*
Added title: *NASA digital learning network*
Note: Meta title: *NASA digital learning network*

Why are most websites given title main entry?

Usually, the main entry for a website is entered under the title, because often many contributors or corporate bodies are involved with creating content for a website, or a specific author is not mentioned. If the cataloguer has any doubt as to whether a named person or corporate body is a creator of a website, they are not recorded. Statements expressed as 'Created by', 'Produced by', and 'Webmaster' are not necessarily regarded as statements of responsibility.

If genuine authorship statements are given, as in the case of personally authored web pages, then an appropriate statement of responsibility is added. Websites created by corporate bodies that are about their procedures, resources, policies, or history are given main entry for the corporate body, for example: *Western Australia. School Curriculum and Standards Authority*.

What information is given for publication?

Place of publication: is given as found on the home page or the 'About' page of a website. If the location is not certain, a probable location is used in square brackets with a question mark, for example: [*United States?*]. If the place of publication is totally unknown, then [*place of publication not identified*] is recorded.

Publisher name: is recorded as found on the home page. If the name of the publisher is uncertain, then a probable or 'best guess' publisher is given. If no publisher can be identified, then [*publisher not identified*] is recorded.

Date of publication: if there is a date of origin found on either the home page or an easily located copyright page, then this date is used.

If there is a definite indication that the website is going to be updated regularly, then an open date is given, e.g. *2000-* (with no spaces or full stop after the hyphen).

Where the home page gives more than one date, the earlier date is chosen. If no date can be found on the home page, the following sources are consulted: copyright statement page, disclaimer page, 'about' page, or metadata; and the earliest date is recorded. Where there is no date to be found on any of these sources, an approximate date is supplied, for example: [*2013?*] or [*between 2010 and 2013?*]. If an approximate date cannot be determined, the current year is recorded as the probable date, in the form of [*2015?*].

When is a contents note given?

A *Contents* or *Contents includes* note is provided for enhanced access, where appropriate. For example, for a website with the title: *Ancient history homework helper*

Contents includes: *Ancient Egypt -- Ancient Greece -- Ancient Rome -- Other ancient civilizations -- Mythology*.

When is a summary note given?

A *summary* note is included only if it adds valuable information and can be based on an easily accessible source, such as the website itself or an electronic version of a review.

How is the website accessed?

The URL of the home page recorded on the catalogue record will allow direct access to the website. Other URLs may also be included if deemed useful. For example: the URLs of preliminary pages, mirror sites, different viewing formats, and related or supporting resources.

> Here at SCIS we run reports on dead or faulty links twice a month, in order to ensure that URLs are current. We find that some websites no longer exist and therefore the SCIS records for these are deleted; other websites have been moved and their old URLs are replaced with a new link.
>
> If you come across one of our website records that has a faulty or dead link, search the SCIS OPAC: http://opac.scis.curriculum.edu.au/vwebv/searchBasic by title.
>
> If you cannot find the record for the website, delete the record from your catalogue.
>
> If you can find the record in the SCIS catalogue, check if it has a different URL to the one in your library catalogue. You can easily cut and paste this new URL into your catalogue, if required.
>
> If you come across a faulty or dead URL link we would appreciate hearing about it. Please email us at catinfo@esa.edu.au

How can I find recently catalogued website records on SCIS?

The Special Orders page on the SCIS website provides a convenient way to access batches of our website records. These records can be searched by date and selected for downloading.

To access the special orders file:

http://scis.curriculum.edu.au/scisweb/specialorder.php

Please note that some records for websites relate to commercial products and may require a subscription for access.

John Parsons
Author and Director of The Literacy Tower

John has worked in educational publishing for 25 years, and his books inspire and ignite young imaginations throughout the USA, UK, Canada, Australia, and New Zealand. He welcomes any comments, perspectives or debate on the below at john@theliteracytower.com

Let's talk about literacy

Search for 'literacy standards' on the web, and your first ten pages will be articles about plunging standards, woeful skills and a slippery slide towards becoming a nation of illiterates. Plough onwards for a bewildering array of cutting-edge initiatives, ambitious policies, and funding demands, all designed to reverse the appalling decline.

It is not until you are weary of clicking 'next page' that any measured statistics appear. If you've lasted that long, you discover that literacy standards in Australia, New Zealand, and the UK *haven't* declined significantly in the last twenty years. Despite decades of adapting our policies and practices, they remain relatively unchanged.

The real slide, I suggest, is not in literacy competency but in the level of *engagement* today's young readers have with the written word. It is not teaching practices or the curriculum that should be under the spotlight. I firmly believe it is the levelling, nature, and quality of classroom reading resources we need to examine. Here's why.

I'd like to share my watershed moment. Like most of my classmates, our school's traditional readers had given me a fair competency at decoding, a mildly appalling spelling ability, a disregard for grammar, and a distaste of boring writing. As my colleagues will attest, I've retained these core skills to this day, so there is no question the basics remain with you through life.

It wasn't until Year 2 that one teacher made a real difference. She did it by reading books to me that, had anyone found out, in those days would have probably seen her disbarred: *The Famous Five*, by Enid Blyton.

I was utterly enthralled. Suddenly reading wasn't just a race to get to the end of a reader or graduate to the next colour band. It was something to be savoured: a rich, rewarding experience with engaging characters, inspiring settings, and language to ignite the imagination. I sat in class, reading books way above my competency level, praying the bell wouldn't ring so I could finish my chapter. Quite simply, books opened my eyes to a world of possibilities. The traditional reading scheme had given me the basics, but being exposed to challenging, richly varied language, and captivating, high-interest texts made me a *reader.*

I loved going to the library and being free to choose books that seized my attention, regardless of their level. I was good at reading. I graduated to *Biggles* and ended up bilingual enough to intercept a useful range of German commands, had my plans to pilot a Spitfire squadron come to fruition. My teachers had other ideas. They made me sit with kids with literacy difficulties in the hope my enthusiasm would rub off. That's when I witnessed another watershed moment.

One older kid in our class could fell any other with a single punch. He was ten. He was frightening. And, I now realise, very troubled. He had no interest in anything, let alone reading.

Seating him beside the kid who *did* read didn't work. In despair, our teacher again did something that would have provoked a severe reprimand: she gave him a tatty pulp-fiction novel about a bikie gang, the sort of sensational rubbish popular in the seventies.

I watched that kid read the whole thing. Slowly, and with plenty of whispered pleas for me to decipher the harder words; but when he got to the last page, he asked the teacher if she could get him another one. She did, and that kid read books for the rest of the year. Hard books. Challenging books. The 'wrong' books. But he persevered, every day.

I've spent my adult life writing and publishing books that challenge and extend young readers—readers more media-savvy, print-aware, and visually discerning with each year. Books with different, inviting topics, storylines, and characters to enhance and extend contemporary kids' natural enthusiasm. Traditional readers may equip kids with the basics, but, after the emergent stage, teachers need to have resources built on a strong literacy framework to coax them beyond those readers. Readers that, let's face it, still use the core rationale and levelling criteria they did in my day.

Today's kids deserve resources that *engage* them and provide a bridge to real literature at the earliest stages. Never has it been more important to give kids challenging, high-interest, richly varied reading experiences that really do engage, inspire and ignite young imaginations. Those books work. They're working in Australian classrooms right now. No matter how hard they may appear, the right book will light up a kid's face. Beautifully designed literacy resources with a wealth of high-interest content and language that kids *want* to read will take them to the next level of reading confidence and accelerate them on the journey to becoming lifelong readers.

Educators do understand the spark those resources ignite and they know how to provide the watershed moment. To help them make a real difference to literacy engagement, it's vital that every classroom and school library has the contemporary reading resources that give them every opportunity to do so.

Image Credit:
The Literacy Tower. Used with permission.

Les Kneebone
Metadata Services Manager
Education Services Australia
http://scot.curriculum.edu.au/contact.asp

The relationship between SCIS Subject Headings and ScOT

SCIS cataloguers use a combination of SCIS Subject Headings (SCISSHL)[1] and Schools Online Thesaurus (ScOT)[2] when adding resources to the SCIS database. ScOT is a relatively later addition to the SCIS arsenal of cataloguing tools, introduced and explained in *Connections* Issue 60[3].

This article evaluates this two-vocabulary approach with a view to distinguishing the strengths and roles of these vocabularies within education metadata.

Subject Access

MARC21 standards define a number of 'subject access' fields–the 6XX fields–some or all of which are used in each SCIS record. As a rule, every SCIS record includes entries in the *topical terms* (650) field. The term 'topic' will vary from one standard to another; for example, 'categories', 'keywords', or 'concept terms' are used interchangeably with 'topic'. Somewhat confusingly, 'subject' is commonly used to denote a similar purpose (the 'DC.Subject' element of the Dublin Core Metadata Initiative is effectively a topic field).

Topics are flexible and robust; they simply let the cataloguer (or user-tagger) define what a work is about. Entries are typically single words or multi-word terms, but not clauses or sentences. A topic could be 'physics' or 'nuclear physics', but not 'this is an article about nuclear physics'.

Article may not itself be a suitable topical term, if the work referred to is an article, and not *about* an article. For example, a work may be about some kind of genre or form, as in 'history of 19th century science fiction', where it is *about* science fiction, but is *not itself* science fiction.

Genre is another subject access field that provides a useful contrast to Topics. The MARC 655 field is reserved for genres such as science fiction or horror, or forms such as directories or diaries. In fact the genre versus form distinction is somewhat blurry.

Geographical terms (MARC 651) have a similar purpose to Topics but differ in scope. As the name suggests, this field is for storing subjects concerning places, environments, built structures, regions, and continents.

The 600, 610 and 611 fields deal with names that are the subject of a work: personal, corporate and meeting names, respectively. Proper names are a special challenge for any kind of authority control. Indeed, it may not be feasible to control a vocabulary of names, but rather to establish rules for their construction as the need arises. This is standard practice in cataloguing and in various metadata standards. Name authority files are a reflection of actual names stored in a bibliographic database, rather than a predetermined list that constrains which names may be used. Name authorities improve retrieval by ensuring that all works about a given person, corporation, or meeting are clustered around the exact same name, making it easier to identify those resources within a single set of results.

SCIS Subject Headings

Each of these subject access fields is hand-crafted by SCIS cataloguers using the SCISSHL as a controlled vocabulary and system of rules. SCISSHL provides a controlled vocabulary for the topics field, as well as rules around how and when to construct sub-divisions, for example 'Nuclear energy – Economic aspects'.

SCIS Standards for Cataloguing and Data Entry[4] provide detailed instructions on creating genres, geographical names, and each of the names-as-subjects fields. Each of the 6XX fields use *scisshl* as the source of the heading or term in subfield $2.

As well as providing guidelines and authority for creating a range of subject access fields, SCISSHL is a faithful reflection of what is in the SCIS database. All 1.4 million items added to the SCIS database are candidate sources of warrant for the SCISSHL. That means that each time a new topic, geographical feature, or personal name is identified in a new work, the SCISSHL are updated, making them a thorough description of what SCIS records are about, and of what kind of resources make up the SCIS database.

SCISSHL also provide *see* and *see also* references, which help users navigate subjects and negotiate synonyms and name-form variants. This provides users with useful search features such as 'did you mean' and 'you might also like' search tips.

Schools Online Thesaurus (ScOT)

In contrast, ScOT is unfaithful.

ScOT has provided SCIS with a controlled vocabulary for subject access–and especially for topic access–since 2006. But ScOT has also been busy elsewhere, serving cataloguing needs in other education repositories. A significant program with a strong recognisable brand was The Le@rning Federation (TLF). I started working on ScOT soon after TLF commenced. TLF at first sourced high-quality interactive learning objects and delivered tailored 'learning object metadata'[5] records into systems such as TALE (NSW), The Learning Place (QLD), FUSE (VIC) and Digistore (NZ). Today, Scootle (various sectors in Australia) is the most common portal through which teachers access the rich repository of learning content arising out of TLF and its successors[6].

TLF broadened its scope, creating metadata for cultural resources from galleries, libraries, archives, and museums (sometimes called the GLAM sector). ScOT did a lot of its growing up in amongst this vibrant and somewhat ambitious content program. ScOT provided topic access to resources that varied in levels of interactivity, learning design, aggregation level, content and media types, and intended user levels.

ScOT vocabulary developed in response to diverse metadata sources, but also in response to curriculum frameworks. In an attempt to align the taxonomy structure with State and Territory portals, ScOT incorporated terminology and structure from many curricula. This 'top-down' pressure on ScOT has resulted in a neat triangular shape of terms, with ten terms at the top, about 100 at the second level and about 1,000 at the third. ScOT still holds this hierarchy shape today.

The timing was right for ScOT when the Australian Curriculum was initially released in 2011. ScOT was identified by Australian Curriculum, Assessment and Reporting Authority (ACARA) as a suitable vocabulary with which to index, or 'catalogue' the Australian Curriculum Content Descriptions. This was a path less travelled, as ScOT was going places that subject vocabularies do not ordinarily go. As well as being used to describe information resources, ScOT has been used to describe the source of requirements for those resources: the educational objectives that we call 'curriculum'.

So not only has ScOT been used to catalogue records outside of the SCIS database, ScOT has been used to catalogue objects not usually considered information resources. These unique circumstances have positioned ScOT as a powerful curriculum-alignment tool. ScOT has a relatively one-track mind: aligning information resources used in schools with curriculum frameworks. ScOT plays this role in SCIS records, but also wherever curriculum alignment is needed. ScOT can be used in many different metadata standards such as MARC21, Dublin Core, ANZ-LOM and Achievement Standards Network (ASN), to name a few that are commonly used in the education sector.

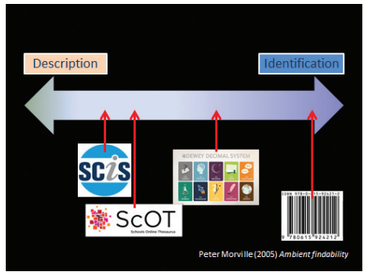
ScOT can also be further adapted to any curriculum or teaching framework. Work has recently completed to align ScOT with the New Zealand Curriculum for Mathematics and Statistics[7].

Complimentary approaches

ScOT does not and never will provide a basis for constructing subdivisions or for authorising names; nor will it ever be reasonable to expect that ScOT will absorb every specific topic taught or learned in schools. ScOT is involved in too many environments for that to be viable. The purpose and strength of ScOT is in providing a vocabulary with which to indicate topics, with a vocabulary immersed in the language and structure of curriculum; and the learning resources circulating within the Australian and New Zealand context since 2004. ScOT effectively provides a bridge between collections described with different metadata standards, and between curriculum and resources.

SCISSHL is closely adapted to the requirements of the SCIS database. There is nothing in the SCIS collection that SCISSHL cannot describe. It is by its very nature self-adapting as items are added to an ever growing collection of 1.4 million resources. SCISSHL provides the services that ScOT cannot: proper nouns, subdivisions, geographical, and genre headings.

Therefore, ScOT and SCISSHL have complementary roles. Together they ensure that SCIS records are thoroughly described and thoroughly connected to the wider school education environment. I often come back to a simple model published by Peter Morville in 2005[8] where metadata elements are plotted on a continuum between 'description' and 'identification'. We often refer to metadata as something that is plotted in the centre, but of course it is all metadata from the far left (e.g. an abstract) to the far right (e.g. an ISBN).



Subject vocabularies are primarily tools for supporting robust, consistent and intuitive *descriptions* of resources. Plotted on this continuum, I'd put SCISSHL closer to the description side and ScOT closer to the middle. ScOT goes some way to identifying resources within formally recognised frameworks. We can make simple assertions about resources that have ScOT terms: the terms may indicate that the resource is relevant to this curriculum objective or that teaching standard. Classification systems like Dewey Decimal go even further in this direction, and their descriptive power is narrower, more precise and far more selective and arbitrary.

A metadata strategy should consider the relative strengths of vocabularies and other encoding systems. SCIS exploits the richly-faceted subject access fields to create neutral, 'agnostic' descriptions about school resources with a view to faithfully representing content and membership within a significant collection. SCIS also links its records outside of its immediate environment with topics and classifications. The SCIS strategy requires significant investment, which is well warranted within the school education sector.

1 The "L" is for List – sometimes part of the acronym.
2 Both SCIS Subject Headings and ScOT are registered with the MARC Standards Office: http://www.loc.gov/standards/sourcelist/subject.html
3 http://www2.curriculum.edu.au/scis/connections/issue_60/scot_in_scis_-_more_of_the_same__or_different.html
4 Registered with the MARC standards office: http://www.loc.gov/standards/sourcelist/descriptive-conventions.html
5 IEEE-LOM, later adapted for the regional context as ANZ-LOM Metadata Application Profile: http://ndlrn.edu.au/metadata
6 TLF was superseded by *National Digital Learning Resource Network*.
7 http://schoolsonlinethesaurus.edublogs.org/2015/07/24/maths-refresher/
8 Ambient Findability.Oreilly.ISBN 978-0-596-00765-2.

Dr Ben Chadwick
Manager, SCIS
Education Services Australia

SCIS is more

Has the second half of 2015 been as busy for you as it has for us? We spoke at the SLAV and SLANZA conferences in August and September, and attended ASLA; we've run workshops in Melbourne, Adelaide, and Christchurch, and as usual, have thoroughly enjoyed meeting and catching up with our subscribers. August also saw a series of SCIS webinars–our third for the year.

We're not slowing down towards the end of this year though; we'll be hosting further workshops in Adelaide on the 20th and 21st of October, and our webinar series will be back on Thursdays between 29 October and 12 November. Visit our Professional Learning page for details.

Term 4 always welcomes the Educational Lending Right (ELR) school library survey, which SCIS manages on behalf of the Ministry for the Arts, Attorney General's Department. 600 of you will be invited to participate. It is voluntary and is generally very straight-forward, and it is all for a good cause: results of the survey are used by the Ministry to help calculate payments to Australian book creators. See our ELR webpage, or the regular *Supporting Australian book creators* section of *Connections* to find out more about the project, and how it promotes great literature in this country.

Invoicing also takes place in term 4, so if you are not under a bulk deal arrangement through your government jurisdiction or Catholic Diocese, please keep a look-out for our invoice.

Talking about subscriptions: do you subscribe to SCIS Authority Files to provide an optimal search experience for your staff and students? In late August we released the latest version of our authorities for subjects and names, and they are now available from our Authority Files page. SCIS recommends downloading the *Reference Only* version of both name and subject authorities, in MARC format. We have simplified the page to make these recommended download options easier to find, but all the other options are still available if you need them. Once you have downloaded the files, updating them in your library system is a one-off task. Seek assistance from your system vendor if you are unsure about how to upload the files; or get in touch with our Customer Support staff with any other queries.

SCIS welcomed two new staff members in August. Kate Love commenced her role as Library Services Coordinator. I hope many of you will come across her at workshops, conferences, or online. She comes to us with experience as a teacher-librarian in a range of Melbourne schools. Helen Le joined our Customer Support team and has jumped in with both feet, assisting with your technical and subscription enquiries.

Laura Armstrong adventures with sculptures.

Finally, it is with a heavy heart that I announce this will be the last issue of *Connections* with Laura Armstrong at the helm. Laura has been with SCIS since 2012 and has been editing *Connections* since Issue 89. During that time she oversaw a 'spiffing up' of the journal's look and feel. She has also been coordinating ELR. Laura is moving on to focus on her PhD in Heritage and Museum Studies, for which she is looking into female artistic responses to war, particularly war memorials designed by women. Thanks Laura, and best of luck!

Image Credit:

Laura Armstrong. Used with permission.

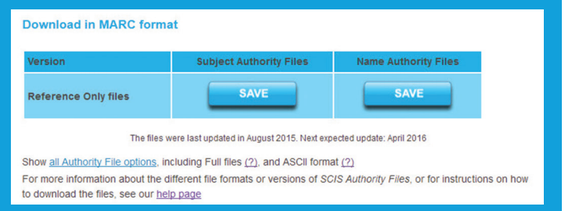
SCIS Authority Files release

SCIS Authority Files are updated twice annually, and the most recent version is now available.

Our Authority Files page has been revamped. The page makes it easier to find and download our recommended files (Reference Only files in MARC format), though all other formats are still available.

As illustrated below, downloading Authority Files is easy:

1. Download the Subject Authority file and/or the Name Authority file (most schools will want both) by clicking on the "Save" button. (For the full range of options, click on the 'all Authority File options' hyperlink.)



The SCIS Authority Files download page:
http://scis.curriculum.edu.au/scisaf/

2. Upload both files into your own library management system.

Website and app reviews

Nigel Paull
Teacher librarian
South Grafton Public School
npaull@telstra.com

The internet sites selected in *Website and app reviews* are often of a professional nature and should be initially viewed by teachers and library staff to determine suitability for students. The links, content and address of these sites are subject to change.

52 of the best apps for your classroom in 2015
http://list.ly/~1u3fy

Teachers introducing tablets and associated apps into their classrooms will find a range of valuable apps to explore here. Both iOS and Android apps are represented, but remember to link to the app store for your own country.

SCIS no. 1730461

2016 International Year of Pulses
www.fao.org/pulses-2016/en/

The 68th United Nations General Assembly has declared that 2016 is the International Year of Pulses, recognising the vital importance of these sustainable food crops. Pulse crops include lentils, chickpeas, beans, and peas. Additional material is being added to the website periodically.

SCIS no. 1730469

Adobe Voice - show your story
https://itunes.apple.com/au/app/adobe-voice-show-your-story/id852555131?mt=8

Students using this fascinating app will not only narrate their own story, but add graphics, soundtracks, and text to create an animated story or project. The app is free and suitable for iPad 2 or later, with iOS7.

SCIS no. 1730549

Bully stoppers
www.education.vic.gov.au/about/programs/bullystoppers/Pages/default.aspx

An initiative of the Victorian Department of Education and Training, this site provides extensive resources, links, and information about current best practice to address bullying and cyber bullying. The material is relevant for primary and secondary students and their parents and teachers.

SCIS no. 1730472

EarthViewer
https://itunes.apple.com/au/app/earth-viewer/id590208430?mt=8

This award-winning, interactive app allows secondary students to delve into the deep history of the Earth. Changes in the Earth over billions of years are investigated with an emphasis on continental growth and drift; as are changes in the composition of the atmosphere, biodiversity, and temperature.

SCIS no. 1730543

Field guide apps to Australian fauna
www.museumvictoria.com.au/discovery-centre/museum-victoria-apps/national-field-guide-apps/

Australian fauna from each state and territory are represented in this suite of eight apps. Students can research over 2,000 Australian mammals, birds, fish, reptiles, and invertebrates from land and water environments. Available free from the App Store and Google Play.

SCIS no. 1730485

Freya Blackwood
www.freyablackwood.com.au

The official website of award-winning illustrator Freya Blackwood comprises biographical information, specifics of purchasing prints, details of the books she has illustrated, and a link to her blog. The wonderful blog is both comprehensive and informative. A notes section is being added to the website with FAQs and information for teachers.

SCIS no. 1525666

Moments in time
http://splash.abc.net.au/home#!/media/1303284/moments-game

This interactive timeline was jointly developed by the ABC, ESA, History Teachers Association of Victoria, and Design Royale. Moments in Time 'gives an accessible entry point to the complex period covered in Overviews for the Australian Curriculum: History at Years 8 and 9 (c. 650–1918 CE)'.

SCIS no. 1691456

My big tomorrow
www.mybigtomorrow.com.au

Developed by the Centre of Excellence for Equity in Higher Education at the University of Newcastle, this website offers students the opportunity to investigate a variety of careers they may be interested in, or simply choose a random career to explore. Teachers are catered for with Stage 5 lesson plans and resources, and there is also a parents section offering advice and assistance.

SCIS no. 1730500

Return to the magic of Shel Silverstein
www.shelsilverstein.com

Shel Silverstein's books are enjoying a resurgence by acquiring a new generation of young readers. His official website features games, posts, animations, background material about his books, biographical information, e-cards, and teaching resources.

SCIS no. 1730512

Tynker
www.tynker.com

Schools wishing to teach students basic coding and computational thinking will enjoy this website and the links to apps available for iOS and Android. The site focuses on students actively creating technology, rather than being passive users of it. Teachers are also catered for with background information, lesson plans and tracking tools.

SCIS no. 1730532

Wonderville - science driven by curiosity
www.wonderville.ca

Aiming to ignite and educate curious students 'with scientifically accurate and curriculum tied science resources', this well-credentialed website features a blog, videos, animations, and online games, covering most aspects of science. The site also encourages students to explore careers in science.

SCIS no. 112584

Save time and effort with Scootle learning paths

Daniel Hughes
Teaching and Learning Advisor
Education Services Australia

Scootle plays host to more than 20,000 digital learning resources, all of which target Australian teachers and students, and many of which are aligned to the Australian Curriculum. The good news is that you can save your favourites and organise sequences of resources into learning paths.

Learning paths are organised sequences of Scootle resources. You can create your own learning paths or view others that have been shared by Scootle users.

How do I find shared learning paths?

Log in to Scootle: www.scootle.edu.au.

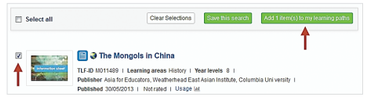
1. Select the 'Learning paths' tab in the navigation bar at the top of the screen.
2. Enter a topic in the Search field under 'Find learning path'.
3. In the drop-down menu, select User Tags or Title (it is worth trying both).
4. Select the magnifying glass to begin your search.

For example, a search on 'Australia Day' and 'Title' retrieves two learning paths. The second is 'Australia Day resources – January 2015'. When you select the name of the learning path, you are rewarded with 14 resources, including videos, interactives, photographs, and cartoons. You can even make a copy of the learning path if you wish.

How do I create my own learning path?

There are a number of ways to create a learning path. If you've never made one before, try this:

1. Once you have found a resource you would like to add to a learning path, select the small box to the left of the thumbnail.

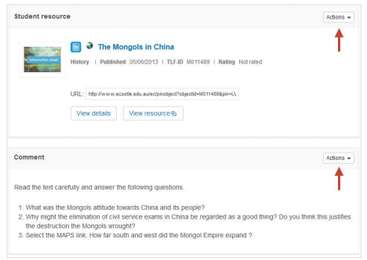


2. Click on the green 'Add 1 item(s) to my learning paths' button towards the top of the page.
3. You will be prompted to create a new folder. For example, you can call the folder 'History'.
4. Give your learning path a name, eg 'Chinese history'.
5. If you wish, write a description of your learning path–you can always edit it later.
6. Click on the green 'Add to learning path' button.
7. Repeat steps 1, 2 and 6 with other suitable resources for your learning path.

What can I do with my learning path?

There is a lot you can do to maximise the usefulness of your learning path. If you select 'Edit details' from the Action box in the top right hand corner, you can edit your description or add additional comments that will appear at the end of your path.

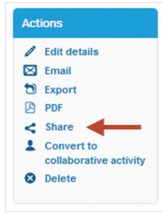
For each resource in the learning path, you can edit the description or add a comment by selecting the 'Actions' menu. Comments are particularly useful. They appear below a resource and provide a great space to enter questions or instructions for students.



If you wish, you can re-order the sequence of resources by dragging and dropping them to where you would prefer them to sit.

How do I share my learning path with other Scootle users?

1. Select 'Share' in the Actions box.
2. In the pop-up, select the relevant year levels, learning areas, and audience.



3. Add up to three user tags–these are terms that will help people discover your learning path when they carry out a search.
4. Select 'Share'–you can always unshare your learning path at a later date.

How do I share my learning path with students?

You'll notice that your learning path has a PIN. If your students go to www.scootle.edu.au then select 'Student login' at the very top of the page, they will be prompted to enter this PIN. Once they've entered the PIN they will have access to your learning path.

Conclusion

Learning paths enhance the value of Scootle resources significantly and can save you a lot of time. They are useful for teacher collaborations, for curating ideas for a class project or unit of work, or for creating a list of resources that you would like to come back to at a later date.

In the next edition of *Connections* we'll look at collaborative activities, as well as some of the helpful ways you can filter content in Scootle.

Laura Armstrong
Communications & Projects Coordinator, SCIS
Education Services Australia

Supporting Australian book creators

ELR's cornerstone

Australian school libraries are the cornerstone of the Educational Lending Rights (ELR), and in the coming weeks 600 schools will receive invitations, either by mail or email, requesting their participation in this year's survey. School library staff play a critical part in the data collection process—without their assistance to extract the book count data from their library management systems, the ELR scheme would not be possible.

Feedback from participants

We encourage all participating schools to provide feedback about their experience via a quick online form, to enable us to improve future ELR surveys.

Australian authors and illustrators value school libraries

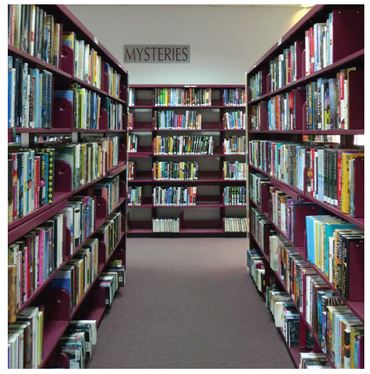
When a school is invited to participate in the ELR school library survey, it is a fantastic opportunity to directly support Australian book creators and publishers. Many authors and illustrators have told us how much they appreciate the support they have received from school libraries, both as students and as book creators.

A message from Toni Jordan

Back in the 1970s when dinosaurs ruled the earth, my school library was an empty room with a few books lining the walls. By high school, the library was more focused towards individual subjects and specific assignments, with resources to provide constructive help. Library facilities now seem sparkling and so inviting by comparison: comfortable chairs, quiet desks and computers, and more books than even I could read.

Some things haven't changed. For me, school libraries were always a place of refuge and imagination. Like many kids who loved to read, I spent a lot of time in my own head. Stories were never things that happened solely within the pages of a book; I often stopped reading entirely to imagine the story going off on a different tangent from the one the author intended.

My parents generally didn't mind me reading at home (although they made me stop every so often, certain I was doing permanent damage to my eyesight), but daydreaming was out of the question. I was vague and I was distracted, or I was plain insolent. I'm so grateful to all the librarians over the years who gave me a place to think, and to wonder.



We have published more of these statements in previous issues of Connections and on the ELR website. Read them all at www2.curriculum.edu.au/scis/elr_value_statements.html.

Image credit:

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Connections

Connections is a quarterly journal produced by the Schools Catalogue Information Service (SCIS), a business unit of Education Services Australia. SCIS is committed to helping school library professionals keep abreast of the latest in information services and technology, as well as wider literacy and educational strategies. Current and past content is available online at www.curriculum.edu.au/scis

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Thursday 29 October 2015
1pm – 2pm AEDT
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Downloading SCIS Records (Webinar)
Thursday 5 November 2015
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SCIS Catalogue searching and selection (Webinar)
Thursday 12 November 2015
1pm-2pm AEDT
3pm-4pm NZDT

Cost and registration details: **http://www.curriculum.edu.au/scis/professional_learning.html**
For any questions please contact Kate Love **03 9207 9600** or **scisinfo@esa.edu.au**

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