

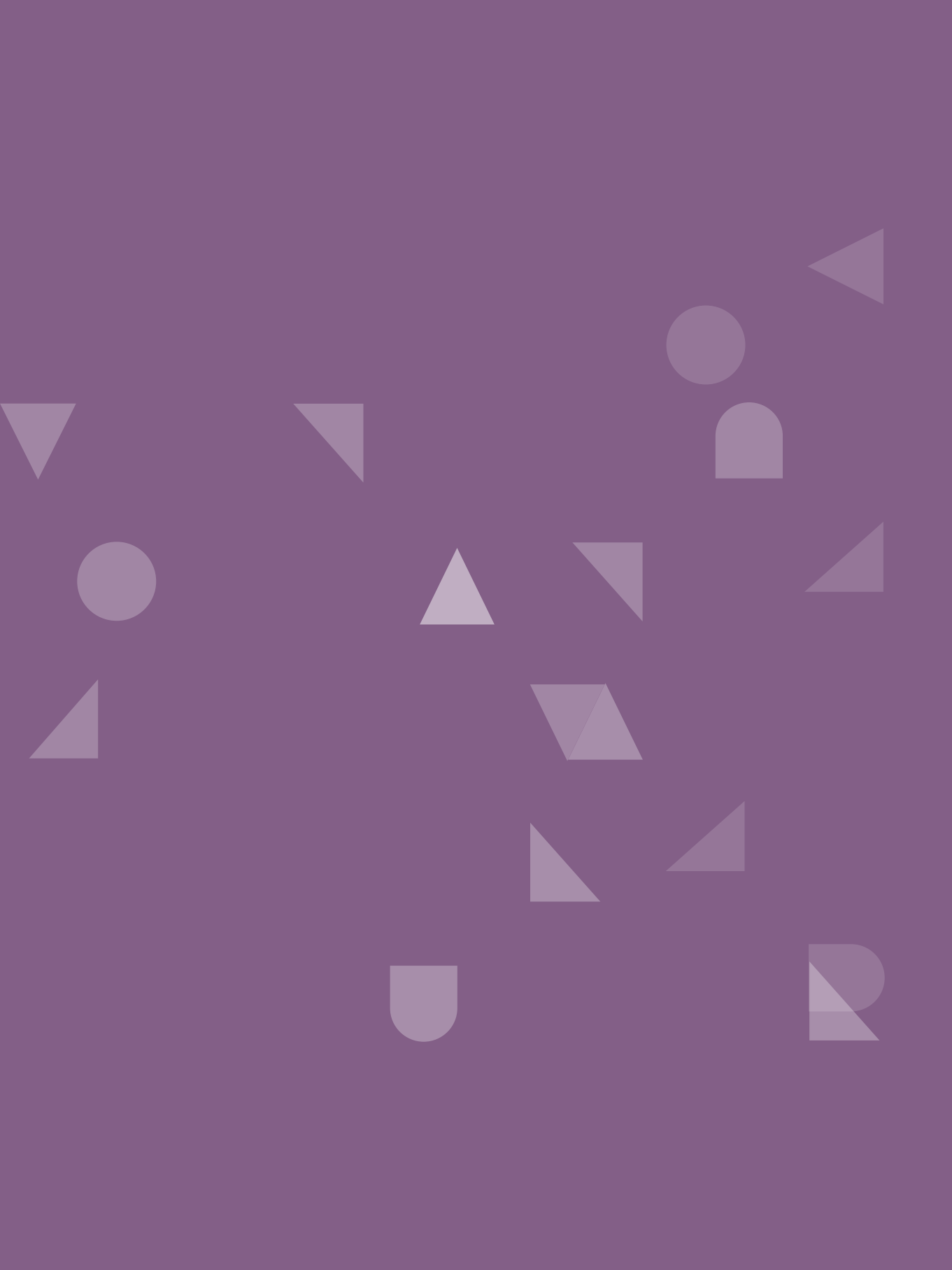
in alliance

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GIRLS' SCHOOLS AUSTRALASIA

Vol. 55







COVER IMAGE
 FabLearn Conference at
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Vol.55 Closing the gender gap

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ALLIANCE OF GIRLS SCHOOLS AUSTRALASIA

The Alliance of Girls' Schools Australasia is a not for profit organisation which advocates for and supports the distinctive work of girls' schools in their provision of unparalleled opportunities for girls.

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FROM THE ALLIANCE PRESIDENT

It is with a sense of genuine excitement that I have stepped into the role of President of the Alliance of Girls' Schools Australasia. It is a privilege to be part of this vibrant organisation, and I am grateful for the opportunity to build on the remarkable work of my predecessors, in particular immediate past president, Judith Poole. The Alliance continues to play an important role in supporting a high-quality education for girls.

With over twenty years' experience in both co-educational and all-girls schools, I have seen first-hand the many benefits that we offer young women within a single-gender learning environment. I am exceptionally passionate about the work of the Alliance and the work of our branches, where we are seeing a tremendous level of commitment and vision with their active engagement. Our members take advantage of the wonderful opportunities to network with talented, like-minded colleagues, and I am confident that, together, we are making a difference for women.

However, there is still a long way to go. The theme for this edition of our magazine, *In Alliance*, is 'Closing the gender gap', and we celebrate the progress that we have made towards gender equality, while also acknowledging the work that still needs to be done. In May, we held a very successful Aspiring Leaders' Conference. It was truly inspiring to see the next generation of leaders who are equally enthusiastic about girls' education and it gives me hope for many great things to come from this cohort.

Over the past few months, the single-sex schooling debate has again appeared in the media. One of the Alliance's key roles is to ensure that the public is well-informed of the great work we are doing in girls' schools, and to provide our members with research and evidence to join the conversation. We hope that you have found the articles prepared by our Executive Officer, Loren Bridge, and the eBriefs prepared by Research Officer, Jan Richardson, helpful.

I was thrilled that a number of our principals embraced the opportunity to be immersed in further learning this year with Alliance partner, Bond University, offering another 'Women Yarning Up' experience in July/August. Having been a part of last

year's trip to the remote Indigenous community of Lockhart River, I can attest to the incredible impact of these experiences. The remote communities visited this year were Thursday Island and Murray Island in the Torres Strait. With hosts Catherine O'Sullivan, Bond University's Pro Vice-Chancellor of Pathways and Partnerships, and Leann Wilson, a Fellow at Bond working closely with Indigenous and women's issues, this distinctive opportunity to learn something new in a way that never fades will have a lasting impact on both the individuals who participated and their communities.

We could not achieve the great success that we have enjoyed without the support of our partners. Bond University, Circle and World Challenge provide the Alliance and member schools with outstanding opportunities. Recently, we have partnered with iVicon, an organisation with links to the Houston Association for Space and Science Education (HASSE) and NASA. Through iVicon, students can attend the HASSE Space School - an international study program aimed at developing students' critical skills through experiential learning and higher order thinking. We anticipate that this new relationship will be greatly beneficial in progressing our priority on STEM for girls and balancing gender equality in this area.

In line with our objectives of supporting leaders in girls' schools, we have also joined forces with philanthropy and advancement experts, AskRIGHT. This organisation helps non-profits to raise money by providing optimal fundraising strategies, identification of donors and training. Of particular interest, AskRIGHT will help us navigate the roles of leaders in relationship development and the roles of schools in community philanthropy. These are important skills for leaders to invest in, and we look forward to having many leaders in girls' schools benefiting from their knowledge in what is a growing area of importance in all educational and not-for-profit sectors. In conjunction with AskRIGHT, I ventured to the UK with a group of leaders interested in fundraising. In one intensive week, we endeavoured to learn how our international counterparts engage in fundraising and build their philanthropic communities. We visited various schools, universities and cultural institutions and learnt about best practice in advancement with a view to bringing back this knowledge to support girls' schools. There is still much work to be done in relation to encouraging philanthropy towards girls' schools, and I look forward to sharing this knowledge with you.

This publication showcases the unparalleled opportunities our students enjoy in their all-girl environments and how they contribute to closing the gender gap. Thank you for your particular contributions - through encouragement, through mentorship, through sharing your perspectives, through being great role models for girls and young women. I look forward to meeting many of you at future Alliance events. ▲

FRAN REDDAN



FROM THE EXECUTIVE OFFICER

Sadly despite the considerable efforts directed towards addressing the issue of gender equality it remains evident in many aspects of everyday life. Women still experience discrimination in their careers. Overall they earn significantly less than men and this has significant impact on their financial security over their lifetime. They are sorely underrepresented in senior leadership positions, on boards and in government, and have a disproportionate responsibility for children and the aged. The World Economic Forum's annual report for 2014 shows Australia has slipped to 63rd for wage equality and 24th in overall gender equality in the world. New Zealand also dropped from seventh to 13th overall and ranks 33rd for wage equality. It is predicted by the Workplace Gender Equality Agency that based on current trends it will be over 300 years before Australia sees gender parity in the leadership of its top organisations.

Gender equity and single-sex schools are a familiar coupling with an entwined history. Many girls' schools were established to give girls the same

opportunities as their brothers and paved the way for gender equality. The case for girls' schools in the twenty-first century remains strong with a growing body of evidence supporting the benefits of single-sex education for girls. Yet the debate over single-sex schooling continues to galvanise opinion.

This issue of *In Alliance* looks at the unparalleled opportunities that girls' schools provide for girls both during and after their schooling. Opportunities for leadership, participation in sport, STEM subjects, and healthy competition and risk taking — skills that are advantageous for life success, counter the underlying causes of gender disparity and help to close the gender gap.

Melbourne Girls Grammar's School Captain, Grace Joel, brings a student's perspective to gender equality and explains what she's doing to fan the flames of modern feminism in her article, *I'm a feminist*. Alliance Researcher, Jan Richardson commemorates the role of girls' schools alumnae in World War I. And Principal of Santa Sabina College and Alliance NSW representative, Dr Maree Herrett, who visited the Torres Strait Islands as part of the Women Yarning Up tour, echoes the plea from Indigenous women to educate their daughters.

In an exclusive for *In Alliance*, we publish an extract from Dr Judith Locke's new book *The Bonsai Child*. Written for parents, Dr Locke has translated her groundbreaking research on overparenting with wit and candour to expose the harm that can be done through overparenting despite the very best of intentions.

Thank you to all our contributors for taking the time to share their ideas and experiences. Please tell me what you'd like more of in *In Alliance* via email at agsa@agsa.org.au and check in daily for the latest research and news on Twitter [@AGSAGirls](https://twitter.com/AGSAGirls). ▲

LOREN BRIDGE



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EDUCATION IS THE KEY

Six Alliance principals, including Alliance Executive member Dr Maree Herrett heard a powerful cry for help from the mothers of the Torres Strait Islands on this year's Women Yarning Up tour organised by Bond University.

In the Torres Strait Islands, prayer isn't just part of their religion; it's part of their culture.

Before every meal on our recent visit to Murray (Mer) Island and Thursday (Waiben) Island, our group of principals, businesswomen, Bond University representatives and community members would gather in a large circle to give thanks.

But one morning was different.

After setting out our breakfast at the Murray Island Guesthouse, local caterer and mother Melora Noah took her place in the circle and drew in a deep breath.

"It is such a privilege to have all of you wonderful educators here on Mer Island but as a woman and a mother, I have to take this opportunity to speak out and say what is in my heart," she began.



For the next ten minutes, Melora spoke eloquently and honestly to us about what it is like for a woman living in the Torres Strait Islands. She told us what she wants for her daughter, in terms of her education and her future; and she told us what she wants from us as educators, what she wants from the government authorities and what she wants from the community.

There were tears – hers and ours – as Melora shared how hard it is for mothers to send their 11 and 12-year-old babies away from home to board on Thursday Island or further away to our mainland colleges because the local island school only goes to Year 6.

But there was steely resolve as she assured us that they can cope because Mer Island mothers know that education is the key to giving their children a future.

This proud and beautiful woman was equally clear about what sort of education she wants us to provide.

"Improving my daughter's grade from a D to a C is not good enough," she said. "We want our children to strive for As; to be held to the same high standard as every other student."

As much as her words resonated with every person in the room, it was her final analogy that really touched our hearts.

"When my daughter goes to the Qantas counter to catch her flight home, I don't want to her stand at the back of the line not knowing what's going on. I want her to have the confidence to step up to the desk and ask about the flight or her seat or whatever she needs to know."

There were many powerful and memorable moments during our five-day visit to Murray and Thursday Islands but I think I can speak for all when I say that this was the most profound: A cry for help ... a cry for our help ... because these mothers want exactly the same for their children that we want for ours.

This moment also illustrated the value of Bond University's Women Yarning Up experiences – that we can't understand what's happening on Thursday Island or Murray Island or in any remote Indigenous community unless we can talk to the people face-to-face and see what their life is all about.

And we had many opportunities to do just that ... at Tagai State School's Murray Island primary campus, where we were welcomed by Principal Jonathon Case, his teaching and support staff, and the children and Elders who presented a performance of local music and dance; in the classrooms where we worked with the children on their reading and learned from them about their life on the island; and at a dinner that evening where we met their parents, community leaders and Elders.

Flying to Thursday Island the following day, we received an equally warm reception from representatives of the Torres Strait Region Authority and the Torres Strait Islanders Regional Education Council, as well as local school principals, teachers and support staff from Tagai State College, Kaziw Meta College and Our Lady of the Sacred Heart School, with Kaurareg Elder Milton Savage presenting a very moving Welcome to Country.

On Sunday morning, we joined with the community once again, attending our choice of Catholic or Anglican church services, then gathering at the new Parish Hall for morning tea where we had the privilege of meeting Bishop Mabo, nephew of Eddie Koiki Mabo.

Bishop Mabo's pride in telling us that he had donated part of his family's land for the Murray Island school perfectly illustrated the impact his uncle's landmark Native Title claim has had on this community.

On our final morning, we toured the Kaziw Meta boarding facilities and Tagai State College's senior campus which provides secondary schooling for students progressing from Tagai's primary campuses on sixteen other islands. Once again, this reinforced the challenges faced by families who have no choice but to send their children away to boarding school after Year 6.



Our business representatives – Kim Van-Look from ISS Facility Services and Stephanie Atkinson from Atkinson Solutions – added their corporate perspective to our discussions and it was a highlight to meet former Brisbane Lord Mayor Sallyanne Atkinson AO who continues to be a role model for women as President of The Women's College at The University of Queensland.

We were particularly fortunate to have the insights and advice of our Indigenous tour leaders: Leann Wilson – a Bond University Fellow and Director of Regional Economic Solutions; Leon Epong – Chair of the Queensland Indigenous Education Consultative Committee and Managing Director of Recruitment Outcomes; and Torres Strait Islander local, Mel Nash – editor of the *Islander Magazine*.

While there was so much to learn and absorb from all of these experiences, the Women Yarning Up trip also provided a valuable opportunity for building relationships among Alliance principals and the other members of our group.

Once again this year, the Alliance contingent represented a dynamic cross-section of school principals from different parts of Australia, including Kathryn McGuigan from Mary MacKillop College in Adelaide, Karen Money from Melbourne Girls' College, Dr Briony Scott from Wenona in North Sydney, Paulina Skerman from St Patrick's College Townsville (which has a number of Torres Strait Islander students) and myself from Santa Sabina College in Strathfield, Sydney.

We were all particularly delighted to be joined by Siobhan Jackson, Principal of Lockhart State School in far north Queensland, who hosted last year's Women Yarning Up trip and generously shared her wealth of knowledge about Indigenous education with this year's contingent.

As always, the group was expertly facilitated by Bond University's Pro Vice-Chancellor Pathways and Partnerships, Catherine O'Sullivan.

In many ways, the diverse nature of this collective and the varied knowledge we each bring to the table reflects the key message of our Torres Strait Island experience: that whatever ideas or projects or opportunities evolve from our visit, we can't do it alone.

The only way we can 'close the gap' between Indigenous and non-Indigenous Australians is to work in partnerships – with our fellow principals, with universities, with training providers, with government and, most importantly, with the community members like Melora who know exactly what they need in order to create a better future for their children. ▲

MAREE HERRETT
PRINCIPAL, SANTA SABINA COLLEGE, NSW



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COMMEMORATING THE ROLE OF GIRLS' SCHOOLS ALUMNAE IN WORLD WAR I



8

When the First World War broke out in 1914, women could only enlist as nurses, limiting their official war involvement to those who had already completed nursing training prior to enlistment. Hundreds of New Zealand nurses served in military hospitals in Egypt, England and France, as well as on British and New Zealand hospital ships. In Australia, nearly three-quarters of all trained nurses enlisted in the Australian Army Nursing Service (AANS), serving in Egypt, Lemnos, England, France, Belgium, Salonika, Mesopotamia, Palestine and India.

The majority of women, however, were forced to find other ways to assist in the war effort, sometimes paying their own passage overseas and joining non-military units or attaching themselves directly to British detachments to work as doctors, masseuses, drivers and nursing orderlies with the Red Cross Voluntary Aid Detachments (VADs). Many of these unpaid volunteers worked alongside the military or near the front lines, but without receiving the same recognition as nurses serving with the Australian and New Zealand army nursing services.

In 1916, the Defence Council lifted the ban on Australian VADs travelling overseas after a request from the British government, allowing the first official group of volunteers to depart Australia in September 1916. As noted on the Red Cross website, the women, known as "VAs", were trained in "first aid and home nursing to carry out unpaid domestic and quasi-nursing duties in hospitals and convalescent homes", becoming "the public face of Red Cross" during the war.

With the centenary of World War I currently being commemorated, the Alliance recently asked member

schools to send in the names of alumnae who served overseas in order to highlight the contribution of girls' schools to the Great War. To date, sixteen Australian and four New Zealand member schools have provided the names of doctors, nurses, masseuses, drivers and VAs, bringing to light the stories of some truly remarkable women.

In sheer terms of numbers, Presbyterian Ladies' College in Melbourne leads the way, with its school magazine, *Patchwork*, of August 1919 naming 25 army nurses, 11 masseuses and 67 members of the VAD. Not far behind is Methodist Ladies' College, Melbourne, with 21 army nurses, including Marie Cameron who suffered permanent injuries when the ship she was on was hit by a torpedo. Her story provided the inspiration for the character of Matron Mitchie in Thomas Kenneally's book, *The Daughters of Mars*.

Also featured in Kenneally's book is the story of Elsie Sheppard, alumna of MLC School, Sydney, who completed her nursing training and married Sydney Cook, son of Australian prime minister Joseph Cook, just before war broke out. Elsie enlisted as an army nurse under her maiden name as nurses were required to be single. In June 1916, having nursed her husband back to health after he was shot in the head at the Battle of Lone Pine, she returned to Australia knowing that she could no longer be sent overseas as a married woman. Instead, she joined the Red Cross as one of twenty 'Bluebird' nurses and was sent to the Western Front. Another 'Bluebird' nurse was Lynette Crozier, also from MLC School, who nursed wounded French soldiers at a mobile hospital south-west of Amiens.

Alumna of Brisbane Girls Grammar School, Grace Wilson, was principal matron of the 3rd Australian General Hospital in England, Greece, Egypt and France. Arriving on the Greek Island of Lemnos to establish an emergency hospital, she discovered there were few



tents or medical supplies and limited water supplies. Grace and her nurses famously tore up their petticoats to use as bandages, overcoming incredibly challenging conditions to treat thousands of soldiers wounded on the Gallipoli Peninsula. Grace was awarded the Royal Red Cross First Class in 1916, appointed Commander of the Order of the British Empire (CBE) in 1919 and received the Florence Nightingale Medal in 1929.

Alice 'Joan' Twynam from Sydney Church of England Grammar School (SCEGGS) completed her nursing training and worked as a 'Bush Nurse' in rural New South Wales before enlisting in the AANS in October 1914. After treating soldiers wounded at Gallipoli in the hospital in Cairo, Joan was posted to a hospital ship stationed off the coast of Gallipoli and then to the Western Front. Joan received a Mention in Dispatches and the Royal Red Cross First Class, the latter award being presented to her by the Prince of Wales at Government House in Sydney in 1920.

Edna Pengelly, alumna of Christchurch Girls' High School, sailed with the first contingent of fifty New Zealand army nurses in April 1915, serving at military hospitals in Egypt, where she treated wounded soldiers from Gallipoli, and later in England. She was awarded the Royal Red Cross Second Class in 1917 and First Class in 1919. On her return to New Zealand, Edna became matron of the Queen Mary Military Hospital and had a long and distinguished career in nursing.

Dr Agnes Bennett, an alumna of Abbotsleigh in Sydney, who became the first female commissioned officer in the British army, joined the Scottish Women's Hospital in Serbia, which was established after the British government rejected the services of female doctors. Another doctor joining the Scottish Women's Hospital was Jessie Scott, graduate of Christchurch Girls' High School. While attached as a medical officer to the Serbian army, Jessie was taken prisoner of war for three months and faced great danger while working on the Russian front in Romania. Jessie continued working with the Serbian army until 1918, after which she was attached as a surgeon with the British Royal Army Medical Corps (which by this time had accepted female

doctors) in Salonika and France. Jessie was awarded the Order of St Sava Third Class by the Serbian army.

Olive King, a graduate of SCEGGS, demonstrated great bravery as an ambulance driver. She funded her own travel to England where she bought a truck which she customised as a field ambulance and named Ella the Elephant. After completing a first aid course and mechanical training, she went to Belgium and then to Serbia and Salonika, where she served with the Scottish Women's Hospital and the Serbian army. In August 1917, facing desperate circumstances, Olive drove her ambulance for over twenty hours transporting patients, medical staff, hospital records and civilians to safety. She received the Serbian Silver Medal for Bravery and, in 1918, the Gold Medal for Zealous Conduct.

Tragically, 21 New Zealand nurses, 27 Australian army nurses and five Australian VAs died while serving overseas. One of those who gave her life was Kathleen 'Adele' Brennan, alumna of Kincoppal-Rose Bay School, Sydney, who started the war as a VA but later transferred to the Australian Army Nursing Service. Adele died of influenza in Leicester, England, on 24 November 1918, less than two weeks after the Armistice. Buried with military honours, Adele's coffin was borne to the cemetery on a gun carriage, followed by a large procession of Royal Medical Corps Staff and nurses from nearby hospitals.

The Alliance wishes to thank the many archivists and staff of member schools who have contributed names, detailed information and images of past students for inclusion in a database of World War I alumnae. ▲

JAN RICHARDSON
RESEARCH OFFICER

ADDITIONAL REFERENCES

- For further information regarding Dr Agnes Bennett, Grace Wilson and Olive King, please see their respective entries in the *Australian Dictionary of Biography* at <http://adb.anu.edu.au>
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THE MATILDA EFFECT: GENDER DIFFERENCE, INDIVIDUAL RECOGNITION AND AUTHORITY IN SCIENCE

Science relies upon social interaction to share and validate its findings. This interaction may be virtual or physical: via the Internet or collaboration. A good scientist is a collaborator, often simultaneously competing for the minimal individual recognition available. In this essay I argue both the Matthew and Matilda Effects impinge upon the scientific rewards system, ensuring recognition for emerging scientists is difficult to obtain. However, the Internet can act to reduce the impact of these effects because it affords greater accessibility to scientific studies and availability of information about scientists.

The Matthew Effect (ME) was a term coined by sociologist Robert Merton in an early publication (1968). It alludes to the Gospel of Matthew:

For whomsoever hath, to him shall be given, and he shall have more abundance; but whomsoever hath not, from him shall be taken away even that he hath (Matthew 13:12 in Rossiter 1993, p.325).

Although the misallocation of recognition due to the ME is seemingly unfair, Merton describes it as “functional” (Rossiter 1993, p.326). Merton (1968) argues that less-known scientists learn to work with the disadvantage of misappropriation of recognition by communicating their ideas to their more-prominent colleagues, who hopefully publicise them and help to construct a reputation for the budding researcher. Yet this makes it difficult for readers to know who has contributed most to a paper: famous names are memorable and have a “visibility factor” (Rossiter 1993, p.326). This fame—particularly for Nobel laureates—is long lasting. This is unfortunate as there are more scientists of Nobel calibre than there are Nobel Prize-winners. For example, physicist Marian Smoluchowski described Brownian motion in 1906, at the same time as, and independently of, Einstein (Rossiter 1993). Unfortunately Einstein’s fame eclipsed Smoluchowski’s career: Einstein is a household name, while Smoluchowski is almost forgotten. More recently, in 1952, microbiologist Selman Waksman was awarded the Nobel Prize for discovering streptomycin’s antibiotic activity against tuberculosis (Mistiaen 2002). Waksman failed to acknowledge the contributions of Albert Schatz, a PhD student in his laboratory. Schatz sued Waksman, received compensation and is now considered co-discoverer.

Sociologist Harriet Zuckerman argues the scientific reward system, even at Nobel standard, is “dysfunctional”. One laureate interviewed claims

THE MATILDA EFFECT CONCERNS THE SYSTEMATIC OBSCURING OF SCIENTIFIC WOMEN, WHOSE WORK IS FREQUENTLY ATTRIBUTED TO THEIR MALE COLLEAGUES. HISTORIAN OF SCIENCE MARGARET ROSSITER (1993) INTRODUCED THIS PHRASE TO DESCRIBE THE DENIAL AND REPRESSION OF FEMALE CONTRIBUTION TO SCIENTIFIC RESEARCH.

Merton extended this to refer to science, implying there is a tendency to celebrate those who are already well known or “prominently-placed” (Rossiter 1993, p.337). It suggests the rewards scheme in science applies a “halo effect” (Rossiter 1993, p.325) to esteemed scientists, who find work they did not do, or did in collaboration, is attributed to them. In essence the ME is the over-acknowledgment of those at the pinnacle of the scientific profession.

The problem here is this awards system does not benefit fledgling or less-known scientists. For instance, the field of radio astronomy was slow to evolve, as detectable radio waves from distant galaxies were not anticipated (Halliwell 1982). Rather, during the 1930s, professional astronomers were too distracted by the revolutionary development of Hooker reflectors and telescope design to be interested in Karle Guthe Jansky’s seminal detection of galactic radio noise. Jansky’s observations were followed up several years later and today the discovery that the Milky Way emanates radio waves is attributed to him. Jansky was an engineer with an interest in physics, not a professional astronomer. The ME can be seen in operation here: Jansky, as an unknown astronomer, found it difficult to draw attention to his findings despite their ground-breaking nature.

the prize is awarded “[b]y some random selection procedure; you pick out a person, and you make him an object of a personality cult” (Zuckerman 1978, p.425). The Nobel Prize, according to Zuckerman, awards a few symbolic figures and does not accommodate great change in science or in its social organisation. According to the ME, few scientists can achieve success: the prominent scientist gains continual recognition, while the underdog struggles to be acknowledged at all.

The Matilda Effect concerns the systematic obscuring of scientific women, whose work is frequently attributed to their male colleagues. Historian of science Margaret Rossiter (1993) introduced this phrase to describe the denial and repression of female contribution to scientific research. There are numerous examples of this and its negative impact upon the rewarding of female scientists for revolutionary work. Perhaps the most outrageous is that of Trotula, an eleventh-century physician (Rossiter 1993). Trotula was famous for her cures of women’s diseases, but her name was miscopied by a monk in the twelfth century who assumed such a successful scientist must have been a man. Nineteenth-century medical historian Karl Sudhoff further downgraded Trotula to midwife, implying only a male physician could

have documented such important ideas. Trotula is consequently not included in the *Dictionary of Scientific Biography*. The work of women scientists has repeatedly been ignored and eradicated from history, often due to antagonistic historians and because their work was subsequently eclipsed by their male counterparts.

Yet is the Matilda Effect simply a re-labelling of the ME? Sociologist Jonathon Cole (1979) argues the Matilda Effect is the application of the ME to the consideration of women. He posits that women have been less cited and have received less attention and are therefore *deserving* of a lower academic rank in science. Cole implies the Matilda Effect is not of particular importance, it is simply a fact of scientific endeavour, and this unfairness is equally as applicable to men as it is to women.

However, the Matilda Effect is more significant than Cole suggests. The concept is a significant feminist idea that reveals much about the importance of diversity in science. Sociology of science has progressed minimally since Cole's article, with philosophers of science giving gender more attention than sociologists (Rossiter 1993). Raising awareness is vital to the combat of institutionalised sexism, and Rossiter (1993) does exactly that with her notion: there must be a *focus* upon gender for the public to be made conscious of and work to reverse any inequalities in science. Historically, diversity in science was irrelevant. Women were not expected to be scientists. Rather than pursue careers in science themselves they were encouraged to rear scientifically oriented sons. In fact, women were restricted to assistant jobs and social entertainment amongst scientists was deliberately masculinised in order to discourage female attendance (Watts 2007). Physicist Maria Goeppart Mayer, for example, shared the Nobel Prize in 1963 with two male scientists for their co-discovery of the shell model of the nucleus. Due to strict anti-nepotism rules forbidding women to work in the same faculty as their husbands at the University of Chicago at the time, Mayer worked as an unpaid volunteer faculty member (Watts 2007). Mayer's contributions would easily have been disregarded by the Nobel committee if she had not been included as a member of the Fermi research group, despite her informal title (Dash 1980). Variety of collaborators, particularly in science, bring new and creative ideas. The sex of the investigator or observer is irrelevant. Rossiter (1993) emphasises this, and with awareness of these inequalities, females should be *encouraged* to pursue scientific endeavours if an interest is evident.

Without doubt the advent of the Internet and prevalence of open-source publishing has altered the way information is presented to the public. Material of varying quality is now accessible to anyone with an Internet connection. It could even be argued that technology has had negative effects on individual recognition in science. With the Internet comes rapid and twenty-four hour access to information. Now some papers are free-to-access, the most eye-catching and glamorous work will receive most publicity and attention. Conversely, biologist and Nobel laureate Randy Schekman (2013) argues that science has

changed for the better. Schekman announced last year that his laboratory would no longer send articles to top-tier journals such as Nature, Science and Cell, arguing that their reputations are not entirely warranted because like many journals, they concentrate upon selling their brand rather than stimulating pioneering research. Rather, Schekman is editor of *eLife*, an online open-access journal funded by the Wellcome Trust, the Howard Hughes Medical Institute and the Max Planck Society. *eLife* publishes high-quality research that is free for anyone to read, avoiding unnecessary promotion of expensive subscriptions. The Internet therefore also works to make science more *accessible* and facilitates access to the achievements and research of scientists, including women. While the Matthew and Matilda Effects are undoubtedly still relevant, scientists who publish online are listed as authors and are cited and referenced appropriately. Personal recognition in science can only change for the better if the scientific rewards system fundamentally changes too. While the Internet may bombard the public with information, ultimately it makes science accessible and hopefully up-and-coming names will be remembered.

Currently, individual recognition in science is still difficult to attain, but with increased awareness of this and of the Matilda Effect, the public and scientific elite can make a conscious effort to effect change. Distraction and rapidity of global information sharing aside, the Internet remains the single best tool to ensure this happens. ▲

CLAIRE BARNES

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RETINKERING OUR APPROACH TO STEAM EDUCATION IN AUSTRALIA

LAURISTON GIRLS' SCHOOL, VIC

Lauriston Girls' School held its inaugural FabLearn Australia Conference in July. I was encouraged to create an Australian version of the FabLearn Conference which is held annually at Stanford University in California, by Associate Professor Paulo Blikstein who developed the Fablab@Schools program of which we are a part.

The purpose of the conference was to enable sharing of ideas and practices, creating opportunities for collaboration between colleagues and schools, and to demonstrate the power of digital fabrication to engage our students and inspire them to become innovators now and in the future.

We were thrilled with the response to the FabLearn Conference (#FabLearnAus) from both delegates and the number of applications to run workshops. School leaders as well as science, technology, design and visual arts teachers came to Lauriston from all over Australia. We even had two educators from the National Institute of Education, Singapore come specifically for the day.

Participants attended FabLearn for many reasons. Some are upgrading science facilities at their schools and wanted fresh ideas, others already carry out their own digital fabrication program and wanted to meet like-minded educators, and many were simply interested in finding out more about the possibilities of a FabLab.

As a principal and educator, I have responsibility for preparing our girls for exciting futures with transferable skills. We see our graduates becoming maximisers, optimisers, transitionists, ethicists and makers of beautiful things. Within the curriculum offerings for our students, we are looking for opportunities to engage our students in ways which will enable them to use their creative thinking skills, and learn in an experiential way.

Our FabLab has allowed us to create a cross-disciplinary space in which our students can participate in a broad range of projects and activities that encompass all of the subjects they study. We believe that through digital fabrication, we are providing a valuable avenue for inspiring our students to continue their studies in STEAM and helping them to see the world as it will be.

AS EDUCATORS, RULES ARE IN OUR BLOOD, AND SO WE HAVE SOME FABLAB ANTI-RULES THAT DRIVE OUR PHILOSOPHY WITH DIGITAL FABRICATION.

- › MAKE MISTAKES
- › REVISIT AND PERSIST WITH IDEAS
- › MERGE ALL THE SUBJECT DISCIPLINES – THE 'A' IN 'STEAM' STANDS FOR ANYTHING
- › PUT YOURSELF OUT OF YOUR COMFORT ZONE
- › REINVENT OLD TECHNOLOGIES AND DISCOVER NEW ONES
- › BE COMFORTABLE NOT KNOWING
- › LEARN WITH YOUR STUDENTS
- › EMBRACE THE FUTURE. DON'T BE SCARED OF IT.





Projects that have been conducted in our FabLab since it opened eighteen months ago include the Year 10 STEM elective which encourages girls to design their own model of a sustainable house. Years 5 and 6 girls have been using coding to create light and music, and Year 11 students have constructed a 3D eye in their psychology class.

Our FabLab coordinator, Dr Michael Street, is working with teachers from Prep to Year 12 to design activities and opportunities to utilise the resource.

FabLearn Australia consisted of keynotes from Professor Ian Chubb, Dr Genevieve Bell and Dr Elizabeth Finkel, who set the context for science applications beyond school. Three different streams of practical workshops followed and to finish our day, we visited Swinburne University of Technology where we were 'let loose' in their brand new 'Factory of the Future'.

Chief Scientist Professor Ian Chubb stressed the importance of creating a reliable pipeline of STEM graduates and congratulated Lauriston for making the bold step of reimagining education and making science inspiring for a generation with so many choices.

"Often the conversations in schools are a proxy for conversations we find hard to have in the rest of society. Mainly about the future. The future surrounds us in education because everything we do comes down to the decisions we make to equip us for life and

not just for today's economy but to be prepared for a world we are only just grasping based on the changes of today," he said.

"It matters that we get science right in schools and that it is not just about activity but the quality of that activity," said Professor Chubb.

Dr Genevieve Bell is an Australian anthropologist and Vice President at Intel who helps predict the future. Dr Bell leads a team of social researchers to develop new products and technologies that are shaped around people's needs and desires. Dr Bell explained that we must address the seduction and fear of new technology in a human way and that we need to frame the right conversations to do so.

Prior to the FabLearn Conference, we held a three-day workshop for 40 girls from four schools. With our inspiration 'What will the world look like in 2050?', the girls worked in groups of three to consider, plan and make their own prototype of objects they believed would be commonplace in the future.

Projects included a dome house to be made of redwood and solar glass panels, an inner-city building with solar panels, hydro turbines to convert water into energy, wind turbines and vertical, self-watering gardens. There was also a model of a waste conversion vat; a self-sustaining flower pot, which included a shower head, timer and water reservoir; and the 'Tronomato', a modern unicycle which runs on solar power and electro-magnetic force.

As educators, we need to question our own assumptions about what an education looks like in 2015 and beyond. As we would like our own students to reflect on their learning and aim for deep understanding, as educators we need to be more adaptable and open to changing our approaches to teaching, using digital technologies and thinking about how our students might be able to demonstrate their knowledge and understanding.

We made many friends at FabLearn Australia and look forward to the next one. ▲

SUSAN JUST
PRINCIPAL

GIRLS IN SCIENCE

ST PATRICK'S COLLEGE, QLD

The Science faculty at St Patrick's College Townsville has noticed a significant trend toward science subject selections, with interest and demand increasing.

The College is experiencing impressive uptakes in the sciences. St Patrick's College is a small school with around 320 students and only 48 in this year's senior class, but out of this cohort 49% are enrolled in biology and 40% in chemistry, almost double last year's enrolment. Subjects such as Maths C and Physics have remained stable with approximately 23% of students enrolled. Anecdotally this appears to be trending against the norm when it comes to girls choosing the sciences.

The College has a dedicated focus on STEM (Science, Technology, Engineering and Mathematics) and has a number of innovative programs available to promote this field of study. 'Think Ladies', a club for students in all grades who are interested in science, engineering, technology and maths, was started at the beginning of this year. The group meets regularly to work on term-based projects and this term, the girls are developing a video game as part of the National STEM Video Game Challenge.

The College is currently planning for a Space Camp to the USA in 2016 to incorporate the Space & Rocket Center in Alabama and the Kennedy Space Center in Florida. The Space Camp is another innovative way to promote an interest in the sciences and encourage students to get involved.

Marine Science will be introduced in 2016 to complement the suite of maths and science subjects available. As a Reef Guardian school located on the beachfront it's a logical extension and a relevant area of specialty for students.

Science Teacher Chris Pacey, a former marine biologist with twenty years' field experience, will carry his passion for the protection and advocacy of marine environments into the program. This is a hands-on science. Students enrolled in the subject will spend at least eighteen hours per year learning in marine environments such as reefs, rocky shores and estuarine areas. They will be out in the field investigating and collecting data and then analysing, interpreting and evaluating their findings in the classroom.

The subject will give students the opportunity to gain practical experience and theoretical formation for an industry that provides a number of career paths including marine science, marine biology, nautical science, fisheries and aquaculture, conservation and resource management and tourism.

Through the program, students will be learning to become active stewards of our marine environments. Through their investigations and studies, students will come to understand and appreciate the importance of protecting our marine environments.



(ABOVE) YEAR 11 SCIENCE STUDENTS MEG ALLOWAY (LEFT) AND SARAH MIDDLETON (RIGHT)

The College will soon have a large-scale aquarium installed as part of the Marine Science program. The aquarium will promote an interest in the sciences in our younger students who will use the labs and enjoy the ambience created by the aquarium. The girls will be responsible for caring for the marine ecosystem within the aquarium.

The College held week-long program of science and light activities to celebrate National Science Week, under this year's theme, 'The Science of Light'. Activities included workshops, debates and photography and culminated with a 'Science Under the Stars Open Evening' for the community.

St Patrick's College is also eagerly awaiting the arrival of a drone that will be used across subjects including Physics and Technology. The drone will be an interesting addition to our science and technology programs and the students are very keen to learn about and start to use this technology as part of their learning programs.

Principal, Paulina Skerman is committed to creating a learning environment where girls are affirmed in their ability to do more and be more than they ever thought possible. Science is vigorously promoted and the College's high participation rates for science subjects speak for themselves. ▲

JULIE PLATH
DIRECTOR OF COMMUNICATIONS AND ENROLMENT



TAKING ENDURANCE TO THE EDGE

ST MARY'S COLLEGE, TAS

St Mary's College in Hobart took its school slogan of 'One Pace Beyond' quite literally recently, with a small group of students, alumnae and staff taking on the famous Kokoda Track.

This makes the College the first Tasmanian all-girls school to participate in the trek, which is most commonly undertaken by adults (predominantly male) due to its physically demanding nature.

The College has a holistic approach to education and is always looking to take girls 'one pace beyond' in all pursuits – across academic, sporting, spiritual, cultural, leadership and outreach programs.

Experiences such as the Kokoda trek provide the opportunity for our students to challenge themselves and shows them a world of possibilities. One of the many benefits of an all-girls school is that there is not just equal opportunity, but every opportunity for girls across all areas, and this is particularly important in leadership experience. It was interesting to hear the group on their return say how often the other groups they passed on the trek exclaimed 'Oh, you're all girls!'

Having completed the Kokoda trek on two previous occasions, Sport Administration Officer, Sheree Kemp, thought the trek would be a fantastic opportunity for students to challenge themselves and give them an edge in developing leadership skills and resilience.

A lot of preparation was required prior to the arduous eight-day trek to ensure students were ready for the physical and emotional challenge, including eight months of intensive group training and a series of student

interviews with Clinical Psychologist, Sarah Haberle.

Year 11 student, Madeline Haigh, said it was the trip of a lifetime, with the girls experiencing a deep sense of connection with the locals and those that fought and fell on the track in World War II 'The experience was tough – physically, mentally and emotionally, but mateship made it all easier.'

Alumna, Zara Dixon, said that she has long dreamt about walking the Kokoda Track, and it was the first goal that she ever wrote on her bucket list. 'The struggle, sweat and tears are worth it when you walk through the final Kokoda archways at the finish line; the feeling you get is something that you'll hold on to for a lifetime.'

Sheree Kemp said it was a joy to share the journey with such a fantastic group of young women and watch them go through the extremities of exhaustion and elation, and experience the many highlights along the way. 'It was a special moment to see Zara (who has Papua New Guinean heritage) connect with the PNG culture and say she had never been prouder of anything in her life than to be PNG.'

'It's a privilege to help students tick goals off their bucket list, connect them with cultural experiences, and see them realise what amazing things they are capable of achieving with hard work.'

Outdoor Education Leader, Sarah Cubit, has completed many difficult bushwalks around Tasmania with Outdoor Education classes but said this is physically and mentally the most difficult walk she has undertaken in her six years of teaching. 'The girls showed resilience beyond their years and have gained life long memories that will help shape their future.' ▲

MELISSA MCLEOD
COMMUNITY RELATIONS OFFICER

PERCEPTIONS OF SELF AND CAREER OPTIONS: WHAT NARRATIVES FROM OLD GIRLS OFFER TODAY'S STUDENTS

ST HILDA'S SCHOOL GOLD COAST, QLD

The evidence seems to be mounting that collaboration between schools and universities can develop and grow girls' interest in engineering (Lawrence & Mancuso, 2012). Partnerships with universities cultivate an awareness of courses, the diversity of practice within a discipline, and what it is like to study in particular faculties. But what about life stories, the narratives which focus on personal experience – how do these influence girls' perception of their career options?

In 2014, senior students studying engineering at St Hilda's School on the Gold Coast donned high viz vests and hard hats to tour the site of our three-storey building renovation. As the project manager explained the significance of pre-tensioning concrete, a process that enhances concrete's ability to withstand tensile forces, the girls' engagement with this daunting problem-solving process was fascinating. Walking alongside them, staff began to discuss possible futures for the girls to evaluate career options in engineering and broaden their expectations. A quick roll call of the school's graduates – working in areas as diverse as nuclear science, water resources, biomedical engineering, structural engineering and aeronautical engineering – triggered the decision to design a Girls in Engineering conference to cultivate awareness of professional opportunities. What's more, we decided to harness the goodwill of our Old Girls to focus insight on personal experiences of study, career path and the skills women bring to this profession.

Many of us have drawn on our Old Girl associations to inspire the young women in our care as we understand that similarity of background contributes to developing a perception of what is attainable. This is supported by research conducted by Lapor and Heppner (2009), who argue that “adolescents develop an idea of what is attainable partly depending on how well an occupation fits with their social class and their gender as well”.

Amazingly, bringing together speakers from Massachusetts, the Pilbara, Darwin, Brisbane and the Gold Coast was easy to facilitate even though the conference was mid-week. The great relationships maintained between past students and the school played an important role in this process.

The 2015 STEM Engineering Conference for Girls was advertised to schools in South-East Queensland and we were pleased to welcome fifty students from as far up the coastline as Gympie. In total, 110 girls attended a seven-hour program at our campus which

included keynotes, panel discussions and mentoring breaks, followed by demonstrations at the Griffith University Engineering faculty led by female engineering students and an address by Pro Vice Chancellor (Sciences), Professor Debra Henly, and Head of the School of Engineering, Professor Geoff Tansley.

Conversation flowed, and neither the students nor the presenters were shy in asking questions about what women experience and what they bring to a contemporary workforce. Demonstrations by lecturers and student presenters at Griffith University allowed, in many cases, hands-on learning. Our aim was to provide an opportunity for students and visiting teachers to become more aware of the extraordinarily diverse study, employment and travel opportunities open to girls today. Surveys and a further increase in students selecting engineering for their senior studies are testament to the success of the conference and the role engaging with Old Girls has had on girls' expectations of engineering and their perceptions of themselves as being able to achieve in this career.



(ABOVE) STUDENTS AT 2015 STEM ENGINEERING CONFERENCE FOR GIRLS

Historically, we know that in the mid-nineties 5.8% of engineering students studying at a tertiary level were female. Today, this figure has increased to 18 – 20%. Moran (2008) suggests these figures could plateau if there is a lack of education of the general population of the role of engineers in society.

Certainly, a great deal of effort has been directed in Australian girls' schools to promote STEM subjects and the uptake is good. We can continue to have confidence that a shift will occur with a considered approach to promoting this suite of subjects. A longitudinal American study on girls continuing to pursue STEM career plans after secondary education, conducted by Packard and Nguyen (2003), identified that 30 of the 41 participants persisted with their aspiration. Intensive academic programs and important mentoring relationships were seen to contribute to this outcome.

As schools continue to prepare girls for the numerous career options in engineering, our experience suggests the initial sharing of Old Girls' personal stories can have a strong influence on students' perceptions of themselves in this field and the formation of career possibilities. Our next step is to investigate intensive vacation programs and mentoring to support long-term engagement. ▲

WENDY LAUMAN
DEPUTY PRINCIPAL

FULL STEAM AHEAD PENRHOS COLLEGE, WA

The acronym STEM is widely used to represent study in the areas of Science, Technology, Engineering and Mathematics. With the acknowledgement that studies in the areas of Arts are equally critical, we now have the acronym STEAM, which is recognised as the fusion between these areas. As Donna Shalala, President of the University of Miami and influential advisor to the Clinton Administration wrote, "Science and maths may be the brain of our curriculum and we cannot do without them, but the arts are its heart and we cannot do without them either."



(ABOVE) STEM ACTIVITIES ARE A FOCUS AT PENRHOS COLLEGE

The curricular and co-curricular offerings at Penrhos offer breadth and depth across science and mathematics, arts and humanities with a focus on creative and critical thinking, collaboration and communication.

We have chosen to highlight the STEM activities underway at Penrhos because this area, according

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to the Australian Bureau of Statistics, is the most rapidly growing area of employment in the Australian economy. It is also an area that is most under-represented by women but interestingly enough, girls from girls' schools are bucking this trend by choosing to study and work in the STEM areas.

This is a trend that we have seen when reviewing the pathways chosen by our graduates for their tertiary studies. In fact, in recent years, the top two university courses chosen by Penrhos College graduates have been Health Sciences (18 per cent) and Science (17 per cent).

There has been a particular focus at Penrhos on raising the girls' awareness of the value in studying mathematics and science and the breadth of opportunity that this affords them in their post-school study choices. This has largely been through Maths Mentor, our mathematics extension program, which has been in operation for six years. It began in 2009 to cater for one exceptionally gifted student and now has 70 students attending on a weekly basis.

Maths Mentor is designed for very able students in mathematics. Students follow a rigorous course designed by the Australian Mathematics Trust (based at the Australian National University in Canberra). This course broadens the experiences of students, provides opportunities to think about mathematical concepts and theories that enhances their critical and creative skills. The course increases their knowledge and gives them mathematical tools to enable them to solve problems. The focus of the course is not only on the 'how' but also on the 'why'.

Maths Mentors encourage students to become more involved in mathematical activities offered outside the College. There are weekly after school classes taken by the Maths Mentors. Our Maths Mentors include teachers, university lecturers and top university students.

Maths Night @ Penrhos celebrates the work and achievements of the Maths Mentor students throughout the year. Guest speakers inspire the girls with stories of how they have developed their passion and interest in mathematics into a career.

In 2014, Penrhos was invited to attend the Singapore International Mathematics Competition, which was the most wonderful opportunity for four of our students and two staff to experience such a high



level of intellectual rigour in the area of mathematical modelling and problem solving. Dr Lloyd Dawe's presence at Penrhos as our Visiting Mathematician for the past two years, has been very well received by both Junior and Secondary Schools. Dr Dawe is a highly experienced mathematics educator with a PhD in mathematics from Cambridge University and thirty years' experience lecturing in education and mathematics at the University of Sydney.

Our students were also given the opportunity to work with mentors through the Engineers in Schools Program at Curtin University and the Girls in Engineering Program at the University of Western Australia.

For the past two years the College has participated in the Profs @ Perkins Program. This program enables a group of selected students to undertake collaborative research with doctoral studies students at the Harry Perkins Institute of Medical Research.

The College was fortunate to be the first school in Western Australia invited to take part in an inaugural

education program. This is an amazing opportunity for girls interested in medical research and will provide a useful background for their Mathematics and Science studies at school.

The program runs for twenty weeks during Terms 2 and 3. Students attend the Harry Perkins Institute once a fortnight for a two-hour session. A flipped classroom approach utilising device technology is combined with more traditional lectures and laboratory investigations, providing a rigorous and 'up close and personal' immersion into the real world of medical research.

All of these fabulous opportunities, together with the wonderful work being undertaken by our Gifted and Talented Integrators in Junior and Secondary Schools, have opened the students' eyes to the possibilities that abound in the world of STEM. In 2015, it really has been full STEAM ahead! ▲

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that it will similarly appeal to a wide range of students.

The particular focus of the GEMS teaching and learning program will be negotiated according to the interests of the students who select the subject. Some possible focus areas include: renewable energy sources; electricity production, transfer and storage; sustainable housing; solar vehicles; aviation; science and engineering challenge (presented by the University of Newcastle); the Australian STEM video game challenge and STELR program.

A thread running through the program will be the Engineering Design Process. The components of this process include: defining the problem; background research (which may involve explicit teaching of concepts and skills from

science, technology and/or mathematics); specifying the requirements of the solution; designing/building a prototype; testing and redesigning and communicating the findings.

Through applying this process in a variety of contexts, students will improve their ability to analyse and solve problems. These skills will be invaluable for future study in sciences, technology and mathematics. It is also anticipated that the awareness raised of opportunities in STEM will lead to more students considering and pursuing careers that use STEM knowledge and skills.

A precursor to GEMS is the Year 7 Mathematics/ Science Inquiry course. This is a semester course involving four lessons per fortnight and is taken by all Year 7 students. In Term 3 the new course uses the Engquest resources developed by Engineers Australia and in Term 4 uses the Science by Doing materials developed by the Australian Academy of Science. The semester program will support Guided Inquiry through the following stages: structured whole-class activities with a Humanitarian Engineering focus and connections to a variety of learning areas, including humanities as well as mathematics and science; group challenges in which students will design a solution to an engineering problem and individual science experimental investigation.

It is anticipated that this course will also raise awareness in students of the relevance, importance and opportunities provided by studies of STEM. ▲

BRIAN PARSONS
HEAD OF SCIENCE

UNCOVERING GEMS

ST PETER'S GIRLS' SCHOOL, SA

Science, Technology, Engineering and Mathematics (STEM) education is becoming increasingly recognised as a priority for schools. It is clear that many of the careers with employment growth opportunities in the future will require STEM skills and qualifications.

Several groups of students are under-represented in STEM education and careers and increasing the participation and engagement of these students in STEM subjects will be needed to meet the demand for qualified professionals in these careers. For example, increasing the number of girls and women studying and working in these fields is seen as an effective way of addressing the looming shortage of qualified STEM professionals.

Two strategies that encourage students to engage in STEM involve them making connections between traditionally separate areas of the school curriculum and developing their ability to apply understanding and skills when solving real problems.

A new initiative at St Peter's Girls' School that will use these strategies is the Year 10 elective subject GEMS (Girls in Engineering, Mathematics and Science). All Year 10 students will continue to study a year of Science which addresses the four strands of the Australian Curriculum. In addition students can choose from a number of electives. In 2015 Forensic Science and Psychology were introduced and chosen by large numbers of Year 10 students. In 2016 GEMS will be offered for the first time with the expectation

GLOBAL AND CULTURAL COMPETENCY: GIRLS WHO ENGAGE, EMPOWER AND INSPIRE

ST MARGARET'S ANGLICAN GIRLS' SCHOOL, QLD

The St Margaret's Global Exchange Program is an integral part of the School's strategic goal, Broadening Horizons, and aims to strengthen the international focus of school activities. The program empowers students to understand others through a broader range of perspectives, which then allows students to better understand themselves. Each year the program offers 32 places in partner schools in ten countries. The time frame for all exchange places is one full term. The experience culturally enlightens and challenges girls to embrace the opportunities to gather life lessons and to expand their horizons for the future.

Girls returning from exchange demonstrate that self-reliance, heightened problem-solving abilities, self-confidence and self-discovery are the major developmental gains. On completion of each student exchange, a debrief interview is conducted, and statistics reveal that girls return with a focus on new aspirations, attitudes towards student leadership and future study, and an enhanced desire to succeed.

Through a series of surveys completed by students at specific intervals during the exchange process, student feedback is provided with regard to a deeper appreciation for the St Margaret's school community and greater awareness of the love and support of family. Personal challenge, engaging in a new school community, studying subjects not in the Australian curriculum and the expectation of developing life-long friendships are major reasons girls participate in the program.

Each term Year 10 peer groups experience a shift with St Margaret's girls travelling away on exchange and with the immersion of the incoming exchange students. Wonderful friendships are formed not only with exchange partners, but across the year level. The entire school community benefits culturally and socially from the opportunities to embrace differences and to cultivate respect. In learning from each other girls also learn much about themselves, therefore encompassing global connections on many levels.

Responses to survey and debrief questions can be surprising on occasion, and each girl experiences a unique and individual journey during her time away, following are two student responses:

How has your experience changed you as a person?

I have discovered that I am the only person responsible for how things make me feel. Even if things did not turn out best or were completely different to



(ABOVE) STUDENTS ON EXCHANGE IN GERMANY

how they were planned, I always tried to find a way to solve a situation instead of reflecting on the negative changes. This change in my attitude not only made my exchange happier, but also meant that so much more was accomplished, resolved and unique. It has completely changed my outlook since my return to Australia and this has helped me make the most of my time and my wellbeing as I am now more efficient and much more positive.

What did you learn about yourself as a result of being away for a term?

I realised I am very capable of functioning independently. Whilst in Andrews House by myself, I was regularly catching up with the girls in Frances Baines House I was eager to support and protect my friends in all situations. It was the other girls who helped me realise that it is important to not only experience life in South Africa but that we make the most of every day.

Parents also have the opportunity to provide feedback as to their hosting situation, as well as their daughter's exchange experience. They typically report that, while they may initially have had concerns that a full term's absence could leave their daughters with a learning gap, the students developed better study habits. One parent commented that their daughter returned from exchange better organised, self-motivated and now plans her schedule ahead of time.

The program continues to provide opportunities to empower, engage and inspire young women towards cultural competency in our global society. ▲

SHARON MAHONY
GLOBAL EXCHANGE COORDINATOR

IMAGES PAGE 21 (TOP LEFT) ANASTASIA TAM, ELIANE GEBAUER AND MILLICENT MCMAHON ENTRUSTED EACH OTHER TO COMPLETE A PROBLEM-SOLVING TASK

TOP RIGHT: SOPHIE HAGLEY AND EMMA RYAN WERE GIVEN A SET OF ITEMS AND ASKED TO MAKE AN ORIGINAL INVENTION

BOTTOM: TESSA STIRLING, TAMARA MCWHIRTER AND PARIS ATKINS WORKED AS A TEAM TO MAKE AN INTERESTING CREATION



GIVING GIRLS AN EDGE PERTH COLLEGE, WA

A partnership between Perth College and the University of Western Australia is giving the School's Year 10 students a head start as they prepare for life after graduation.

The girls are learning from world-renowned experts about the techniques of positive self-leadership – including goal-setting and motivation – during an annual two-day workshop at the prestigious institution.

The initiative is part of the College's *InsideOut* self-leadership programme, now in its fourth year.

The partnership with UWA aligns with our belief of the importance of women in leadership and our philosophy of developing young women who are confident, independent and determined.

Through *InsideOut*, our long-term goal is to help redress the low number of women in corporate leadership roles in Australia, and our research has shown the students who have completed this workshop feel confident to lead themselves as well as others.

The two-day 'Positive Self-Leadership: Lead Yourself to Personal Excellence' course at UWA's Business School aims to make students' personal and school lives more effective and meaningful. It



introduces the girls to techniques and strategies to take responsibility for their own learning, development and growth (including a requirement for students to make their own way to the workshop using public transport), empowering them to improve their personal and school lives themselves instead of relying on teachers, classmates or friends.

The course is based on the premise that change comes from within and teaches students how they can change their lives without relying on others. Girls learn how to utilise their character strengths, serve others and lead, while preparing for life beyond Perth College. The course teaches them how to take control of their lives by setting SMART goals, increasing positive emotions, improving motivation and promoting positive thought patterns, leading to constructive behaviours. By understanding their own thinking patterns and setting realistic positive goals, they can fulfil their potential and overcome obstacles independently.

The workshop culminates in an Amazing Race-style adventure through the Perth central business district, where the girls put their newfound knowledge and skills into practice by completing a series of problem-solving tasks, challenges and fun activities.

The impact of the workshop and the Amazing Race is significant. Our studies showed the confidence of the students who completed the workshop in 2013 increased in the following year and for the girls who participated in 2014, their leadership, leader identity and confidence all rose at the end of the programme.

Year 10 student, Alana Vinci, said the workshop had taught her skills that could be applied across all aspects of her life. 'I have used the problem-solving tools we learned to help me deal with new or potentially unnerving situations or cope with stress.'

'It really got me thinking about my future and excited for my possible university experience down the track.'

Shannon Black said the workshop had made her more aware of her strengths and also brought the students in her form group closer together. 'It made me realise how I can do my best at school using my strongest skills, and being out of the classroom at UWA gave me a new perspective.' ▲

LAUREN UNDERHILL
COMMUNICATIONS MANAGER

EMPOWERING GIRLS WITH FINANCIAL LITERACY

MENTONE GIRLS' GRAMMAR SCHOOL, VIC



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Many of us have been raised to believe that money is a distasteful topic of conversation, and this is especially so for women. 'Less than a generation ago both sexes considered it somehow unfeminine for a woman to be smart about money' (Harris, 1996). The legacy of this gender stereotype can still be felt today, and we have to combat the problem head on if we are to fix it. This means bringing the topic of money out of the closet.

In a capitalist society, money means power, and in order for women to achieve equality in the workforce, as well as in the household, we need to equip young women with the language and knowledge to manage their own financial futures. 'Despite the fact that 60% of women are in the labour force, a majority of middle school boys report that they expect to have a stay-at-home wife, while nearly a third of girls in another survey said their 'financial plan' for when they grow up is to marry a wealthy man' (Rock, 2005).

Australian studies have shown that most women take the back seat in planning for their family's financial security. 'Most Australian women marry and, despite changes in attitudes and expectations, the economic support of a man remains the best security against poverty for women in old age' (Rosenman & Scott, 2009). In addition, from a young age, girls battle against the stereotype that, 'Boys make money, girls spend it' (Rock, 2005).

As an ASIC MoneySmart School, we have been teaching our students not to shy away from financial matters. Students learn the concepts of planning, spending, saving, donating and investing, and their rights and responsibilities as consumers. At Mentone Girls' Grammar, we have introduced a comprehensive

financial literacy program very early in our students' education so they become comfortable and literate with the concepts. Managing your own finances is such an important part of being an adult, and children are not going to learn positive spending behaviours overnight. A thorough understanding of the principles of commerce gives girls a head start to help empower them for their future.

Year 1 teachers, Camilla Gaff and Kylie Federici, have been working on a project which covers financial literacy, entrepreneurship and social enterprise. Year 1 recently held an Enterprise Stall at the school fair selling handmade gift tags for charity. Camilla Gaff says that the stall 'is just the tip of the iceberg of a much larger financial literacy project. Another arm of the project is the Tri-Fi money boxes. The girls are using these boxes to learn about spending, saving and giving.'

'The girls are encouraged to share their money across the three areas, they set financial goals and learn how to work towards achieving them. The introduction of our money boxes at home has generated brilliant conversation about how to earn money in the home environment. The girls are learning that being part of a family comes with responsibilities such as cleaning their own room, but there is also opportunity to be enterprising.'

This unit is about choices students can make with money, responsibilities that come with money and ways to successfully manage money. If we continue to introduce these concepts to girls at an early age, and in a safe environment in which they can experiment with money, we will make progress in bridging the gender gap and empowering women to take charge of their future. ▲

ANN MATHERS
HEAD OF JUNIOR SCHOOL

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IMAGE (P.23) GRACE JOEL WITH DIRECTOR OF SENIOR YEARS, LAMIA ROCKWELL

I'M A FEMINIST

MELBOURNE GIRLS GRAMMAR SCHOOL, VIC



It's the movement that allows girls to succeed in the classroom in the same way boys do. It's the movement that ensures they can wear what they want without being said to be 'asking for it'. It's the movement that will shatter their glass ceiling, giving them a place at the table in years to come. It's clear 'they', the girls of the twenty-first century, will appreciate these opportunities, so why then do so many young girls reject the very movement that allows them these rights: feminism? And a more important question, how do we inspire a change in attitudes?

Growing up in a family with a mother who works full-time and attending an all-girls school where gender never limited my opportunities meant that it never crossed my mind I might not succeed purely based on biology. When I was told that the values of equality I supported were the values of feminism, I adopted the term with ease. I believed in equality so I became a feminist. Simple. Taking on the position of School Captain in my final year I wanted to ensure gender equality is always a part of the discussion. Yet I quickly began to see a resistance to the word 'feminism'. There are so many negative connotations to the term that many young girls immediately jump to the stereotype of a radical feminist. The word conjures in their mind imagery they cannot relate to, and so young girls begin to reject feminism because they do not want to be associated with the radical definition of the term.

My challenge has been to overcome this mindset. A question I'm always asked from younger students is why do I have to identify with feminism? I can want to be treated equally without giving myself this label, so what's so important about the term? The first response to these questions must be to redefine feminism as a mentality, rather than a label. Girls must understand that by calling yourself a feminist and believing in the movement, it does not change who you are, it does

not demand you dress or act differently and it certainly does not mean you hate men. For me personally, identifying as a feminist has always been about the belief that as a female, I deserve the same access and opportunities as my male counterparts.

Although we may not suffer daily oppression for our gender, others still do. It's easy at a school like MGGS to lose sight of where we are along the timeline of solving gender inequality. We cannot blame young girls for not knowing, because in an environment where teachers support your every endeavour and where you are encouraged to enter any field from arts to physics, it's easy to think your glass ceiling is shattered. Yes, you might be one of the lucky ones, but as female leaders, it's our obligation to ensure the younger generation know that women still deal with catcalling on a daily basis, that our appearance is still judged and analysed and that in domestic abuse cases, more often than not people ask 'why did she stay?' instead of 'why did he abuse?'

MGGS's 2015 Gender Equality Campaign has identified the drastic inequity that exists between the donations equivalent boys' schools receive compared to girls' schools. I'd never considered there were individuals who valued their son's education more than their daughter's. The campaign taught me something important: gender inequality exists on every level in society, and therefore our solution must too.

We must never lose sight of the global context of this issue, because by doing so we become immune to blatant oppression and sexualisation of women. Take Robin Thicke's single Blurred Lines, one of the most popular songs in recent years. Girls probably sung along to the catchy tune in every school hallway around Australia, blissfully ignorant to its meaning: that sometimes when a woman says no, she really means yes.

The questions that need to be asked are often ignored in a world where we are bombarded by pop culture and influenced by the media's biased spin on an issue. We do not get girls to identify with feminism by telling them to, we do it by asking questions. When a girl says no, should she be able to mean it? Should you be able to walk in the street alone at night without fear? Do you want to earn a position on the board of a Fortune 500 company by earning it, rather than merely filling a quota? When we ask these questions, we not only get answers, but we get girls talking. We get girls questioning their own inequality, and we inspire an inquisitive, driven mentality. So ask the questions, challenge others, share your stories and make feminism approachable and understood for what it really is. Only then can we expect to hear the words 'I'm a feminist' said proudly, firmly and meaningfully by every girl and every boy. ▲

GRACE JOEL
SCHOOL CAPTAIN

FORGOTTEN HEROES ST URSULA'S COLLEGE, QLD

We often hear the stories of the ANZAC soldiers being courageous and brave, but the nurses who cared for them are often forgotten. The St Ursula's College Senior Dance Troupe chose to choreograph and perform a dance for these forgotten heroes at the prestigious Sydney Eisteddfod.

The emotion filled dance acknowledged that although the soldiers were the face of the war, the sacrifices of the nurses were just as worthy

Troupe to be able to tell this empowering, often untold story through dance before such a large audience'.

The Sydney Eisteddfod is one of the most important and prestigious competitions in Australia, and St. Ursula's College was immensely honoured to send our students to compete amongst the best in the nation. The opportunity to perform at the Eisteddfod was a unique opportunity and to place second in the competition whilst honouring such important women in our Australian history gave our girls an amazing sense of achievement.

On return from their success in Sydney the girls were able to perform at the Toowoomba Eisteddfod in front of their family and friends where they placed first with the same performance. Adrianna said 'performing

THE OPPORTUNITY TO PERFORM AT THE EISTEDDFOD WAS A UNIQUE OPPORTUNITY AND TO PLACE SECOND...WHILST HONOURING SUCH IMPORTANT WOMEN IN OUR AUSTRALIAN HISTORY GAVE OUR GIRLS AN AMAZING SENSE OF ACHIEVEMENT.

and honourable of our admiration and should be acknowledged and remembered. The performance was an opportunity for the troupe to connect with the audience on a different level; it was not just about dancing choreography, it was about telling the story of those women who sacrificed so much. Dance Captain Adrianna Williamson said 'It was an honour for our Dance

our dance routine in front of our local community, family and friends was a wonderful experience. We were so grateful to be awarded first place and I am so proud of all the effort and emotion our team put into both competitions'. ▲

EMILEE NICHOLS
MARKETING & COMMUNICATIONS MANAGER





(LEFT) HER MAJESTY QUEEN MOTHER SANGAY CHODEN WANGCHUCK OF BHUTAN CHATS TO JUNIOR STUDENTS. (ABOVE) THE QUEEN MOTHER WITH SHELFORDIAN ALICE I'ANSON. PHOTO: CONOR ASHLEIGH/ AUSTRALIAN HIMALAYAN FOUNDATION.

INVESTING IN GIRLS SHELFORD GIRLS' GRAMMAR SCHOOL, VIC

'Teachers provide support but they encourage students to use their initiative and lead the way in a variety of endeavours.'

Students at Shelford Girls' Grammar are encouraged to have a sense of social justice and to assist those who need help. In 2014 the Queen Mother of Bhutan, Her Majesty Gyalum Sangay Choden Wangchuck, visited Shelford and spoke about the need to support the education of women and girls from remote and impoverished parts of Bhutan. Shelford has always championed the importance of girls' education, and this project aligned with the School's values that encourage students to make a positive contribution, to reach out to others and to strive for justice.

Her Majesty was in Australia on a ten-day fundraising tour as a guest of the Australian Himalayan Foundation (AHF). She is the patron of the AHF's Girls' Education Program, which supports women and girls in Bhutan, ensuring their access to a quality education and to safe work and life opportunities.

The AHF works closely with Her Majesty's charitable organisation RENEW (Respect...Educate...Nurture...Empower...Women) which she founded in 2004. RENEW's work focuses on the development of women and girls from impoverished and remote communities who often walk up to 3-4 hours a day to reach the nearest school. AHF provides more than 400 girls in these communities with school meals, textbooks and boarding facilities so they too can receive an education - because investing in a girl is an investment in a whole community.

School Co-Captains, Bianca McMahon and Bridgette Hynes, and the Senior School Parliamentarians made a commitment to support RENEW through a variety of student-led initiatives. Bianca recalled her meeting with the royal delegation and the advice given by the Queen Mother who, 'spoke to us about our role as leaders and the opportunities that we have to make a difference'.

A walkathon organised by the students involved walking for two hours, reflecting the time it takes many Bhutanese girls to walk to school every day. The students organised sponsors, a variety of refreshments including drinks, food stalls and a sausage sizzle, and ran an awareness campaign to encourage participation across the school. Bianca explains that teachers provided support for activities but importantly 'they let us lead the way'.

The need to empower women and girls in Bhutan has strongly resonated with Shelford students who feel an obligation to help others who are less fortunate. It is hoped that the World Challenge expedition in 2017 will be to Bhutan, giving students an opportunity to see first-hand the work of this charity while making a significant contribution to the people there.

Other student initiatives to support RENEW have included Business Management students' Market Day, involving a collection of food market stalls, each run as a business venture and a casual clothes day.

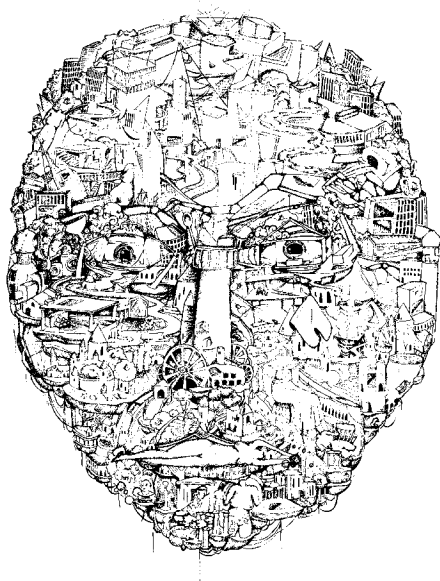
Students continue to take on leadership roles throughout their tertiary study and beyond. Alice I'Anson (former Shelford Co-Captain) has become an AHF Youth Ambassador, assisting with fundraising and social media. Shelfordians (past pupils) have also been prominent in a wide variety of community service endeavours including establishing residential palliative care hospices in regional Victoria, creating a foundation to support young people in aged care, and conducting pioneering research in endocrinology and diabetes at the University of Cambridge. ▲

FIONA QUINN
DIRECTOR OF DEVELOPMENT AND MARKETING

EXPLORING FEMINISM THROUGH ART PRESBYTERIAN LADIES' COLLEGE, WA

Art class for our Year 12 students is more than a creative outlet it is an opportunity to explore how they define themselves as women.

PLC WACE (WA Certificate of Education) Art students are required to provide creative commentary on their chosen Women in Context theme and have researched everything from 1970s feminism through to Indigenous and contemporary artists dealing with current gender issues. Topics included ideals of beauty, motherhood, women in the workplace, women in sport, representations in the media, domestic violence and social objectification.



ALICE FORD'S PRIZE-WINNING SKETCH, TITLED *CONSTRUCTION*

Through researching the history of women's oppression and representations by women artists, students have been able to examine their own reactions to gender issues.

Alice Ford's prize-winning sketch, titled *Construction*, traces the history of women etched in extreme detail into the very fabric of a woman's face and mind. Inspired by artists Irana Douer and Kathryn Barton, Alice outlines the connections between women from the past, present and future.

This piece intends to expose the journey women have experienced and to predict what is to come in the future. *Construction* reveals a great deal of historical and artistic research, coupled with a hope and confidence in the future.

Art teacher, Margaret Litton, felt that exploration of the feminist theme was another avenue to empower young women.

Margaret believes that girls in all-girls schools tend to have high aspirations and be free from gender stereotypes. The girls express an easy confidence that they can do anything and be anything. They do not feel sidelined, compared or judged by their male counterparts.

However the girls feel betrayed by media portrayals of women, which they feel, undermines their potential by focusing on superficial, outdated and stereotypical judgments.

In her triptych of charcoal self-portraits Cara Teusner-Gartland explores the issues of patriarchal and media stereotypes and their impact on women. Her naked body is bound in red string with a hand above pulling the strings and in the final piece she is untied. Her work examines the role that social media plays in entrapping young women in a cycle of unrealistic expectations and self-doubt, which can manifest itself in the psychological turmoil of negative self-talk, eating disorders, painful cosmetic procedures and even self-harm.

Artists Barbara Kruger and Julie Rrap inspired Cara and reinforced her view of the media's influence on girls to conform to debilitating trends, all in the name of a socially constructed and often unrealistic ideal of beauty.

Cara's artwork is intended to demonstrate that although social ideals are constraining, they are not impossible to escape.

Cara cut off her hair last year for Shave for a Cure and sees this as an extension of her refusal to abide by any unwritten rules regarding femininity.

Cara found the experience gave her confidence and allowed her to explore what really matters to her as a person and realised that appearance is a superficial way of judging people.

Sophie Lewis also chose to make a statement on how women are judged with her textiles piece, titled *We Can't Win*. She depicted three different garments of clothing – lingerie, a business jacket and a burqa – with words typically associated with women wearing different styles of dress.

While still trying to find her own truth in self-expression, the process of reflection has been profound and liberating for Sophie, "Art makes you think about the different issues. Art can change your whole mindset," she said. ▲

SIMONE CUMMING
PUBLICATIONS & COMMUNICATIONS CO-ORDINATOR



WHAT GENDER GAP? SANTA MARIA COLLEGE, WA

Students at Santa Maria College, a Catholic girls' school in Perth, could be forgiven for being ignorant about the term 'gender gap'. Students are encouraged to be the best they can be in all they do, regardless of their gender. Students are free from the gender stereotypes that may influence what they choose to study and are encouraged to take up subjects based on their interests and abilities.

Santa Maria College offers many opportunities for girls to excel in leadership, the arts, sport and curriculum. One area in particular that operates against gender stereotypes is science. The science curriculum is aimed at encouraging a passion and interest in science beyond school. Head of Science, Simone Sawiris, says that being a school for girls "doesn't stop our students from participating in traditionally male dominated subjects and students are encouraged to discover their passion for science". Staff aim to raise awareness among students about the opportunities available to them within the field of science.

Guest speakers including Professor Lyn Beazley AO, former Chief Scientist of Western Australia (2006 - 2013), Dr Chris Smith, founder of the BBC's Naked Scientist program and speakers from Women in Engineering regularly visit the College to promote science to the students. Junior School students recently spent a morning skypeing with Canadian astronaut Commander Chris Hadfield, and Old Girls working in science fields are often invited back to share their experiences.

Students in Years 7-10 are able to choose from an exciting selection of science electives - Mythbusters, Science Quest and Marine Studies, and in 2016 a new elective titled BrainSTEM will be offered which will focus on neuroscience and biotechnology. In Years 11 and 12, there are healthy numbers of girls selecting Western Australian Certificate of Education (WACE) science courses, including Chemistry and Physics.

(LEFT) YEAR 8 STUDENTS DISSECTING A HEART
(ABOVE) YEAR 11 BIOLOGY STUDENTS EXAMINE FISH GILLS WITH A MICROSCOPE

Santa Maria College also has a strong science co-curricular program called 'Ladies in Lab Coats'. Students in this group have been involved in various activities such as growing crystals, building bat boxes with the local council and the re-vegetation of local bushland.

The College is committed to STEM (Science, Technology, Engineering and Mathematics), evidenced by its investment in an innovative new science building, the Consilii Centre, and academic programs tailor-made to develop students' interest and achievement in these areas. The Consilii Centre was created to inspire students and designed to cater for effective teaching of specialist science subjects. It boasts state of the art science facilities featuring a 'super lab', a blackout physics lab and a biology lab with an adjacent greenhouse.

For the first time in 2016, the College will offer a mathematics/science tour program for students in Years 10 to 12. Students interested in mathematics and physics will be invited to join the tour to the United States, visiting NASA and Washington, further extending their love of science.

However, it is not just the fantastic facilities and engaging teaching and learning programs that are encouraging Santa Maria girls to participate in science, but an emphasis on having a growth mindset towards any challenges faced in their learning. Through this, students are better equipped to approach what might be viewed as 'difficult' science courses with a focus on effort and growth in their learning rather than just the end product. ▲

KAREN BICKERTON
HEAD OF COMMUNITY RELATIONS

THE EXQUISITE PRESSURE AND PRIVILEGE OF EDUCATING YOUNG WOMEN FOR THE TWENTY-FIRST CENTURY

BRISBANE GIRLS GRAMMAR SCHOOL, QLD

'Communities and countries and ultimately the world are only as strong as the health of their women.'

— Michelle Obama

On her first overseas visit as First Lady, Michelle Obama made a memorable speech at a girls' school in London, passionately making the case for every girl to take her education seriously. Posted to the TED Blog as 'an idea worth spreading', the video has since been viewed more than 600,000 times.



In her speech, Ms Obama cited education among the list of factors that contribute directly to women's health, and she encouraged young women to reduce the gap between the way the world exists in its present state, and how women know it should exist. She told the students, 'In pursuing your dreams, use your talents, be resolute, create the world as it should be, not as it is' (Obama, 2009).

Taking advantage of every educational opportunity that is presented to girls will empower them. It will help them take control and make a positive contribution that not only benefits other women, but also communities at large.

At the heart of Brisbane Girls Grammar School is our Statement of Intent: 'Proud of our Grammar tradition, we are a secondary school that establishes the educational foundation for young women to contribute confidently to their world with wisdom, imagination and integrity'.

This statement guides our School community in helping to ensure our girls have everything they need to achieve their goals, through their learning network, their families, their extended families and their friends. If our students truly love learning and know

what helps them to learn, they will be successful in life. We encourage our girls to embrace knowledge and their individual learning styles and to be twenty-first century learners.

American writer and futurist Alvin Toffler once said, 'The illiterate of the future are not those who can't read or write but those who cannot learn, unlearn and relearn' (Toffler, 2014). To achieve in contemporary life and find their place in the world, our students must have transitional attitudes while remaining flexible, honest and open. This combination of attributes also underwrites the building of resilience in young people. At what stage in the schooling of a Grammar girl is she ready for the 'real world'? And how is this achieved?

Students must be academically resilient. Academic resilience in a changing world requires the ability to absorb new problems and encounters and create new systems and skills to conquer the challenges. Furthermore, a sharply honed intellect, nurtured through the highs, lows and challenges thrown at us by life can result in a heightened ability to create unique solutions. The young women of today can take up this challenge if armed with skills.

The support, nurturing and love shown by today's schools and parents is essential, however hardship and challenges are part of everyday life and therefore education must offer a balanced approach. We would never wish tragedy or unhappiness upon our students, however evidence shows that a little bit of hardship builds character and makes us more resilient — so while we want to nurture our girls, we do them no favours by protecting them from reality.

In the words of Samuel Smiles (1859), 'We learn from failure much more than from success'. When our young women are challenged, or if they feel tired or uncomfortable it is often a time of personal growth. Building resilience is ultimately the responsibility of the individual. Our girls need to practise handling the challenges life will present to them and build confidence through practice to know they are capable of facing adversity. After all, it has been said that the only thing worse than an unhappy childhood is having a too-happy childhood!

Teachers are architects for learning, designing the environments for developing minds and preparing students for a somewhat unknown future. Teachers of today must use higher-level thinking, processing vast amounts of information related to the students they teach, the abstract and essential learnings

of the subjects they teach, and the most effective instructional strategies for each situation. It is the role of every teacher in every classroom to bring these aspects of every student's learning journey into focus.

However, the getting of wisdom is a very individual journey. In their 1991 text, Caine and Caine asserted that to acquire meaningful knowledge, 'students must be able to perceive relationships and patterns to make sense of information'. To do this, they relate it to their past unique experiences and the current environmental context and interactions. They describe ideas of disequilibrium and self-organisation as central to knowledge acquisition. Disequilibrium is 'when the original state of equilibrium is disturbed'. So when a learner meets new information that is confusing or disturbing, he or she enters a mental state of disequilibrium. This state is reconciled when 'the learner moves to a broader or more inclusive notion' (Caine & Caine, 1991).

Transfer of learning and the development of intellect are the most important reasons for designing concept-based curriculum and instruction models (Erickson, 2008). Transfer of learning supports new learning, and retrieval of past understandings as a student travels their own educational journey.

To prepare our students for life beyond school and a life of contribution and service, we provide the advantage of the open-ended study of topics and encourage a liberal, broad-based curriculum that addresses the central developmental aspects and skills of the curriculum. These are known as enduring understandings and ensure experiences and judgments of what a student knows and what a student can do. The design of curriculum and instruction enables students to take increasing responsibility for constructing their own knowledge.

It is essential that the randomness of current thinking in education, the busyness of knowledge and the presentation of facts in the media, does not disorder our students' individual learning journeys. A young woman's education is ultimately about her slow, measured accumulation of facts, skills, an understanding of her own learning, and the getting of wisdom, imagination and integrity. This education will prepare her to go on and create a world for all women, as it should be, rather than as it is. ▲

ANNA OWEN
DEPUTY PRINCIPAL (ACADEMIC)

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STRONG FEMALE ROLE MODELS ROCKHAMPTON GIRLS GRAMMAR SCHOOL, QLD

You don't have to look too hard at Rockhampton Girls Grammar to determine that there is some fantastic work happening in the STEM subject areas. The senior subjects of Chemistry, Physics, Biology, Agricultural Science, Information Technology Systems and Mathematics A and B have seen rapid growth in recent times. The figures speak for themselves. From 2014 to 2015 we have seen increased enrolments of 45 per cent in Agricultural Science, 87.5 per cent in Chemistry, 90 per cent in Physics, 31 per cent in Biology, 86 per cent in Mathematics B and 10 per cent in Mathematics C, while enrolments have doubled in Information Technology.

At the national level, based on 2013 figures, Roberts (2014) reports that within the female cohort only 6.6 per cent were studying advanced mathematics and 17.3 per cent studying at the intermediate level. With above national levels of participation in advanced (10 per cent) and intermediate (53.5 per cent) levels, Rockhampton Girls Grammar is once again proving that they are closing the gap.

One of the key ideas that has been postulated as the reason that STEM is so underrepresented by females was due to such a small pool of women acting as role models, including both high school teachers and industry professionals (Roberts, 2014). Rockhampton Girls Grammar is combating this issue by providing excellent role models within these areas through numerous partnerships with industry and an all-female science faculty. Ku Lacey leads the Agriculture Department and has extensive experience and connections in both the education and agricultural sectors. Her agriculture students work with Don Menzies at CQ University to remotely monitor cattle growth rates using telemetry and GPS technology to assess the effectiveness of different feeding regimes. Students are also involved in artificial breeding programs with Graham Stabler at Beef Breeding Services, and are applying their knowledge to improve the genetics of the School's Ausline herd of stud cattle.

Hannah Mounsey has modelled the senior ITS program on a first year university course in computer-based art and design. Her students are producing websites, games, animations and films that reflect current industry practice. Junior students are using state-of-the-art technology to study robots, circuitry, coding and computer engineering. From Years 9 to 12, her students have the opportunity to master the complete Adobe Creative Suite of software, and be ready to transition into technology-based careers and university courses with ease. She is also implementing a Maker Space on campus in 2016,



(ABOVE) YEAR 7 STUDENTS AND CHRISTIE DEY WORKING WITH ROCKETS

where students from all areas will be welcome to 'tinker' and put their ideas into action.

With twelve years' prior experience as an industrial chemist in pharmaceutical, environment, minerals processing and power generation sectors, Christie Dey has seen first-hand the lack of females within the industry and is encouraging the next generation into the field as a specialist facilitator of science with primary students and their teachers.

The chemistry and physics students are led by Christie Mahon, a passionate teacher with over thirteen years' experience teaching senior science. Rather than sitting in front of the whiteboard, her students are learning the theory through practical situations. Galileo and Newton's laws and theories are being absorbed through first-hand real-world applications. This blended learning style of pedagogy is also being used by Nikki Hislop, who is implementing flipped classroom learning to improve the interest of students in her classes.

With a background in medical research, Nikki uses her research experience to develop real-world skills for her science and biology classes. She has started 'flipping' her classroom by moving the lower-order thinking skill of reading and note-taking to homework time, freeing up class time for more engaging practical activities that demonstrate concepts that students can interact with. It means a lot more, for example, if a student can see diffusion rates changing between different cell shapes, rather than just being told that it is so. Flipping also provides time for students to cultivate their higher-order thinking skills, like synthesis and evaluation, while they have ready access to their teacher for support. Nikki has created a series of video lectures that her students watch in their own time, and can view again as revision. Along with the rest of the teaching faculty, Nikki is also using OneNote Class Creator to create a one-stop learner-centred environment where connectivity amongst students and their teachers is key.

Melanie Brooks, Head of Maths, is focused on appropriately placing each student in the correct class with the best support to optimise growth and development through senior schooling. Melanie has experience in teaching both high school and at university, which gives her a greater appreciation for the different levels of student learning, the progression through and between each, and insightful guidance for students with diverse goals.

Supporting our academic staff is our Scientific Officer, Mala Ekanayake, who also holds a PhD in electrical engineering. The qualifications held by our staff are not only evidence of their quality, but also the value they place on education for women, particularly in the STEM fields. Given the effect that the teacher-student relationship can have on student learning (Hattie, 2009), it is important that these relationships continue to be fostered. The female science faculty at RGGGS act as valuable role models for women in science. With the dynamic and experienced teaching team at the helm, Girls Grammar is truly leading the charge in STEM education – learning is for life. ▲

KU LACEY AND NIKKI HISLOP

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In recent years governments around the world have acknowledged the “critical need to empower consumers through financial education” and to build financial literacy skills.¹⁵ The investigations into financial literacy levels that have ensued have brought to light concerning evidence of a financial literacy gender gap not only in the developing world but also in western nations. Given that evidence of a gender disparity in financial literacy levels exists in Australia, it is crucial that focus is placed on engaging students, particularly adolescent girls, in quality financial education.¹⁵

Studies suggest that a confidence gap exists between men and women when it comes to planning for the long-term financial future, ensuring enough money for retirement, being confident in one’s ability to understand financial language and being confident to invest, with men having the upper hand.⁹ A recent study exploring financial literacy levels and ‘financial attitudes’ concluded that women aged 28 and above had ‘lower scores on average than men on financial knowledge and numeracy’² There is a need to bolster the financial literacy skills and confidence levels of adolescents girls through the provision of quality financial education during secondary school years so they are more likely to engage with (and can more readily engage with) such materials in later life. The financial literacy gender disparity becomes even more concerning when considered alongside other statistics regarding gender economic disparities.

The average man working full-time earns 18.8% more than the average full-time working woman and the gender pay gap in Australia has increased by

1.4 percentage points since November 2013.¹⁸ This translates to an approximate gap of \$700,000 in income over the duration of a woman’s career.⁴ When it comes to superannuation women are retiring with \$90,000 less superannuation on average than men.¹⁴ Alarmingly, it is estimated that 29% of women over 65 are living below the poverty line.¹⁴ These issues are compounded by the fact that women live approximately five years longer than men on average and consequently, can be reliant on superannuation and retirement savings for longer and potentially incur higher healthcare costs over their lifespan.^{8;6;19} An education that improves financial literacy among adolescent girls can play a key role in reshaping women’s own financial attitudes and behaviours.

A financial education can impart knowledge of prudent financial management strategies, develop an awareness of personal financial issues, provide solutions to financial problems and assist students to set financial goals.¹³ The evidence gathered from developed countries highlights the importance of financial education programs in positively impacting financial literacy, particularly in regards to retirement savings.¹⁰ Evidence has unsurprisingly suggested that financially literate individuals do better at budgeting, saving money and controlling spending.^{12;16} A positive relationship has been found to exist between financial literacy and the handling of mortgages and other debts.^{5;11} It is also suggested that financially literate individuals do better when participating in financial markets, planning for retirement and ultimately, successfully accumulating wealth.^{17;7} The benefits of a quality financial education in enhancing financial literacy levels are clear.

Currently in New South Wales, students’ compulsory exposure to financial literacy skill development is limited to financial mathematics units explored within the Mathematics curriculum. There is the possibility of including elective subjects like Commerce, Economics, Business Studies, Financial Services, Human Society and the Environment Life Skills in a student’s suite of subjects but not all students undertake such pathways, presenting a challenge to addressing the financial literacy gender disparity that exists.³ Looking forward, a new opportunity exists to engage students with financial issues and develop financial literacy skills with the future implementation of the subject Economics and Business within the Australian Curriculum as a mandatory area of study for students in Years 5-10.¹ One of the expressed aims of the Economics and Business curriculum is to develop students’ “understandings that will enable them to actively and ethically participate in the local, national, regional and global economy as economically, financially and business-literate citizens” and the fact that all students will be exposed to this within a mandated curriculum framework is a step in the right direction towards ensuring girls are developing financial literacy skills early in their schooling.¹

In the meantime, we as educators need to challenge ourselves to think about ways to ensure

that this financial literacy gap is reduced even within current curriculum constraints. Given that theoretically, adolescent girls have just as many opportunities as adolescent boys within the curriculum to engage with subjects that enhance financial literacy skills, perhaps we need to reconsider the way that we promote and deliver elective courses that provide opportunities for girls to increase their financial literacy skills. We do not want our girls to be allowed to remain 'behind' in this increasingly crucial skill-set as we want to empower them with the knowledge that they require to be financially savvy, prudent citizens in an increasingly complex financial world. ▲

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TEACHER OF HSIE

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- > **14 DECEMBER / QUEENSLAND**
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