

# Women in STEM Decadal Plan

Centre of Resources  
Excellence (CoRE)

Champion Response

2021



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# Women in STEM Decadal Plan

**CoRE - 'Supporting today's  
youth for tomorrow's world.'**

## Prologue from Tara McCann CoRE Alumni 2007



"Females in STEM 2021 marks 14 years in the industry as a then STEM student, now a STEM professional. My journey began with a STEM role model, as my high school geology teacher, who is still instrumental in encouraging me through the moments of self-doubt. These moments I think, "She's done it and been successful, I can too".

During the career stage of STEM, my role models have varied from males and females who support ALL team members based on merit to simply observing strong, empowering women within the industry who continue to strive in their own right and support all women around them.

I hope to one day inspire the next generation of Women in STEM roles."



*Women in STEM Decadal Plan*

# CHAMPION RESPONSE

## 2021



Centre of Resource Excellence (CoRE) is a STEM (science, technology, engineering, mathematics) learning program focusing on Australia's place in 21st-century evolving industries, providing quality hands-on learning in resources and agriculture, space, defense, and energy.

CoRE is a proven, contemporary student-centered, project-based learning model embedded into the school curriculum, timetabled, and assessed. Developed at its lighthouse school, Kent Street SHS in Western Australia from 2004, it was officially launched in 2015, and since 2019 it has undergone expansion throughout regional and metropolitan Western Australia. In 2021, there are 10 primary and secondary schools engaged in CoRE STEM Learning.

CoRE Alumni are successful STEM industry and education-based personnel whose CoRE Learning has provided them with the necessary STEM skills and capabilities to develop and navigate a career steeped in their passion, innovation, and curiosity. CoRE's unique learning structure ensures everyone's skills, talents, and abilities are utilized to complete a project, a project which is based on real-world problems.





Women in STEM Decadal Plan

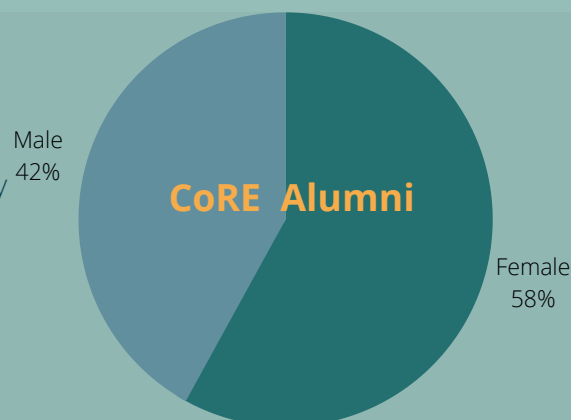
# CHAMPION RESPONSE

2021

CoRE is about reducing inequalities and celebrating inclusivity and diversity, attracting young students to aspire to STEM careers of the 21st century. The CoRE Learning Model provides every student the opportunity to excel and work to the best of their ability.

**With 58% of CoRE Alumni being female (35% English as a second language, and 3% identifying as Aboriginal or Torres Strait Islander), CoRE underpins the vision of the Women in STEM Decadal Plan by:**

- exciting, motivating, and encouraging a new generation of students to pursue STEM 21st Century careers through contemporary learning experiences
- building connections between education, industry, and government, learning experiences which we term #therealclassroom



**CoRE Female Alumni 58%**



**ATSI**



**ESL**



**Global +1  
Generation**







Women in STEM Decadal Plan

# CHAMPION RESPONSE

2021

*"I love CoRE, it has made me realise how much I love engineering and problem solving."  
(Y6 female student, 2020)*



CoRE's mission is to implement the CoRE Learning Model throughout schools, initially in Western Australia and eventually nationally. A key objective is to coach CoRE educators and empower their students through project-based, student-centered learning. Our STEM Learning system is underpinned by developing students' social and entrepreneurial skills by utilizing a collaborative, real-world industry environment that fosters STEM career awareness and transition into tertiary, VET, or Workplace STEM career pathways.



Figure 1: The CoRE Expansion Model.





*Women in STEM Decadal Plan*

# CHAMPION RESPONSE

2021



## CoRE Expansion-Primary & Secondary Growth

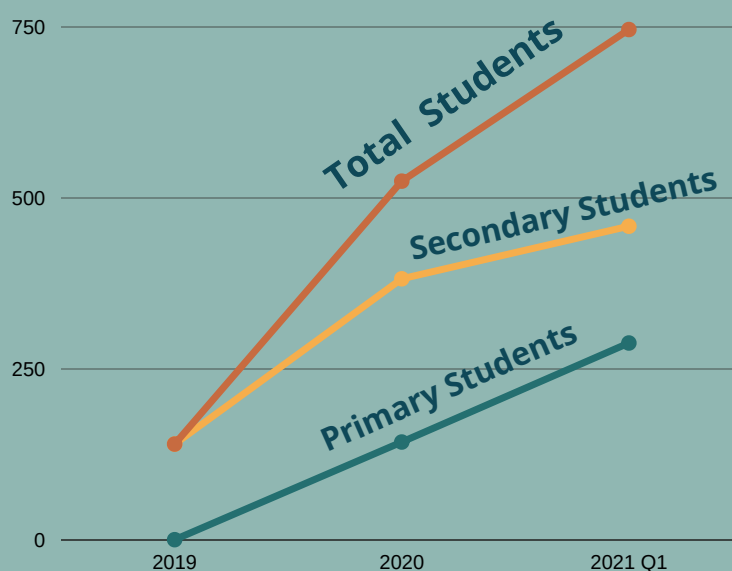


Figure 2: The above graph shows the growth in CoRE student numbers in WA over a 3 year period. There is a significant jump in primary school numbers, an area where STEM through CoRE is embedded to promote STEM learning and make it equitable for all students.

"As a year 10 female CoRE student who came from an another school where science wasn't prioritised, I have now the confidence to try new things, take risks and am not afraid to try and fail. This field trip has improved my stamina and tolerance, my teamwork and observational skills." said by Karryn when she was a year 10 student, now in 2021 she is undertaking Agricultural Science at Murdoch University WA.





CoRE Achieving Opportunity 4

# VISIBILITY

## THE IMPORTANCE OF ROLE MODELS

*Seeing women in diverse STEM careers and equally represented in the media, in public events, and other forums like boardrooms and classrooms will provide role models for girls and women and inspire a nation.*

In CoRE, the SWANS (STEM Learning, Women in Leadership, Aboriginal Science, Networking, and Sustainability) philosophy underpins this contemporary learning model's teaching and learning strategies.

The Leadership demonstrated by our CoRE STEM Educators has inclusively empowered our young STEM female students from diverse backgrounds to pursue STEM careers in Western Australia's burgeoning resources industry.

Our CoRE STEM educators also recognise that all students, whatever their gender are important and all play a crucial role in establishing future diverse and equitable learning and work environments. In CoRE, we empower our male champions to foster collaborative and empathetic learning teams to benefit from harmonious teamwork with their female peers.







# VISIBILITY

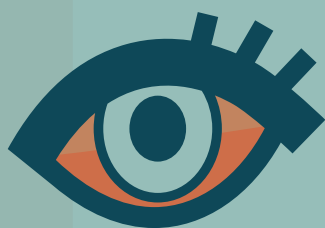
## THE IMPORTANCE OF ROLE MODELS

The leadership demonstrated by our CoRE STEM educators (mostly female, industry-experienced STEM professionals), collaborating with STEM industry associates on some occasions, has inclusively empowered our young STEM female students from diverse backgrounds to pursue STEM careers in the evolving 21st-century Industry 4.0 careers.

- In 2021, CoRE introduced The IGO (Independence Group)-CoRE-Norseman District High School Graduate Learning Program, where the graduates are working with the students to complete their CoRE Learning Tasks. In return, the students are building relationships with the graduates, all the while being exposed to discussions about how their learning can translate into STEM careers (image below)
- STEM educators, i.e., STEM industry-trained educators, are the leaders of CoRE delivery. The CoRE Lead (coordinators and educators) have previously worked in STEM-based industries. They share with their students how real-world learning applies to their student's capabilities, talents, and STEM career aspirations.
- STEM educators have the capacity to develop and grow trusting relationships with STEM students by sharing 'real' and engaging stories of their career journey, their achievements, and their pitfalls. Students can develop an authentic understanding of their career journeys. **(Nikita Y7 2020, "Suzy, did you go to university to be a geologist."** For authentic STEM education, it starts with knowing the career aspiration through experience and knowing someone who has done it, and then having the confidence to ask the question! This trust can make it so real for some students, particularly those from compromised regional areas, as is the case for Nikita, to visualise and experience a possibility through their association with a STEM educator. This is awareness and goal setting.







## CoRE Achieving Opportunity 4

# VISIBILITY

"In a male dominated discipline such as geology, having strong female role models in this space made me feel like I belonged there, and helped me feel more comfortable."  
Loraine CoRE 2015

"Seeing other females strive in a STEM related career is the core to what has driven my motivation to achieve success, as I have been shown from an young age that it is possible for females to fit in and prosper in those fields that have traditionally been male dominated."  
Tiffany CoRE 2015

"Role models come in all different types of forms, yet for me, one of the key teacher role models guiding me through my education journey was my STEM teacher; without her, I wouldn't have discovered the greater world of science, its real-world applications, and built the foundational skill-sets I've been using the last few years at the beginning of my career path." Ewelina CoRE 2013

"All I can say is the only reason I went into mining and towards a STEM pathway is because of a female STEM role model. She was the factor nothing else." Tara CoRE 2010

"As a female engineering student, having a strong & independent STEM Female role model has been incredibly powerful for me. I'm no longer afraid to speak up, express my ideas in a male-dominated classroom thanks to the nurturing & inspiring environment that was created for me & other CoRE girls. After having a STEM educator as my teacher and mentor, I now know for a fact that I can do just as well, if not even better, than everyone else in an industry where I'm in the minority. Thanks for giving me the opportunity to be brave and strive for the best". Lily CoRE Class 2020

"I've been lucky enough to have such a prominent woman of STEM teach me Science in high school, through her passion, it made me feel empowered to pursue a career in Science (Geology), something I had never thought possible before, growing up." Lee CoRE 2017



**Tara M**  
2007



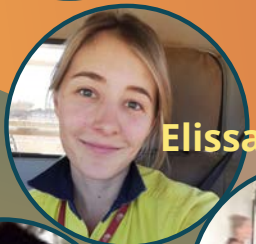
**Yasinta**  
2008



**Bec**  
2009



**Tara**



**Elissa**



**Ewelina**



**Loraine**



**Emily**



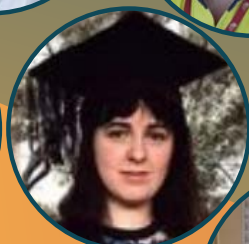
**Jenny**



**Lily**



**Lee**



**Tiffany**



**Portia**

"My female STEM role models taught me that despite your circumstance, you can still achieve greatness in an industry where women are a minority." Emily CoRE Class 2019



"Yes! CoRE is Fun, Challenging & helps with social interaction. CoRE is AMAZING" Primary Student 2020

"My female STEM role model showed me the value of an outdoor office, and continues to remind me to exercise courage and passion throughout my life and career." Elissa CoRE 2012

"I appreciate my STEM Role Models for encouraging me to join CoRE, If it wasn't for them, my passion for Earth and Environmental Science wouldn't have ignited. I would also like to say, that I was able to get an opportunity to be one of two year 12 students to attend an industry presentation and present myself there!" Portia CoRE 12 2021





CoRE Achieving Opportunity 4

# VISIBILITY

## THE IMPORTANCE OF ROLE MODELS

In CoRE, this relationship is proven and validated by 58% female CoRE Alumni. With access to real industry-trained STEM educators and associates through CoRE, real-life leadership is accessible to students who are empowered and encouraged as future STEM Learners. This unique approach enables young women to pursue careers in the future of Industry 4.0, which they would not otherwise have considered.

- In CoRE, its STEM educators and associates' industry experience is largely embedded within the physical sciences, disciplines with low participation rates of women. In Australia, just 16 percent of the STEM workforce is female (falling to 12 percent in engineering and nine percent in technology). (1) Conversely, CoRE showcases the importance of STEM educators as a critical impetus to encourage young women to pursue further education and careers. CoRE Alumni who have entered the physical STEM disciplines are **260% greater** than the overall Australian Female STEM workforce as mentioned above.

CoRE's motto is #therealclassroom. Fundamental to its delivery are unique learning experiences such as field trips, networking events, and self-development practices. In CoRE, female STEM students are encouraged to develop a network ecosystem based on attending industry events, developing a social media LinkedIn Profile (from 16 years), and evolving their self-confidence through project presentation work.

- Female CoRE students attend many industry events during their CoRE years, such as the WIMWA (Women in Mining Western Australia) Summit, Careers in Geoscience, Chamber of Minerals and Energy - Inspiring Girls.







*CoRE Achieving Opportunity 4*

# VISIBILITY

## THE IMPORTANCE OF ROLE MODELS

CoRE students are also provided with the opportunity to present their work to industry, such as the Kalgoorlie CoRE Forum, the CoRE Industry Showcase, Parent and Community CoRE Showcases, and the AMEC Conference. All our students from year five through to year twelve are encouraged to talk with STEM industry personnel during such events. They develop their communication skills, an awareness of the diversity of STEM careers, and an understanding of how their skills and capabilities are suited to STEM careers. Profoundly, the most significant feature of these networking events are the real stories these STEM personnel convey to students, such as:

- a real-life view of their STEM career pathway
- dispel misconceptions concerning 'STEM is only for A grade students' and reveal to our CoRE students not to focus so much on the ATAR and get more 'hands-on' skill learning
- to believe in their passions and capabilities
- to understand that it is 'ok to change your pathway and
- It is not essential to know what you want to be or do when you leave Year twelve.

Presenting CoRE Learning to an audience of +1000 delegates for a AMEC Conference. Drawing correlations between real world STEM learning and Industry 4.0 STEM career pathways.

Sharing CoRE Learning STEM knowledge with the community, parents and industry representatives during a CoRE Community Showcase. This one is from Tom Price, for the Ashburton Shire CoRE Hub.

Engaging industry and tertiary education representatives during a CoRE Industry Showcase. Students from Joseph Banks CoRE are describing their sustainable 21st century housing designs.





# VISIBILITY

## THE IMPORTANCE OF ROLE MODELS

CoRE field trips further reinforce how networking and real-world exposure and learning cement the correlation between our STEM students' capabilities, aspirations, self-worth, and self-belief in their goal setting and purpose. Students talk to STEM personnel who work at the 'gold-face' and to see how their STEM learning applies to their talents and aspirations - a powerful combination which empowers our female STEM students to pursue STEM career in the resources industry.

CoRE alumni give back to current CoRE students. Our STEM CoRE Learning Model engages our CoRE male champion alumni in inspiring future STEM professionals. CoRE alumni are evidence for CoRE STEM Learning and its purpose to inspire students to pursue STEM Industry 4.0 careers.

CoRE Alumni are a measure of sustainability and provide authentic visibility. When successful CoRE STEM females return to the school where they were taught and share with current STEM students their journey and experience, it is a strong message. CoRE STEM Alumni have been asked to volunteer their time both in informal (class visits) or formal settings such as Women in Mining Events or mine sites. Furthermore, our alumni are often not typical 'Straight A' students - this reinforces our current CoRE students the accessibility of a STEM career and provides an energised purpose to achieve.

***"Suzy Urbaniak, so impressed by what CoRE is pumping out! Some of these Year 11 students were understanding concepts not introduced to me until my first year of uni. Had such a wonderful time!."***  
**Heidi Allen - GSWA Palaeontologist**

Heidi, volunteering her time to share her STEM knowledge with CoRE students on a field trip.

CoRE Alumni, Ed Fox sharing with CoRE students his CoRE Learning Journey during a mine site visit. Ed is a mining engineer.

Inspiring STEM education to primary students in #therealclassroom. Why learning applies and how it is relevant..







# EDUCATION

## THE IMPORTANCE OF 'HANDS-ON' STEM LEARNING

*Strengthening the education system to support teaching and learning on a national scale will enable and encourage all girls and women at all levels to study STEM courses and equip them with the skills and knowledge to participate in diverse STEM skills.*

### Why CoRE?

In CoRE, science and engineering are 'doing.' It is 'hands-on learning, learning focused on process learning and skills. CoRE has its students working as young scientists and engineers, problem-solving, designing, investigating, and exploring.

Design thinking, ICT, data literacy, and science and digital technologies, together with more traditional learning processes such as explicitly scaffolded learning, are the foundation to student engagement and achievement.

CoRE is '**for the students, by the students,**' it's a collaborative learning model; student feedback, facilitator mentoring, and reverse mentoring are critical enablers of its contemporary evolutionary development.



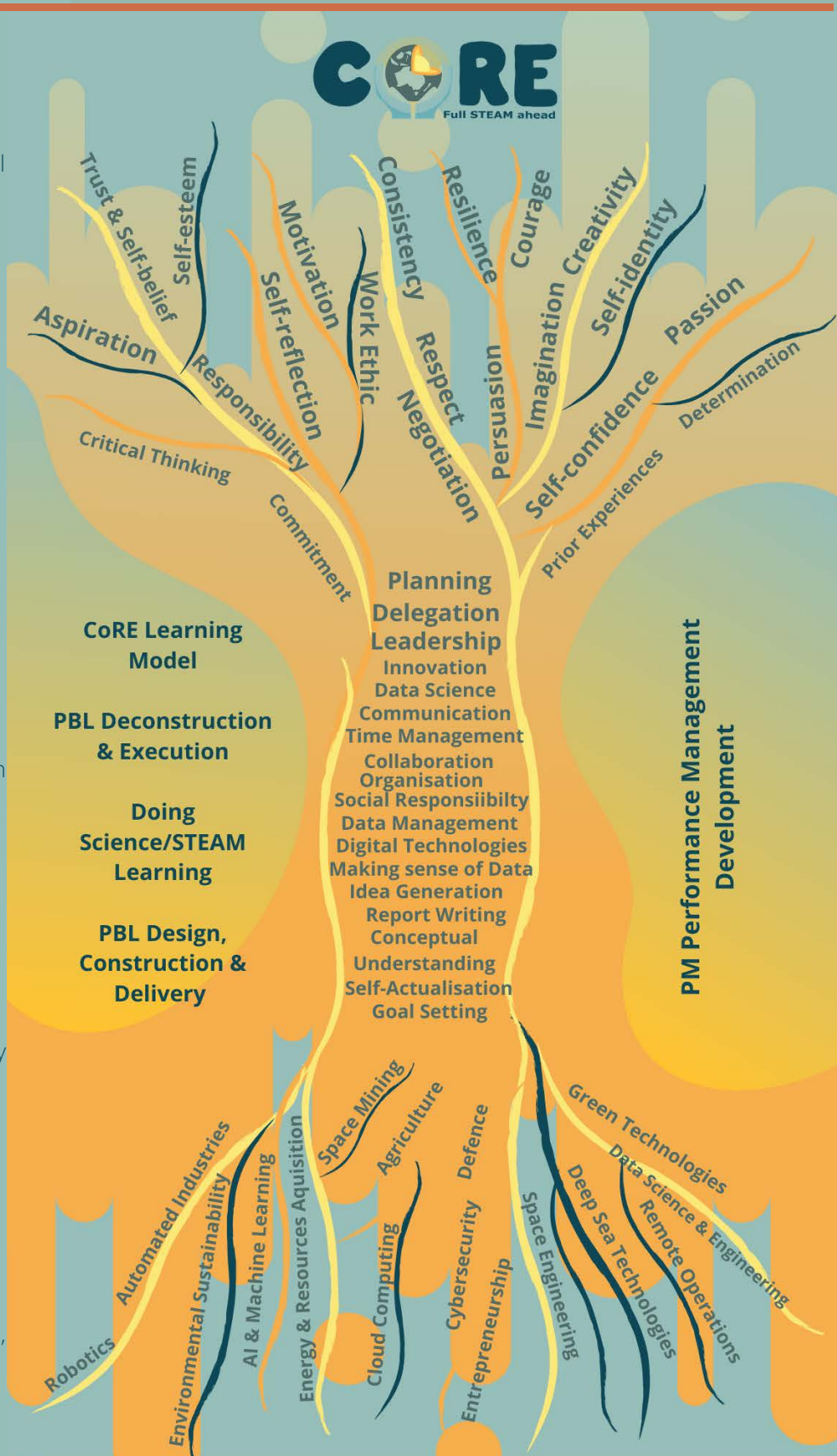


# THE IMPORTANCE OF 'HANDS- ON' STEM LEARNING



# EDUCATION

The CoRE Learning Model is a contemporary STEM Learning process integrated into the Australian Curriculum, timetable, and assessed according to schools curriculum and assessment standards. It is not an external, after-school learning experience nor a school elective. It is embedded through the science timetable. This is its point of difference, which is why, in CoRE, it is defined as STEM Learning. Underpinned by 21st century social and emotional enterprising skills, students acquire industry 4.0 skills and knowledge. Its contextual project-based learning scenario promotes career awareness and connects student learning to real-world settings, situations, and events, #therealclassroom.



Explore

Explain

Evolve

ACQUISITION

ANALYSIS

SYNTHESIS

STEM CAREERS





*CoRE Achieving Opportunity 5*



# EDUCATION

## THE IMPORTANCE OF 'HANDS-ON' STEM LEARNING

**CoRE** is a unique combination of:

- STEM industry educators, mainly female and of physical STEM industry experience
- its #therealclassroom approach which brings STEM industry practices into the classroom and takes its students out into the field to network with STEM personnel
- its industry, community, and government links and collaborations
- its support for CoRE Alumni beyond their secondary and tertiary qualifications
- its inclusion of CoRE Alumni to inspire young females to pursue STEM careers

### Coaching the CoRE Educators

To ensure that CoRE classrooms benefit from authentic CoRE leadership and learning, a fundamental goal for the CoRE Lead is to support, mentor, and coach CoRE educators. STEM CoRE educators are paramount in the pursuit of inspiration and aspiration for females' engagement and empowerment in STEM.







# EDUCATION

## THE IMPORTANCE OF 'HANDS-ON' STEM LEARNING

### Coaching the CoRE Educators

- The CoRE Educators Pilbara Summit
- Data Science by the WA Data Science Innovation Hub
- Team teaching
- Program development
- Field trip creation and management

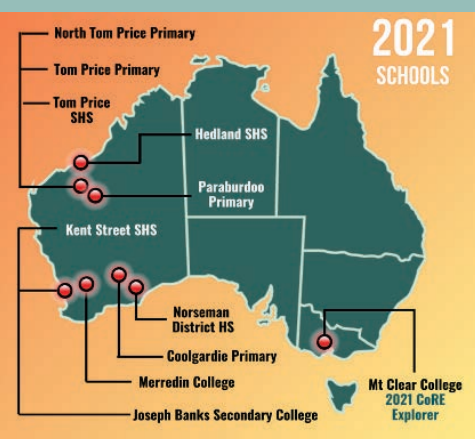






CoRE Achieving Opportunity 6

# INDUSTRY



## THE FUTURE'S WORKFORCE FOR INDUSTRY 4.0

*Access to a broader pool of skilled workers will become essential for business success.*

Tomorrow's leaders are in today's classrooms, and through CoRE, we are changing the future of education.



Empowering students & educators through Project Based Learning

*"The future of our industry is in today's classrooms, and Saracen has been proud to support the CoRE Learning Foundation over the past 2 years. We have employed CoRE alumni and have found they can quickly adapt to their professional roles and show tremendous leadership skills."*

*"I encourage you all to support this great foundation that is helping prepare our students for a bright and successful future."*

**Raleigh Finlayson, Managing Director of Northern Star Resources Limited**



Developing tomorrow's leaders

CoRE is responsible for the growth, sustainability, and promotion of STEM females entering Australia's Industry 4.0 careers. With the establishment of the CoRE Learning Foundation (CLF) and its CoRE Expansion Program, the aim is to replicate Kent Street CoRE's graduation of female STEM students at regional and additional metropolitan schools. The CoRE Learning Model delivers student-centered Project-Based Learning through integrated curriculum programs addressing Australian STEM strategies across various contexts, including; Resources, Agriculture, Aerospace, and Transport sectors.



Elevating career awareness & a sense of self & knowledge



CoRE is  
#therealclassroom  
developing  
#FutureLeaders





# INDUSTRY



## THE FUTURE'S WORKFORCE FOR INDUSTRY 4.0

The CoRE model of Project-Based Learning was developed by leading science educator, geologist at heart, and Australian Prime Minister's Prize winner, Suzy Urbaniak, in conjunction with Kent Street Senior High School's support. Since its official program launch in 2016, the CoRE Learning Model has been adopted by both primary and secondary schools across Western Australia.

The CoRE Learning Model Expansion Program, driven by the CoRE Learning Foundation (est. 2018), has resulted in significant growth in educators and students' numbers. The CoRE Learning Foundation establishes links to connect industry, community, education, and government. Any industry investment in the CoRE Learning Foundation is an investment in our students to succeed in the real world. This starts in #therealclassroom.



### Securing our Future

Industry investment in the future of our children is pivotal to our growth to ensure all students can develop 21st-century STEM-skills through the CoRE Learning Model



### CoRE has proven results

CoRE is changing the future of education and our results speak for themselves. Our CoRE Alumni work across a diverse range of industries and professions.



### Quality Education fills Industry needs

Students develop work ready skills through their engagement in the CoRE Project Based Model of Learning and Industry partnership mentoring programs.



### Sustainable Development

CoRE's framework integrates the United Nations Sustainable Development Goals (SDGs) through economic development and social inclusion.





# INDUSTRY

## THE FUTURE'S WORKFORCE FOR INDUSTRY 4.0

The CoRE Learning Foundation is a not-for-profit whose business model is based on industry, community, education, and government partnerships - a collective aimed to develop and improve STEM outcomes for the STEM leaders of industry beyond 2025.

CoRE and its prototype-learning model have evolved as a result of industry collaborations. The CoRE Lead sought sponsorship, both financial and in-kind, to develop and run unique CoRE Learning experiences from the onset.

Since 2006, a significant financial sponsorship was amassed to support the CoRE Learning Model's development at Kent Street Senior High School, the CoRE Learning Foundation's Lighthouse School. Additionally, several companies provided in-kind mine site, classroom visits, and their time to attend special events such as the Kent Street Women in Mining Events.

Leadership demonstrated by the CoRE Learning Foundation ensured that industry partnerships are sustainable and evolving, providing CoRE students with exposure to the latest in industry and technological practices and procedures.

These industry-CoRE relationships are now seeing the benefit of investment through the success of the CoRE Alumni and the development of the CoRE Expansion Program.





# References

1.



## **Fixing the leaky pipeline of women in STEM**

Tara Broadhurst wants more girls to study science, technology, engineering and...

 [uwa.edu.au](http://uwa.edu.au)