

FIONA WOOD

Inventor of spray-on skin

Written by Cristy Burne



Teacher Notes

written by
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About the series

Aussie STEM Stars is a fresh and unique series for children and young teens aged 10-13 years that focuses on Australian STEM heroes. Each book is written by an award-winning children's author and follows the real-life stories of Australia's top scientists and inventors, chosen for their pioneering work. Themes explored in the series include childhood, school, family and formative experiences, what inspired them to pursue their chosen path, how they persevered in the face of challenges and what they have contributed to science in Australia.

Reason for studying this book

Wild Dingo Press publisher Catherine Lewis is excited about their publication. "These disciplines are more important than ever as we look to our inventors and innovators to solve contemporary problems facing humanity and the planet. Our **Aussie STEM Stars** series uses narrative nonfiction as a tool for educating children – making it as fun and interesting as fiction books for these readers. Our writers are passionate about doing justice to their chosen subjects – and their lives – providing teachers, parents and librarians with a wonderful series aimed at encouraging children to develop an interest in STEM at a young age."

About the author

Cristy Burne is a children's author, science writer and presenter who has worked as a science communicator for 20 years across Australia, the USA, the UK, Japan, South Africa, Switzerland and beyond. She has degrees in biotechnology, science communication and professional writing. She is passionate about blending STEM and creativity to enthuse, engage and empower children and is a sought-after education presenter.

Who is Cristy Burne? <https://cristyburne.com/free-stuff/>

About Fiona Wood

Professor Fiona Wood is a plastic surgeon whose expertise in burns treatment came to the world's attention in 2002 in the wake of the Bali bombings. From defending the weak and fixing the broken to fighting for her chance to study medicine, the story of plastic surgeon and spray-on skin inventor Fiona Wood shows us the value of dreams, hard work and having the courage to do what is right.

Check out her work and the foundation she started: <https://www.fionawoodfoundation.com>

OUTCOMES

Australian Curriculum

Key focus areas

Science Stage 2-4

Literacy Stage 2-4

OUTCOMES

NSW Curriculum

Key focus areas

Science Stage 2-4

Literacy Stage 2-4

Key Projects

Key project 1: Stand up

What is something you would like to stand up for? What is something that you think needs to change to make the world a better place?

With the help of others or independently, think about changes you would like to make at your school or in your community.

Write a letter or organise a meeting where you can discuss what you believe in and try to make changes for the better.

Key project 2: Gender stereotypes

Research how gender has played a role in women's rights and the perceptions people have had of women in Australia over the last 200 years.

Find some defining moments where women have been listened to and given more equal rights.

Identify what perceptions held by society are still powerful today, and if they impair how women can do some activities.

Extension: Compare women's rights in Australia to those in another country. How are women treated in this country and what are the factors that influence this?

Key project 3: Skin

Fiona Wood, along with her colleague Professor Marie Stoner, invented spray-on skin to help burn victims.

Through research, discover more about skin.

- Why do we need it?
- What is it made of?
- Do other living things have skin like ours?
- How is our skin different from other living things?
- Does every living thing have a skin of some sort? How do they play different roles?
- What is the process of growing skin?

Key project 4: Science inquiry

When Fiona and Marie came up with the idea of spray-on skin, they did a lot of research and experiments to make sure they found the right solution.

Ask students to think of something they wish to learn more about or change. It could be something like:

- *Which material is as strong as plastic but can break down with little harm to the environment?*
- *Which method of washing hands is best?*
- *Are all soaps of equal value when it comes to cleaning our hands?*

Students then can be asked to choose an area to conduct a science inquiry project so that not only are they learning about the science methodology of inquiry, they are also trying to devise or invent something that will improve something in their world.

There are some great resources at this website and even a competition to enter:

<http://www.youngscientist.com.au/how-to-guide-for-primary-teachers/how-to-conduct-a-scientific-investigation/>

Key project 5: How to write biographies

This can be started in many different ways but should culminate in the presentation of a piece of writing, a speech or a visual item. This could also be presented as the student dressing up as the person and role-playing them as they 'discuss their own life'.

1. Students choose someone who has made a difference in the world (encourage a positive impact, but could also be a negative one) and research.
2. Fill a bag or piece of art with symbols and images to represent that person and share.
3. Depending on the age of students, come up with at least one fact to one paragraph under the headings:
 - Childhood
 - Interests and/or hobbies
 - Early career
 - Problems and significant events
 - Where are they now?
 - Why are they famous?
 - What do you admire about them?

Key project 6: Reflection on literature

Students can fill in this table as they read to record their ideas and feelings in response to the book:

Chapter	How did I feel during this chapter?	Character profile: How did the main characters feel? What did they do?
What real-life events occurred? Use research to find some evidence to show this.	New language used	How has the author made you feel? Think of the language used to create tension, happiness, wonder, anxiety, or other emotions.

- What is some new information you learned through reading this book?
- How did your feelings change?
- Did you see the characters change as you learnt more about them?
- What new vocabulary have you learned from this book?

Before you begin reading this book

Front cover

- Look at the cover. Have you heard of Professor Fiona Wood? Find some images of her, as well as websites which may include interviews or research findings.
<https://www.fionawoodfoundation.com/about-us/professor-fiona-wood/>
- What is spray-on skin? (*Gather information from the students about their understanding before the book is started.*)
- Look at the sketch of Fiona on the front cover. Who has drawn this and why have they drawn her in this way?

Back cover

- Read the blurb. What can you gather about this book from the blurb? Why do we need blurbs for all types of books?

Inside the cover

- On the first page we see an image of a microscope and test tubes. Why?
- When you read this quote, what do you think of?
- *Grasp the nettle with both hands and don't let go.*
Discuss what this could mean before you start reading the book and then again at the end.
- Have this quote printed out to refer to throughout the book. Keep talking about it and how it influences Fiona's life over the years. See how your understanding changes once you learn more about her life.

Teaching and learning activities

Chapter 1

- Where is Yorkshire? Read the description, draw what you see and find images of the place at different times of the year.

The day was grey, a typical Yorkshire morning with ice still shining on some of the puddles. Smoke tumbled from red-brick chimneys atop the two-storey brown-brick houses that lined the street.

Discuss what students think it would be like to grow up there.

- Draw up a chart for Fiona, members of her family and room for other people Fiona meets. Write up words and sentences that create a picture of this person as the story unfolds.
- Vocabulary: rapiers, pit pony – what do these words mean?
- Why would Fiona's mother have to lie about her age to get into the Royal Air Force?
- Who are the boys who bully Fiona and why are they bullying her?
- Read through the description on page 5. What is being described?

Faster than the wind. Legs like pistons. Faster and faster. She could hear the horns blast, the crowds roar. A fine start, she'd found her stride. The world record was well within her reach. A sensational final sprint and – yes! The crowds cheered. She smiled for the flashing cameras. A hot favourite for the Mexico Olympics, she heard them say. Britain's big hope for bringing home the gold!

Write your own description of you winning something. Imagine what you would look like and how the crowd would cheer for you.

Look up our own favourite Olympic runner who won the 400-metre race at the Sydney 2000 Olympics.

- Find Frickley on a map and find out what is there today. Is it similar to when Fiona lived there?
- How has coal been mined in the past? Read the description of what happened to Fiona's Dad in the mine. Do people still go down mines today to find coal? Are there coal mines in Australia? Do miners have to go underground to dig it out?

- How do some people get trapped in life? Give some examples of what 'being trapped' could mean and how we can make sure we don't get 'trapped'.
- *You want to be able to get up in the morning and enjoy what you do, they'd say. That means you've got to work hard, so you can make those choices. You've got to train hard, study hard, never give up.*
How do you think these words affected Fiona and her choices in life?
- Who are Dorothy Hyman and Valerie Peat? Find out more about these women and why Fiona looks up to them.
- Why is fitting in so important to many of us? Why didn't Fiona care?
- Chapter 1 finishes with: *At least, that's what Fiona thought then.*
What do you think is going to change in this story? Make some predictions as a group.

Chapter 2

- Have you ever practised for something as much as Fiona does in this chapter? What does it feel like to practise for something you really want?
- The bullies appear again in this chapter. Why do you think they are picking on a younger girl this time?
- Why do the bullies react the way they do when Fiona tries to fight them? Why do they call her names instead of fighting back?
- Read this quote: *But not Fiona. 'A fight's no place for a girl,' Sailor Smith would say.* Why have people in the past, and still sometimes today, not allowed women to participate in these types of sports?
- How else can you deal with bullies apart from fighting? Discuss different ways children can overcome bullying without having to physically fight. Discuss what works for you and the different situations you might face.

Chapter 3

- Continue to build on the character profiles: did you see the characters change as you learnt more about them?
- What is cross-stitch? What can you design with this type of stitch?

- What is a Humber Super Snipe? Why does being able to travel ten miles make a difference? How important is travel as a way of opening opportunities for families?
- When did people start to own their own home TV sets in the UK and in Australia? How do you think neighbours must have felt about the Woods owning one? How much did a TV cost back then in the UK and in Australia?
- What was NASA's space program and how did this start to change the world?
- What does 'university material' mean?
- Are there still education systems in the world that stop girls from continuing their studies beyond high school?

Chapter 4

- What is the difference between miles and kilometres? Why do different countries use different measuring systems?
- What is an orphanage? Why did they exist? What happens now to children if there are no orphanages around and they do not have parents?
- What is a boarding school? Are there any near where you live?
- What is a co-ed school? What other types of schools can you have and what is the difference in the education you might receive?
- *Her school in the village had been less about having friends and more about staying alive.*
How can schools become places like this for some children?
- How should schools be set up so that they are safe places for all and places where everyone can be challenged and excel?
- How did Fiona manage to get a free place to study at the expensive Ackworth School?
<https://www.ackworthschool.com/>
- Fiona moves into a house that was built in 1820. How old is this house? Are there any houses near you that are this old?

Chapter 5

- Does your school have 'houses'? They are often named after significant places or people.
Who were the people whose names Ackworth used? *Gurney. There was also Woolman, Penn and Fothergill.*
What or who are your school houses named for?
- Fiona stood up to the headmaster to speak about something that was important. Have you ever wanted to stand up for something like this but been too afraid? How could you deal with this next time?

Chapter 6

- Fiona feels lucky to be at Ackworth School: *All that week at Daily Worship, Fiona marvelled at how lucky she was to be at a school where the voices of kids counted as much as the voices of adults.*
Do you feel that you are at a school where the voices of kids are just as important as the adults? Why or why not? What could you do to try and change this?
- Fiona practised 'mindfulness' before it was a common term we use on a daily basis. What does it actually mean and why would you practise it? What are some of the different ways you can actually practise mindfulness?
- Why is it important to respect 'other voices' as Fiona learnt?

Over many years, Fiona never lost this respect for other voices. In leading teams through challenge after challenge, she realised that everyone had something special to offer. Sometimes honesty was what was needed. Sometimes loyalty. And always a good dose of courage.

Chapter 7

- Why does Fiona's mother think that she should study to be a doctor rather than a scientist or mathematician? What evidence does she use to support her position?
- The Dean of the Medical School at St Thomas's Hospital had doubts about allowing Fiona to study to become a doctor. What were his reasons?
- What made the Dean change his mind and accept her into the medical course?

Chapter 8

- What is formalin and what is it used for?
- Why would someone want to donate their body to science when they die, instead of being buried or cremated?
- Explore the human body and how the muscles work as described in the book. Find an image of the muscular system to see how muscles interconnect.
- Where is the Hunterian Museum? Find out more about this place and what is inside it.
- In this chapter, Fiona is told again that she can't do something because she is a girl. Find out what percentage of doctors are female and male in Australia now. Then look at the percentage of women who are surgeons in Australia now. Why do you think there are more men than women who are surgeons?

Chapter 9

- Explore all of the different areas of surgery and find out what they specialise in. Some examples to start with: general surgery, orthopaedic surgery, paediatric surgery, eye surgery, gut surgery, heart surgery, etc.
- Discuss this quote: *How much trust people place in their surgeon, she thought.* Why do people put trust in surgeons? Why is it important that people can have trust?

In what other areas of life do we need to trust people with our lives? Discuss the importance of these roles and the types of people who do them.
- What year did Fiona start her job as a surgeon? Why did many people still think women weren't suited for the role?
- How important is it to be positive? Discuss how we can all overcome negative aspects of our lives. (*This is a positive thinking activity.*)
- What are cadavers? Why are they used in universities?
- Fiona met a young boy who was covered in scars from coffee spilling on him when he was two years old. How is this moment pivotal for Fiona? What do you think it encourages her to do?

Chapter 10

- Read this quote from the book: *It's just ... you have children. You won't be able to do the job.*
What year was this comment made to Fiona? Suggest why the interviewing surgeon assumes that having children will affect her work as a surgeon? Is this different now?
- Fiona never forgets the words Professor McComb was fond of saying when she worked with him: *Today doesn't have to be criticised, but it should be analysed. One should never think that today is as good as it gets.*
How is this a great line to live by? How does this help us improve on ourselves and our skills?
- How important is skin? Explore skin further through the Key project. Discuss why we need it, why other animals need it to and the differences between our 'skins'.
- Draw up a timeline of how Fiona tried to save the young women with burns through growing her own skin. Add to this timeline the generosity of others and the people involved.

Chapter 11

- What is the time difference between where you live and London? If it's 7pm for you, what time would you have to call someone who lived over there? How is communicating with those who live overseas easier now?
- This quote from Fiona helps her to strive harder: *'Every patient is an opportunity to learn,' she told her team. 'And the hard lessons are the ones that help us improve.'*
How do you think other surgeons felt about this? How do you feel about this?
- Build your medical vocabulary. Here are some to start with: grafter, blood vessels, enzymes, methodology, split skin graft, full-width graft, etc.

Chapter 12

- How did Fiona and Marie come up with the idea of spray-on skin? Draw up a timeline that shows the different pathways taken to arrive at this new invention.
- What is the image on page 108? Discuss what it is showing, the words associated with it and the different stages of cell growth.

- How long did it take for Marie and Fiona to be able to use the spray-on skin with patients? What are clinical trials? Why are clinical trials important before a new medicine or medical invention is used? What do you know about clinical trials and a vaccine for COVID-19?
- Why does it often take a disaster for people to start making changes? How can disasters be helpful and harmful? Discuss this in pairs and then share in larger groups. Discuss if we need to avoid disasters: if we do, will we never change anything?

Chapter 13

- Find out what you can about the bombings in Bali in 2002.
- A descriptive passage is written about when the bombings occurred. What language is used to create suspense and the feeling of being there? How are the sentences structured to impact how you read the story? Find some sentences or paragraphs that make you 'see' this event and feel the terror people must have felt.
- *There was so much to do, and it all needed to be done yesterday.* What does this mean? How does this show the urgency of the situation?

Chapter 14

- How is Fiona a great leader in the hospital during this time? Think about the qualities great leaders need to show in times of hardship, and compare these to Fiona and her organisation of the burns unit when the victims of the Bali bombing were there.
- Why were blood donations needed? Why did people donate food, equipment and supplies?
- Discuss the feelings the readers might feel as they read through this chapter and learn of people like Jodie O'Shea and Tracy Thomas dying. Why do we react differently when we read stories like this? Does using the names of real people and mentioning their families evoke different emotions?
- Why do some people see asking for help as a weakness? *It wasn't a weakness to accept help from others. Giving and accepting help were both vital.* Why do you think Fiona felt as if she couldn't ask for help?

- Discuss ways you and others you know help each other – including the small or bigger acts of help and kindness you have seen in your neighbourhood and especially during the COVID-19 pandemic. How do these actions make us feel?

Chapter 15

- *Why does it take a tragedy to bring out the best in people? Fiona wondered.*
What are your thoughts on this?
- What is a Member of the Order of Australia
- Fiona talks about how we are all unique and special: *Every one of us is unique and special, every one of us has a gift, a gift we should share. If we don't, that gift is worthless.*
How often do we do less than our best? How often do we challenge those around us to be their best?
Write or draw about what you feel is your special gift. It could be something you have, or something you dream of being able to do so you can share it with others and make the world a better place.
- Watch some talks by Fiona Wood. What did she say that inspired you? Or did she teach you something new?:
<https://www.youtube.com/watch?v=csYyjc7c8xY> (Young leaders' talk)
<https://www.youtube.com/watch?v=xY7kVVS2HVV> (TED Talk)

Chapter 16

- What are some key points you have learnt about Fiona Wood's attitude towards life and learning? How can you apply this to your life?
- Fiona is a National Living Treasure. Why do you think she has this status? Who else is on this list?
- Read over the burns first aid outline. How has first aid for burns changed over the years? Can you make this poster so it can sit somewhere in your house or in the school to help people to know what to do?

Extension questions for further thinking

Paradox

What is unusual about children giving advice to adults about rules and decisions at school? Think about when Fiona spoke up to her headmaster.

Why is this unusual? Devise ways for students to use that would enable them to speak on the same level as teachers. Develop structures and processes that schools could introduce into the school community to ensure student voices could be heard and students would be consulted as a matter of course.

Analogy

How is a disaster like an alarm clock?

Consider asking students to present this creatively – poem, artwork

Attribute listing

List what qualities someone needs to have to be a good leader.

Present this in a fun way that appeals to young children.

Provocative question

Women are still not equal to men.

Discuss how this is or is not the case. Conduct a debate to discover the different viewpoints on this issue.

Creative writing skills

Write a story about another person who has been awarded an Australian of the Year award. Use ideas from this book to engage and excite readers about this person's achievements and influence.

Follow-up research

Study and explain how the invention of spray-on skin has made a contribution to so many people's lives. Find further examples of how it has helped people.

Visualisation

Draw and label what skin looks like, the different layers and what each layer does to protect our bodies.

Discrepancy – Examples of change

Research some new inventions in the field of surgery that are changing how surgeons can help their patients. How are these inventions helping hospitals and surgeons?

Learning about professions

What does a surgeon do?

Consider the different types of surgeons there are and focus in on two, showing how they are different and how they are the same.

Elaboration of outcomes to the Australian Curriculum

Science

Stage 2

Science involves making predictions and describing patterns and relationships (ACSHE050, ACSHE061)

With guidance, plan and conduct scientific investigations to find answers to questions, considering the safe use of appropriate materials and equipment (AC SIS054, AC SIS065)

Stage 3

Scientific knowledge is used to solve problems and inform personal and community decisions (ACSHE083)

Identify, plan and apply the elements of scientific investigations to answer questions and solve problems using equipment and materials safely and identifying potential risks (AC SIS086)

Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena and reflects historical and cultural contributions (ACSHE098)

Scientific knowledge is used to solve problems and inform personal and community decisions (ACSHE100)

Identify, plan and apply the elements of scientific investigations to answer questions and solve problems using equipment and materials safely and identifying potential risks (AC SIS103)

Stage 4

Scientific knowledge has changed peoples' understanding of the world and is refined as new evidence becomes available (ACSHE119, ACSHE134)

Science knowledge can develop through collaboration across the disciplines of science and the contributions of people from a range of cultures (ACSHE223, ACSHE226)

People use science understanding and skills in their occupations and these have influenced the development of practices in areas of human activity (ACSHE121, ACSHE136)

Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge (ACSIS124, ACSIS139)

Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed (ACSIS125, ACSIS140)

Literacy

Stage 2

Discuss texts in which characters, events and settings are portrayed in different ways, and speculate on the authors' reasons (ACELT1594)

Draw connections between personal experiences and the worlds of texts, and share responses with others (ACELT1596)

Make connections between the ways different authors may represent similar storylines, ideas and relationships (ACELT1602)

Discuss how language is used to describe the settings in texts, and explore how the settings shape the events and influence the mood of the narrative (ACELT1599)

Plan and deliver short presentations, providing some key details in logical sequence (ACELY1677)

Plan, rehearse and deliver presentations incorporating learned content and taking into account the particular purposes and audiences (ACELY1689)

Use comprehension strategies to build literal and inferred meaning and begin to evaluate texts by drawing on a growing knowledge of context, text structures and language features (ACELY1680)

Use comprehension strategies to build literal and inferred meaning to expand content knowledge, integrating and linking ideas and analysing and evaluating texts (ACELY1692)

Stage 3

Clarify understanding of content as it unfolds in formal and informal situations, connecting ideas to students' own experiences and present and justify a point of view (ACELY1699)

Plan, rehearse and deliver presentations for defined audiences and purposes incorporating accurate and sequenced content and multimodal elements (ACELY1700)

Navigate and read texts for specific purposes applying appropriate text processing strategies, for example predicting and confirming, monitoring meaning, skimming and scanning (ACELY1702)

Make connections between students' own experiences and those of characters and events represented in texts drawn from different historical, social and cultural contexts (ACELT1613)

Analyse and evaluate similarities and differences in texts on similar topics, themes or plots (ACELT1614)

Identify, describe, and discuss similarities and differences between texts, including those by the same author or illustrator, and evaluate characteristics that define an author's individual style (ACELT1616)

Plan, rehearse and deliver presentations, selecting and sequencing appropriate content and multimodal elements for defined audiences and purposes, making appropriate choices for modality and emphasis (ACELY1710)

Analyse how text structures and language features work together to meet the purpose of a text (ACELY1711)

Use comprehension strategies to interpret and analyse information and ideas, comparing content from a variety of textual sources including media and digital texts (ACELY1713)

Stage 4

Identify and explore ideas and viewpoints about events, issues and characters represented in texts drawn from different historical, social and cultural contexts (ACELT1619)

Reflect on ideas and opinions about characters, settings and events in literary texts, identifying areas of agreement and difference with others and justifying a point of view (ACELT1620)

Recognise and analyse the ways that characterisation, events and settings are combined in narratives, and discuss the purposes and appeal of different approaches (ACELT1622)

Create literary texts that adapt stylistic features encountered in other texts, for example, narrative viewpoint, structure of stanzas, contrast and juxtaposition (ACELT1625)

Use comprehension strategies to interpret, analyse and synthesise ideas and information, critiquing ideas and issues from a variety of textual sources (ACELY1723)