

Reading and the Science Classroom

“Students will develop their reading skills by encountering a variety of scientific texts which they will learn to read with fluency, understanding and competence using a broad range of comprehension strategies.”

(Science specification pg. 8)

In Junior Cycle science students will read text for a variety of purposes. They might read to solve a problem, to gain basic knowledge about a concept or to understand the steps in an experimental or inquiry procedure. They might read to research a topic or question. They will also read from a variety of formats. They might read books, instructions, newspaper articles, websites or digital text and peer work. Science has its own unique approach to communicating and teaching students to *read like a scientist* helps them to engage more effectively with science content in the classroom. It will also support their ability to engage as critical consumers of science in their futures.

In this resource we explore some strategies that you might like to use, and model for your students while teaching and which they might adopt as they develop their ability to *think* like a scientist. For many students reading for comprehension will need to be explicitly taught.

Reading Science

In addition to the general reading skills that students need to understand narrative text, readers of science must also

- Understand specialised vocabulary terms and phrases that are unique to science
- Understand that some vocabulary terms and phrases have different meanings when used in science
- Interpret scientific symbols and diagrams
- Make sense of text in a layout that is not always user friendly e.g. there may be a need to move between text and diagrams in a non- linear fashion
- Infer main ideas and draw conclusions that may not be explicitly stated.

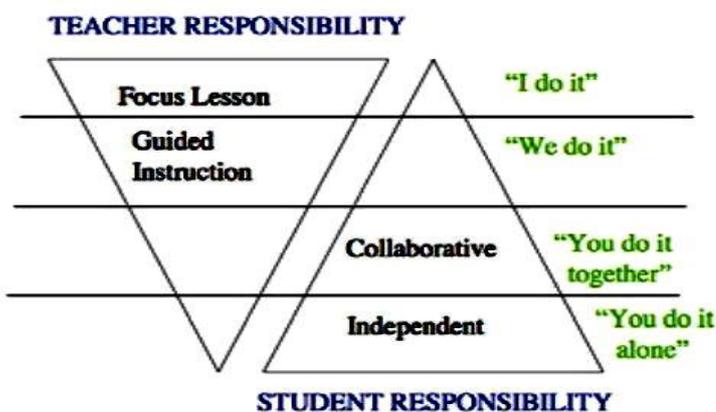
Here are some strategies which have been proven to help students in engaging with science text. Initially you might adopt some of these as teaching strategies, as they work well in the science classroom. However, as the students' develop their skill in reading science they should move to independently using some of the strategies themselves. Techniques students might independently use to enact the strategy are shown in bold.

Strategy	Sample techniques
<p>Connecting with students' prior knowledge</p> <p>This prepares students for reading and increases their comprehension as it helps to connect what they are reading about to what they already know. It also allows them to verbalise possible misconceptions.</p>	<ul style="list-style-type: none"> • Brainstorming on a topic and developing a mind-map of prior knowledge • Anticipation set: Teacher presents students with a number of controversial statements about the topic they are going to read about. They discuss the statements in groups deciding, whether they currently agree or disagree. They reflect on and revise their answers after reading. • Before researching a topic, or on reading a heading or title students write down what they already know that relates to this topic or heading.
<p>Frontloading meaning of specialist vocabulary</p> <p>Introducing students to the meaning of some key words – especially those which are unique to science or which have a different meaning in a science context – will help students to comprehend what they are reading.</p>	<ul style="list-style-type: none"> • Brainstorming on a topic and developing a list of keywords which students work on individually, or as groups, to find the meaning of. • Probable Passage: Present students with a list of key words or concepts and get them to predict what they might be reading about. They have to understand the meaning of these words or at the very least identify those which they do not know the meaning of, to be able to make a prediction. • On encountering a new term in their reading students record it and its meaning in their own word bank.

Strategy	Sample techniques															
<p>Developing students’ ability to process what they are reading, while they are reading.</p> <p>This sends the message that while reading, students should also be thinking about what they are reading and making sense of what they are reading.</p>	<ul style="list-style-type: none"> • Students keep a response log, where they are asked to respond to particular points in the reading as they come across them. Students can be scaffolded in their response log (see example below). <table border="1" data-bbox="799 573 1398 1155"> <thead> <tr> <th colspan="3" data-bbox="799 573 1398 647">Record your response using the code and your thoughts in the space below</th> </tr> <tr> <th data-bbox="799 647 1046 721">What the text said</th> <th data-bbox="1046 647 1193 721">Code</th> <th data-bbox="1193 647 1398 721">My thoughts</th> </tr> </thead> <tbody> <tr> <td data-bbox="799 721 1046 902">“In space, the force of gravity is less so the bones in the spine move further apart”</td> <td data-bbox="1046 721 1193 902">!</td> <td data-bbox="1193 721 1398 902"><i>So astronauts get taller in space – weird!</i></td> </tr> <tr> <td data-bbox="799 902 1046 1084">“In the absence of gravity fluids redistribute more evenly around the body.”</td> <td data-bbox="1046 902 1193 1084">Q</td> <td data-bbox="1193 902 1398 1084"><i>What kind of fluids?</i></td> </tr> <tr> <td colspan="3" data-bbox="799 1084 1398 1155">! = surprise; C = confused; NB = important point; Q = question</td> </tr> </tbody> </table> <ul style="list-style-type: none"> • Students note take and respond to, or summarise text, in notes in their own words, as they read. 	Record your response using the code and your thoughts in the space below			What the text said	Code	My thoughts	“In space, the force of gravity is less so the bones in the spine move further apart”	!	<i>So astronauts get taller in space – weird!</i>	“In the absence of gravity fluids redistribute more evenly around the body.”	Q	<i>What kind of fluids?</i>	! = surprise; C = confused; NB = important point; Q = question		
Record your response using the code and your thoughts in the space below																
What the text said	Code	My thoughts														
“In space, the force of gravity is less so the bones in the spine move further apart”	!	<i>So astronauts get taller in space – weird!</i>														
“In the absence of gravity fluids redistribute more evenly around the body.”	Q	<i>What kind of fluids?</i>														
! = surprise; C = confused; NB = important point; Q = question																
<p>Students talking about what they are reading</p> <p>This helps students to organise their thoughts about what they are reading. Talk improves understanding.</p>	<ul style="list-style-type: none"> • Students read individually, but sit in a group, and the passage is marked at various intervals. At the mark all must stop and each student must make a comment about what they have read. At each pause point a different student leads the comment phase. • Jigsaw methodology with each student reading a different piece and communicating what they have read to the group. • When students are working on a research project they are given time to discuss what they are finding out with their classmates. This is encouraged as part of the SSI classroom based assessment. 															

Strategy	• Sample techniques
<p>Provide opportunities for students to further process what they have read.</p>	<ul style="list-style-type: none"> • Ask each group to recreate what they have read in a different form e.g. on a poster; in a graphic etc. • Students represent written problems as diagrams. • Students write/tell the story that the graph or graphic tells
<p>Provide opportunities for students to apply what they have read.</p>	<ul style="list-style-type: none"> • Students might recreate what they have read in a different role e.g. after reading about the process of digestion students might describe the process as if they were a piece of food passing through the gut.

Whatever strategy you choose it is important that you model the strategy for your students initially while drawing attention to what you are doing e.g. “when I am reading a piece for the first time I often underline what I see as the important points as I go along”. The aim however is for students to adopt the strategy to use independently and automatically when encountering new science text and some students will require explicit instruction in how to do this. This requires that they initially see you use the strategy, then help you use the strategy, then use the strategy with help before adopting the strategy for themselves as a way to read for understanding.



Fisher, D., & Frey, N. (2003)

In this way we can develop our students’ ability to read scientific text for understanding. It is only when they have developed this initial skill of engaging with scientific text with understanding that they can then proceed to become critical consumers of science in the media.