Chapter 9 - Creative science through drama and storytelling

Chapter aims

By the end of this chapter, you should be able to

- Recognise the potential for storytelling in science to develop science attitudes, skills, knowledge and understanding
- Develop strategies for oral storytelling in and outside the classroom
- Summarise a range of drama techniques and how describe how they might be used in the science classroom
- Defend the use of drama as an approach to science teaching and learning in the primary classroom

Introduction

Il était une fois...

والأوان العصر وسالف ،الزمان قديم كان،في ما يا كان

Der var engang...

Es war einmal...

Once upon a time, not in your time, not in my time but a time long ago...

The power of storytelling can capture the attention of children and adults alike with those simple words, once upon a time. In many cultures storytelling, often through song, chants and poetry, was part and parcel of daily life and was how history, morals and lore got passed from one generation or one community to the other. In fact, every human culture in the world seems to create stories as a way of making sense of the world. In old Ireland, a seanchaí, or storyteller, was a well respected member of the community who was usually a servant to the

chief of the tribe and kept track of important information for their clan. In African culture, stories were often created and told through the medium of dance and music. In Aboriginal cultures, children were told stories from a very early age; stories that helped them understand the air, the land, the universe, their people, their culture and their history. In England, 'wassail' refers to the ancient custom of visiting orchards, reciting incantations and singing to the trees in apple orchards in cider-producing regions of England to promote a good harvest for the coming year. We can recognise the long term relationship between stories and our understanding of and connectedness to our world and the people that live in it (and these are only a few of examples from around the globe). These storytelling traditions are still in place today and many are witnessing a revival. Jonathan Gottschall (2012) in his book 'The Storytelling Animal: How Stories Make Us Human' writes: 'We are, as a species, addicted to stories'.

Storytelling has always had a presence in the primary classroom and Daniel (2012) recognises its potential across the curriculum. Some subjects by their very nature lend themselves to the tradition of storytelling and in the case of 'English' is a curriculum requirement in the 2014 National Curriculum for England (Department for Education 2013 p. 21) as children should be taught to develop pleasure in reading, motivation to read, vocabulary and understanding by becoming very familiar with key stories, fairy stories and traditional tales, retelling them and considering their particular characteristics from year 1. Scotland's Curriculum for Excellence encourages children from the early years to create their own stories and share these in imaginative ways (Education Scotland, No Date). Moreover, in the Irish Primary School Curriculum for English, there is an additional expectation that children will hear, discuss and react to local storytellers. (DES/NCCA 1999 p 38) However, what of science? Is there room for story telling in the science curriculum and the science

classroom? We argue an emphatic YES! and not just to provide a hook but to promote teaching for creativity.

Denning (2001) argues that storytelling plays an essential role in children's learning, it brings people together to experience a common perspective, and stretches everyone's capacity to empathise with others and share experiences. Parkinson (2011) recognises that storytelling helps children develop a wide range of skills and that they are marvellous starting points for teaching an art that can help them to pass on experience, train and use imagination, develop language skills, promote their own confidence, communication and creativity and much more. Storytelling and story making may also be essential catalysts for developing critical and analytical thinking skills. Recently, there is much research on using technology to enable, support and enhance children's creative story telling. Daniel (2007) also advocates for story telling in the primary classroom but recognises the vital role teachers need to play as role models for storytelling.

So why use oral story telling in science? Just as stories are used in English, history and other subjects in the curriculum, stories used in science can help develop scientific attitudes, language and skills as well as knowledge and understanding. Oral story telling has particular power when considering environmental, local and global issues in science with its potential to extend children's ability to empathise with others and share experiences. Stories can act as wonderful lesson starters and are particularly effective when used as part of a sequence or scheme of work. They can capture the imagination and enthusiasm of the children and motivate them to achieve their science objectives. The key element in any subsequent work following storytelling will be the dialogue and discussion among the children. Chapter 2 recognised the importance of dialogue and discussion in identifying and supporting conceptual change. This chapter with its focus on oral storytelling and dramatic techniques which demand dialogue and discussion, has underpinning in this theoretical framework.

When using drama and story-telling strategies you are also giving children that critical time to think, which is so often squeezed out of the busy classroom schedule and equally important, to share their thinking. Sharing their thinking and ideas in response to a drama or story is vital in enabling children to progress their scientific understanding. Interestingly, in a study on primary science, Murphy (2005 p. 11) reported that female teachers were significantly more likely than male teachers to use role play and stories in their teaching of science. However she also reported that teachers most often used discussion (91% often used) and group work (84%) as creative contexts for teaching science; whereas role play (10%) and drama (8%) were the least used contexts. Also the use of stories was more prevalent in key stage 1.

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Time for reflection 9.1 – Teacher as storyteller

What skills and techniques do you need to be an oral storyteller?

Hopefully at some stage during your initial teacher training or early experiences in the classroom you have told children an oral story. Think about one of these occasions. If you haven't, think about a time you read children a story (and please make it your goal to tell an oral story as soon as possible!) The following reflections and questions were adapted from de Rusett's guide to storytelling (2012)

Think about where and how you sat and where the audience sat when you told you story. Were there barriers between you and your audience? Could everyone hear and see you easily? It is important to let the audience know that storytelling is different to circle time or other activities by speaking slower and louder than normal.

When you told the story, did you give an introduction about where the story comes from? Was this your favourite story from your childhood? Was it a story you once heard and have adapted it to make it your own?

How did you start your story? While 'once upon a time' is a classic story starter, think about other ways to start your story by considering the time, place and weather of the story.

Did you use simple facial expressions to show the feelings the characters as they progressed through the story? Also, did you use your body and hands through mime and gesture to add more detail to the characters, situations or surroundings? Think about using your body to make yourself as big as possible when describing a character that may be physically big or big in personality, similarly as small as possible with a small or timid character. The way you hold your shoulders and head can convey a lot about the physicality and personality of the character.

Think about how you used your voice when you were telling the story. You have the power to control the pace and volume so use this to your advantage. Did you vary the pace and volume? Did you use different voices for different characters or to create sounds to support the story for example animal (a frog croaking), emotional (yawn), weather (rain) or happening (crash) sounds?

Did you pause at a particular point in a sentence or part of the story to create atmosphere and tension?

It is important the audience feel included and part of the story. Did you ask questions, such as ‘do you know what happened next?’, or use phrases that included the audience, for example ‘as you know walking through woods can be scary but exciting…’

Luckily the ability to structure a story, change pace and emphasise words, use gesture and facial expression, make eye contact are all things that we, as teachers, already have in our

tool box. So next time you go to tell or read a story, please think about using these techniques and strategies…practice makes perfect!

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Activity 9.1 – Tell a story

Have you got a favourite fairy tale? If so, collect examples from other cultures which can add further opportunities for learning. A popular and lasting one is Cinderella and there are so many examples of this story from many diverse cultures. Mufaro's beautiful daughter (Steptoe 1987) is an African Cinderella story; Yeh-shen is a wonderful Cinderella story from China (Louie 1996) and Sootface a Native American Indian Cinderella story (San Souci 2010). While these could also be used as picture books for story time as the illustrations are wonderful; the joy in children's faces as the familiar story is revealed but told in a land and with people and objects that are unfamiliar to them is worth all the time and effort in preparing the story and telling it orally.

This is a skill that can be honed outside of the classroom. Get a few friends or student teachers from your course together and have a go at telling your favourite story. Pick one that you know well. Identify the key stages in the story. Think about how you will start your story. Think of ways of adding simple gestures. What words need emphasising? What is the best way to sequence the story? Is there repetition of events or details? What way can you involve the audience? Don’t be afraid to add your own detail! Before telling your story to your friends have a go at saying it out loud a few times yourself, ensuring you have included the key stages. Over time it will get easier and a lot more enjoyable to tell a story without the comfort blanket of a picture book or other book.

[end box]

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Activity 9.2

Consider the following objectives and guidance for the 2014 National Curriculum for England (Department for Education 2013).

[Insert Table 9.1]

Visit your closest library or bookshop and evaluate what stories could support science teaching such as environmental themes or stories that consider evolution and inheritance. It will be worth the time in finding some key stories that have strong connections with these themes. If you need help getting started, Anne Dolan (2012) explores the possibility of using picture books to help student teachers devise strategies for encouraging children to imagine the future through dialogical engagement in general, and through the use of literature circles in the primary classroom in her book "You, Me and Diversity, The Potential of Picture Books for Teaching Development and Intercultural Education". Consider exploring some of these picture books and chose one that best supports one area of science. Extend this by telling one of these stories orally outside, using your techniques practised earlier. This would work particularly well if you are considering an environmental theme. The power of this oral storytelling can further children's connectedness with the natural world and situate their ideas and experiences in a local context.

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Traditional picture and fiction stories provide a rich and diverse resource for teachers and their children, however it is also important to encourage children's own story creating. Valkanova and Watts (2007) describe a research study that involved digital storytelling in science, where children had to produce a short 3 minute film (edited from 40 minutes) to

show to family and friends what they had learned in science. The research aspect involved analysing the type of talk throughout the process and the nature of the stories. Some groups chose to tell *a* story rather than simply tell *the* story of what they had learned. "This was a strategy several groups used, allowing the medium of video film and visual construction to free their talk. In such situations the medium was used as a vehicle for inventive thinking and communication". (Valkanova and Watts 2007 pp 801) There were also instances indicating how children played with stories to make sense of their ideas and knowledge. This links strongly with the notion of assimilation of knowledge. See Chapter 2. Kelly and Cutting (2011) describe a story telling activity which combines elements of history and geography, with strong links to science. In this, children are told a story about a great dragon who lives in Southern England and none of the King's people are brave enough to fight it until a young girl steps forward. This brings her on adventure with wizards, pirates and witches as she encounters a series of challenges which help her ultimately to defeat the dragon. The science learning here was helping the witches make a potion to put the dragon to sleep requiring the young girl to do some simple plant identification. These are just some examples of the use of storytelling in science.

Drama in science

As with storytelling, the use of drama in English to explore stories, events and character is common in primary school curricula. Additionally, it is typical for primary-aged children to also study drama as a subject in itself, so what of using a creative medium such as drama in the science classroom?

A range of drama and literacy approaches have been used to teach science in the past. Brock (1999) describes the use of drama, story and role-play in a multi-sensory environment to

negotiate and solve scientific problems. Kaplan (1993) showed how a drama activity could be used as a springboard into a science investigation. Puppets have also been strongly advocated for in the science classroom (Rollnick *et al.* 1998, Keogh et al. 2006) and in recent years with great effect (Simon *et al.* 2008). Simon *et al.* (2008) reported puppets having an impact in three distinct ways: on the nature of the discourse in both teacher–child and child–child interactions, on the engagement and interest of children, and on teachers' beliefs and practice. Watts (2001) describes three benefits of using poetry in the science classroom including giving children a chance to 'play with words and toy with language' encouraging students to play creatively and imaginatively with science concepts and ideas, especially when ideas are 'half-formed'. Ødegaard (2003) uses similar arguments to justify the inclusion of drama in school science, showing examples for how this may be used to increase students' learning of science concepts and their understanding of the nature of science and science in society. A strategy to foster critical and creative thinking in the secondary science classroom is a 'structured controversy'. This involves students in discussions and debates which address more than one side of an issue and require students to back arguments with evidence and reference to consequences (DCSF 2008). Pennick proposes that science teaching that uses provocative questions and creates a safe environment for exploring, risk-taking, experimentation, and speculation, can help improve students' creativity (1996 cited in Lee and Erdogan 2007). Additionally, the notion of creativity was expressed explicitly in the 1999 National Curriculum for Science in England and Wales 'that science is about thinking creatively to try to explain how living and non-living things work, and to establish links between causes and effects.' DfE (2011)

Cremin (2009) argues that drama offers children the chance to engage creatively in fictional-world-making play. Such play, whether in the role-play area or in classroom drama, involves making and shaping worlds, investigating issues within them and returning to the real world

with more understanding and insights. Mantle of the Expert (MoE) is one such drama technique that we can use effectively in the science classroom. It is based on the principle that treating children as responsible experts increases their engagement and confidence. MoE encourages creativity, improves teamwork, communication skills, critical thought and decision-making. (Drama Resource 2013) A problem or task is established and the pupils are contracted-in or "framed" as an enterprise – a team of experts using imaginative role-play to explore the issue. The children may be involved in mimed activities, improvisation, research or discussion. While the focus is on the enquiry process, it can often lead to real outcomes such as writing letters, printing leaflets or selling products. The teacher's role is to guide the drama, stepping in and out of role as necessary, providing encouragement and motivation to the experts. The children perceive a real purpose for learning and discovering together in an interactive and proactive way. This provides them with skills and knowledge they can apply to their everyday lives.

Mantle of the Expert involves a reversal of the conventional teacher-student relationship in which the students draw on the knowledge and expertise of the teacher; instead the teacher assumes a fictional role which places the students in the position of being the one who knows or the expert in a particular branch of knowledge. (Heathcote and Herbert p. 173) MoE has real potential in science and Luke Abbott (2013) shares his experience of working with teachers in Ramallah, Palestine to develop their skills in MoE in science. He describes an example where 'a scorpion centre' is set up having identified a problem. The problem started from the notion that if a child was stung by a scorpion 'You might have to go all the way to Jericho Town for a doctor and if it's a child, the child might die on the way.' The teachers in this case suggested a centre in the local town that could deal with scorpion bites and where people could study them to. This allowed for Mantle of the Expert where the teachers could play the part of scorpion experts, researching, developing and running the centre. Abbot then

takes on the role as someone who will pay $100 for every yellow scorpion found. This led into discussion around ethics, morality and the place of science in the environment. He argues that this supports the science units on 'Ourselves', 'Habitats,' 'Local animals', 'Growth and growing' and 'Similarities and Differences'. For further information on this, read the article in full. Additionally, for further ideas on considering controversial issues in science, see chapter 13.

There are a range of other drama techniques that can be used in the classroom. These include:

- Improvisation – Improvisations allow children to produce short performance pieces (movement and/or dialogue) which have not previously rehearsed, scripted or planned
- Hot-seating - For this, the teacher or child is in role in the hot-seat, where they are questioned by children in the class. The role might be a character from fiction, a historical character, a famous person or an imaginary person.
- Freeze-frame - Freeze frames are still images or silent tableaux used to illustrate a specific incident or event.
- Conscience or decision alley - This strategy is used as a way of exploring thoughts, underlying issues or dilemmas of a character at a particular point in a story.
- Flashbacks and Flash forwards – In this, children are asked to improvise scenes or freeze-frames which take place seconds, minutes, days or years before or after a dramatic moment. This enables the exploration of motivations and consequences.
- Role-play – In role-play children and the teacher step into particular role(s) and suspend belief.
- Forum theatre - A scene, usually indicating some kind of negative behaviour or attitudes, is shown twice. During the replay, any child in the audience is allowed to

shout 'Stop!', step forward and take the place of one of the characters, showing how they could change the situation to enable a different outcome.

- Teacher-in-role – the teacher assumes a role in relation to the children
- Thought tapping/tracking - a technique for examining the private thoughts of characters at particular moments.
- Story telling – This can involve the teacher telling stories or the children sharing their stories

See the recommended further reading for more information on these and other drama techniques suitable for use in the primary science classroom. Some of these are also explored in the following case example.

[start box]

Activity 9.3

Think of a favourite story from your childhood. Now brainstorm as many links to science as possible considering all elements of science. Some links may seem tenuous but keep going and more appropriate and effective links will be found. Here are some of the stories I like to use when teaching science with one or two suggestions of strong links to science:

The Three Little Pigs –Materials and their Properties

Wall E – Materials, Recycling, Care for the environment, Green plants

Peter Pan – Light and shadows, Day and night, Ourselves

[end box]

Case example

Finding Nemo, Disney Pixar's 2003 animated movie about the journey a timid clownfish takes to bring his son Nemo home after he is captured in the Great Barrier Reef and taken to Sydney. This story lends itself wonderfully to the study of marine biology, considering living things and their habitats, food chains, food webs etc. and also the study of controversial and environmental issues. This is an example of a primary science lesson using *Finding Nemo*.

Introduction:

Teacher creates some excitement. Who has seen the movie? Who were there favourite characters? Why? The chances are most children will have seen it, if not, re-tell the story orally with some pictures to support.

Activity 1: Freeze-frame and thought tapping

Teacher prepares a fact file on 6-8 of the characters from the movie. These can be adapted to allow for differentiation across the primary age phase. In groups of 4-8 (depending on class size and age), each child is given a fact file and in their groups they discuss their character and the information given on the card – appearance, diet, adaptations, survival strategies etc. After 5 minutes of discussion the children in their groups to a freeze frame of their characters living under the water. The teacher then goes around the groups and does thought tapping – this is a technique for examining the private thoughts of characters at particular moments. In this example it could involve questions like 'Are you worried about where your next meal is coming from?' 'How do you survive when you've got big predators like Bruce (a shark) around?' or 'Why do you like to position yourself on the seabed?'. The teacher can model and encourage the use of scientific words through effective questioning and dialogue with the children.

> "I wear a snorkel and mask and as teacher-in-role pretend to be swimming and taking photographs with an underwater camera taking in all the marine life all around me…and of course reacting appropriately when I see Bruce the Great White Shark!"

Activity 2: Modelling

Staying in their characters, the children then create food chains or food webs (depending on their ability). This provides opportunity to again to encourage and use scientific language. The teacher can purposely omit key elements, such as a primary producer. In a marine habitat for example, turtles mostly eat seagrasses and so a food chain with a green sea turtle, like Crush in *Finding Nemo* needs to have seagrass. With the other main aquatic producers, phytoplankton and algae, it can provide an introduction to discussion on photosynthesis and one of the seven life processes, respiration.

Activity 3: Conscience Alley

When we've done this lesson with our students, initial teacher education students, it is typical for someone to quote Bruce, the Great White Shark: '*I am a nice shark, not a mindless eating machine. If I am to change this image, I must first change myself. Fish are friends, not food'*. This is a great opportunity to do some structured controversy!

Through a conscience (or decision) alley, a means of exploring a character's mind at a moment of crisis and of investigating the complexity of the decision they are facing, the decision of whether Bruce should eat fish or not is considered. To do this, the class divides into two groups and form two lines facing each other. One side come up with reasons to eat fish, while the other group comes up with reasons for not eating fish and should offer alternatives. It is useful to give each group a few minutes to come up with ideas. Either the teacher or a child then walks very slowly through the alley. As they pass each child, they give

them one reason why they should or shouldn't eat fish. By the time the teacher or child has reached the end of the alley they should have made a decision. It is important that the reasons for the decision are shared and discussed. Furthermore, there is opportunity here for the teacher to steer the discussion towards eco-systems and how they are naturally balanced. This allows for discussion to then follow on controversial issues such as over-fishing, dolphin friendly fishing and whaling. Some links to the 2014 National Curriculum for England have been identified (see Figure 9.1).

[insert Figure 9.1]

Figure 9.1: Mapping of the Finding Nemo drama activities against the 2014 Primary Science Curriculum for England

Conclusion

In this chapter we have considered using story-telling and drama as creative approaches to science teaching. The power of story-telling has real implications in the classroom so why not utilise it in the science classroom. Stories provide relevance and purpose to the science activity and this ensures progress is made and outcomes are meaningful to the children. Through story-telling and drama children can situate themselves in experiences that enable them to empathise with others. This has real potential when considering local and global themes, particularly environmental issues. Using techniques like Mantle of the Expert, teacher-in-role or puppets, the children's thinking, methods and results can be challenged in a positive learning environment.

Further reading

Daniel, A. K. (2012) Storytelling across the primary curriculum. Abingdon: Routledge

This book is a rich resource for those who want to explore in depth the theory and practice of storytelling in the primary classroom.

Dolan, A.M. (2013) You, Me and Diversity, The Potential of Picture Books for Teaching Development and Intercultural Education. Stoke-on-Trent: Trentham Books.

Offering a large range of picture-books which are suitable for considering environmental x

Baldwin. P. (2009) The Primary Drama Handbook, London: SAGE.

This is a comprehensive guide to drama in primary classroom, which as well as offering tips on using drama, also provides a key insight into the key role drama can play across the curriculum.

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