Argumentation and practical work – An introduction

This set of resources exemplifies ways in which practical work can be used alongside a pedagogical approach known as argumentation.

*A scientific **argument** uses evidence to make a case for whether a scientific idea should be accepted or rejected. The process of developing, discussing and evaluating these scientific arguments is called **argumentation.***

How this introduction is organised

Quick start guide:

The quick start guide set out the bigger picture of what argumentation involves and how it can relate to practical work in science.

For more detail about the points raised in the quick start guide go to the relevant sections which follow:

Section 1: How is argumentation different to other related concepts?

Section 2: What does argumentation look like in practice?

Section 3: The teacher's role in supporting argumentation

Section 4: The student's role in argumentation

Section 5: Getting critical within argumentation

Section 6: How does argumentation link to other aspects of Practical Work for Learning?

References

Quick start guide to argumentation

Why is argumentation important in the science classroom?

Science education aims to develop students' understanding of both scientific concepts and of how science and scientists work. Argumentation is a core practice used by communities of research scientists, and it is through these activities that science knowledge is developed and agreed. Argumentation activities can be used in school science to mirror this practice.

There is also a strong evidence base highlighting argument and collaborative discussion as key social processes through which we can learn. This is because engagement in these activities can be an effective way of making knowledge explicit, challenging misconceptions, building new knowledge, and increasing articulation.

Research has shown that argumentation approaches can help develop knowledge and skills which are critical to students' short and long term development;

Argumentation encourages students to use higher order processes;

- Teachers whose lessons included the highest quality of argumentation also encouraged higher order processes in their teaching (Simon, Erduran and Osborne, 2006).

Argumentation can develop your students' content knowledge;

- Explicit teaching about argumentation enhanced students' biological knowledge (Zohar and Nemet, 2002).

- Argumentation improves subject knowledge which was significantly better in the argumentation group than the control group (Venville and Dawson, 2010).

Argumentation can help prepare students for assessment;

- Passmore and Stewart (2002), Zohar and Nemet (2002) and Venville and Dawson (2010) provide part of a growing body of evidence suggesting that argumentation is better than other approaches at preparing students for assessment.

Often, Holistic development of thinking skills and development for assessment are seen as polar opposites which compete for time. This research suggests, however, that argumentation may offer a pedagogical approach which can achieve both these goals simultaneously.

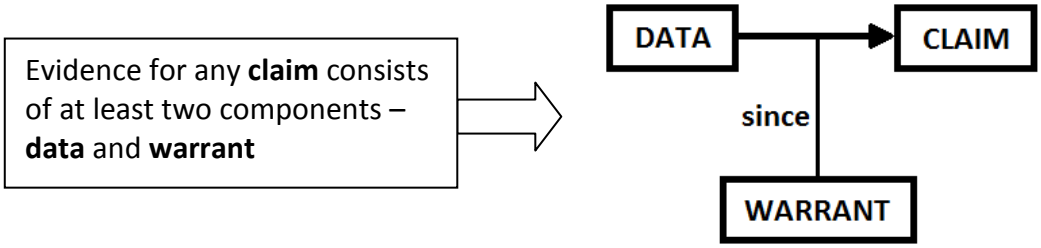
Argumentation and practical work – an introduction

What is argumentation?

Argumentation is the process of developing, discussing and, evaluating scientific arguments.

A scientific argument is based around a particular **claim**, or assertion, which is justified by relating it to supporting evidence, or **data**.

A **warrant** is an explanation of *how the data supports the claim* and therefore why the claim should be accepted.



Adapted from Osborne, J. et al (2001), and Toulmin (1958)

The summary on the following page has been prepared using a range of literature on the subject, and is designed to introduce you to the different factors which go into using argumentation successfully in practical lessons.

It introduces three argumentation frameworks; Predict-Observe-Explain, Classification, and Analysing and Interpreting Data. These frameworks identify the focus of the argumentation for any particular lesson, and are based on those described in the IDEAS In-Service Training Pack (Osborne, J. et al, 2004). They have been chosen because of their relevance to practical work.

• Predict-Observe-Explain: Students predict the outcome of a practical activity using their prior knowledge. They compare the actual outcome with their prediction. They then justify why their prediction was correct, or look for why their original ideas were at fault and develop and justify a new explanation.

• Classification: Students use argumentation to justify their choices about objects/ideas belonging to particular categories

• Analysing and Interpreting Data: Students decide whether or not the data available is sufficient to draw particular conclusions, and justify their decisions through argumentation.

In each case students use collected or given data to justify their claims, which might be an explanation for a phenomenon, their particular way of grouping items, or their assessment of the validity of a data set. In order to justify their claims they need to not only consider evidence which supports their claim, but also address counter-claims (opposing claims).

From these three frameworks, more specific ideas for embedding argumentation into your practical work are suggested. These are only some ideas to help you, and certainly not a definitive list.

The following **sections** will build on this basic model – helping you to prepare to use the argumentation approach successfully.

Argumentation and practical work – an introduction

The Teacher

In the classroom:

Plan to establish effective small group work:

- Introduce students to argumentation and listening skills before starting the activity.
- When presenting new ideas, or challenging students' claims, model argumentation by providing evidence for your claims.
- Ensure the task set creates a need for group work: something beyond what students could achieve alone.
- Consider the make-up of groups and how this could affect group discussion (e.g. consider achievement, talkativeness, communication skills, leadership abilities).
- Keep discussion short and focused; set time limits and provide prompts to guide students' thinking.
- Use a range of strategies in challenging students thinking; e.g. open questioning; playing devil's advocate.

(Simon and Maloney 2007, Eley and Price 2009, Osborne, Eduran and Simon 2004)

The Lesson

Different ways in which argumentation relates to practical work.

CLASSIFICATION

- Using data to create and suggest groupings
- Using data to place items into given groups

PREDICT, OBSERVE, EXPLAIN

- Developing explanations for phenomena

ANALYSING AND INTERPRETING DATA

- Comparing two sets of data
- Evaluating the reliability of an experiment
- Comparing two different experimental methods
- Assessing at validity of data

ARGUMENTATION – Central to the Lesson

1) BUILDING AN ARGUMENT

- Built on the argumentation tool (Toulmin 1958)
- Developed through group discussion

Toulmin (1958)

2) COUNTER ARGUMENT

- Opposing arguments
- Can be addressed in small group discussion and written work
- Encourage students into critical engagement

Nuffield Foundation (2012)

ARGUMENT AND REASONING

- Argument links evidence (data) to a claim
- A good argument will explain why a particular claim is should be accepted **and** why others should not

Nuffield Foundation (2012)
Osborne (2011)

DIFFERENTIATION

- Students of middle and low ability may struggle combining, and understanding difference between, data and warrant
- These two terms can be considered together as "justification"

Sampson and Clarke (2008),
Zohar and Nemet (2002)

Section 1: How is argumentation different to other related concepts?

Scientific knowledge can be perceived as being a collection of irrevocable truths, where data leads uncontroversially to agreed conclusions (Driver, Newton & Osborne, 2000). In reality, however, scientific knowledge is socially constructed and explanations are developed through a process of discussion and argument.

Argument, argumentation, explanation and discussion are closely related concepts. It is useful therefore to consider how they are similar and different.

Argument: A scientific argument uses data to articulate and justify claims or conclusions.

Argumentation: Argumentation describes the overall process of engaging in argument. (Sampson and Clark, 2008)

Explanation: The distinction between argument and explanation is a matter of debate within the literature. Osborne and Patterson (2011) suggest that the terms "argument" and "explanation" have multiple, overlapping, meanings and uses in science education. The two processes can be seen as having a complementary and synergistic relationship (Berland & McNeill, 2011).

It may be useful to think of the explanation as building knowledge of how and why a phenomenon occurs, and argument as socially constructing knowledge when there is a need to justify a claim and persuade others of its validity. (Berland & McNeill, 2011)

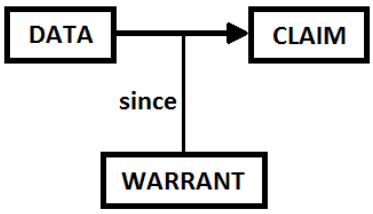
Discussion: Discussion (in particular within small groups) is the main vehicle by which argumentation occurs, it is the process of sharing, comparing and analysing each other's ideas.

In many science lessons teachers do the talking and structure the arguments (Cross & Price, 1996). Argumentation, on the other hand, involves students in discussion and thinking processes which Abrahams and Millar (2008) refer to as having 'minds on' the science.

Section 2: What does argumentation look like in practice?

Scientific arguments can vary in complexity. Depending on the structure, the argument will look (and sound!) different. For example, here are two examples from Toulmin's model of argumentation

A Simple Model



(Toulmin 1958)

- **Claim**: a conclusion or assertion. (A counter-claim is an opposing conclusion or assertion).
- **Data**: the evidence and facts used to support the claim
- **Warrants**: statements (rules, principles, etc.) which explain the connections between the data and the claim/conclusion/assertion

This model represents a relatively simple concept of an argument. By working within this model, students are encouraged to question whether a claim has any merit by considering the evidence, principles and assumptions on which the claim is based.

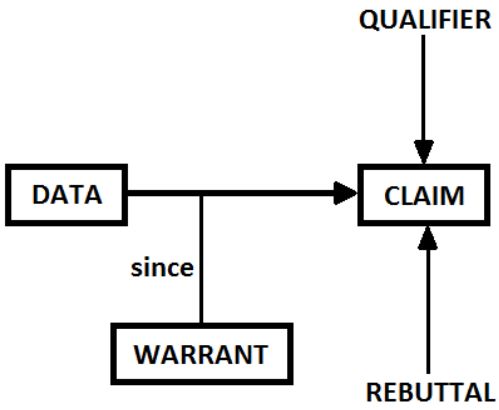
Here is an example which puts this model into practice.

> *Chelsea is a better football team than Arsenal [claim]. It has won more football matches at home and away [data] because its players have superior skills [warrant].*
>
> *(Osborne, Erduran and Simon 2004b)*

A claim is presented, which is then supported through raw data and a sentence applying that data to the claim.

Feedback on the IDEAS project (IDEAS 2004) suggested that students can struggle with the difference between data and warrant, so it can be simpler to consider these together and think of them as *justification*.

A Complex Model



This more complex model also includes qualifiers and rebuttals.

- **Qualifiers**: conditions under which the claim is true
- **Rebuttals**: statements which contradict the data or warrant

Here is a student example which has put this model in practice.

> *Seeing because light enters the eye makes more sense [claim]. We can't see when there is no light at all [data]. If something was coming out of our eyes, we should always be able to see even in the pitch dark [rebuttal]. Sunglasses stop something coming in, not something going out [data]. The only reason you have to look towards something to see it is because you need to catch the light coming from that direction [rebuttal]. The eye is rather like a camera with a light-sensitive coating at the back, which picks up light coming in, not something going out [warrant]*
>
> *(Osborne, Erduran and Simon 2004b)*

This argument, compared to the simple model, is multi-layered; using more than one piece of data and a rebuttal to extend their argument further.

Counter-argument is another term used in these resources. It is an argument (consisting of data and a warrant) for a counter-claim.

Complexity of arguments

As students become more familiar with the skills required in argumentation it is expected that their arguments will increase in both their complexity and quality. A breakdown of different levels of argument is outlined below:

- In its simplest form, an argument must consist of a claim and at least one reason for accepting the claim. The nature of the justification will depend on the type of claim. In this context it will be expected that data from practical work or theory statements provided will be used as justification for the claim.
- As students skills increase they will begin to address counter-argument(s). In many situations a counter-argument reaching a different conclusion is possible. This might use the same data but come to a different conclusion, it may use different data, or it may involve different social or ethical values. Within argumentation lessons it may be the role of the teacher to play 'devil's advocate' by presenting counter-arguments to students and pushing them to explain why they are incorrect.
- Any of the component parts of an argument can be criticised, including the warrant; the link between data and a claim. The critical analysis of claims, data and counter-argument makes use of higher order thinking skills which will really stretch students to engage with the data and scientific knowledge required to interpret it.
- A detailed argument on a complex issue may involve several simple arguments where the intermediate conclusions build up to an overall claim.

The strength of the overall argument will depend on the strength of the component parts.

- As the quality and complexity of students arguments increases it is expected that they will be able to support and justify their arguments through making explicit links to relevant and correct subject knowledge.

Adapted from Science in Society (Nuffield Foundation, 2012).

Section 3: The teacher's role in supporting argumentation

Often when discussion is used in science lessons it is 'teacher-led'. However, in an argumentation activity discussion should be 'student-led'. The teacher should fully embrace the role of facilitator; scaffolding tasks, setting up collaborative small group discussions, and asking probing question to encourage students to justify claims and challenge their own reasoning.

Simon et al (2006) suggest that the process of argumentation can be broken down into 8 categories, in a tentative hierarchy with talking and listening being the lowest order and reflection being the highest order. These are shown below along with examples of the strategies a teacher may use to facilitate argumentation. The exemplifications are extracts of dialogue from actual lessons, presented in Simon et al (2006).

T: = teacher. **S:** = student.

Category of Argumentation	***Teacher facilitates by.....***
Talking and listening	**Encouraging discussion** **T**: OK, how many bits of evidence did Sally give "for" [the zoo]? Did she just give one or did she give more than one? Tell me. Did she just give one? Or were her reasons for agreeing with building the zoo more than one? Who thinks there were more than one? **S:** Definitely more than one. **T:** OK, Onny, give me two things that she said for "why". Whether you agree or not, just tell me what she said.
	Encouraging listening **T:** So we need to be able to say our own ideas and also we need to be able to listen. When you are working in groups the same thing applies. You need to be able to speak, but you also need to be able to listen.
Knowing meaning of argument	**Defining argument** **T:** The way scientists come up with theories is to look at evidence that they are given, look at facts that they've got and then discuss them, argue over them and then, when they have done that they come up with what they think is a good idea.
	Exemplifying (modelling) argument **T:** Let me give you an example, some people say—oh, let's build a new zoo because animals that are going to be extinct, we can save them by putting them in new zoos.
Positioning	**Encouraging students to share ideas** **T:** These are just your first thoughts, some of your arguments for and against. I am not asking you at this stage to decide whether you are for it or against it. Just some of your arguments for and against.
	Encouraging positioning **T:** So you need to decide are you going to say yes, we should support building a new zoo or no, we shouldn't support building a new zoo. Then you are going to have to give your arguments.
	Valuing different positions

	T: OK, you are ecologists, so you would want animals to stay in their natural environment, you study animals in their natural environment, this, to you, is abhorrent; you can't believe that people do this. Taking them out.
Justifying with evidence	**Checking evidence base of students** **T:** So you should all have seen something about zoos now and you should have all maybe just thought about it a little bit last night, about zoos, your experience of zoos, what zoos might be like from the animal's point of view.
	Providing evidence for students **T:** Think about what we were doing in populations <the topic>. What were we doing in populations? So what do things need? They need space, don't they? Yeah, OK, but what is the other problem with animals? Some species are dying out, aren't they? So they could help, couldn't they, in terms of species that are going to be extinct. Yeah?
	Prompting and emphasising justification **T:** Why? How do you know?
	Encouraging further justification (e.g. by playing devil's advocate) **T:** OK, how do you know they like being out in the wild? How do you know they don't think of a zoo like—this is brilliant, I don't have to catch my food, somebody just brings it around to me. **S**: They are free and they can do whatever they want to do. **T**: But how do you know that they don't prefer it in a zoo?
Constructing arguments	**Using writing/speaking frame**
	Encouraging students to make presentations
	Using roles **T:** You've got to become the person you are going to be. Just like when you are acting. This group, you are an MP in the local area, OK? This group, you are residents living very close by. You need to have three proposals, three reasons why you should build or not build the zoo, that you are putting forward to the agency. Only three.
Evaluating arguments	**Encouraging evaluation** **[could focus on use of evidence (process). or nature of evidence (content), or both]** See *Section 5: Getting critical within argumentation*
Counter-arguing/debating	**Encouraging students to anticipate counter arguments** **T:** Can anyone think of anything that somebody might say to oppose that? What might someone say which makes that argument a bit flawed?
	Encouraging debate (e.g. through role play) [A useful strategy may be to pair pupils with opposing viewpoints together to set up a counter argument with the goal of changing the other persons mind.]
Reflecting on argument process	**Encouraging reflection** **T:** So have you thought about how you are going to justify it? What is your argument? You have got to really think about it. Can you see what I am doing? I am constantly saying— why? Questioning what you are saying, so you have to have every single little bit of reason and evidence to back up what you are saying.

	Asking students if they have changed their minds **T:** Did anybody manage to argue it so that their partner changed their mind from where they came? OK, this is the first one. Diane, would you like to explain how you persuaded Sally to change her opinion? **S:** Well, first I found it a bit hard because Sally didn't like to see the animals cooped up in cages, but then at the end she said that she … it is not their habitat so they couldn't get food how they wanted. And then I said—well, if they are in the wild and say an animal got a bad leg or something, they wouldn't be able to go and catch food so then it would die. But then if it had been in the zoo, it would just be fed to them.

Emphasising and modelling argumentation

Teacher: So what sorts of things do you think you need to do to make a good argument? How are you going to make your argument strong?

Student: By backing them up.

Teacher: By backing them up, what do you mean by that, Emma? How can, what do you mean by backing them up?

Student 2 : You need evidence

Student 1 : You say how and why.

Teacher: Evidence. Giving evidence to support, what, your ideas? Your views? Evidence and ideas to back it. Should it just be opinions and feelings or should it be …?

Student: Facts

Teacher: Facts, possibly. What would probably a weak argument be? Any ideas? What might make an argument not a very good one? Would it contain evidence and backing like Emma and Alan said?

In the conversation above the teacher models argumentation by questioning and challenging students' responses, to encourage them to justify their answers.

Challenging misconceptions

It is important to note that although argumentation is a student-centred approach and involves students building upon their own ideas, this does not mean that misconceptions should not be challenged.

Presenting the accepted scientific viewpoint at the end of an argumentation activity could disengage students from thinking and leave them wondering what the point of the activity was. On the other hand it is clearly important to encourage students towards these accepted ideas.

One way of achieving this might be to present data which conflicts with a misconception, and ask students to evaluate their claim in light of this new data. In this way students determine for themselves which argument is better.

Questions to challenge misconceptions:

- That's an interesting point, but how can you explain this.....
- Your point is supported by this data but how might you adapt it to explain this other data....
- Have you thought about.....
- There are lots of ways of interpreting the data. Why might ..... be a stronger argument than your own?

The process of argumentation aims to demonstrate that scientific explanations are constantly evolving and it is often the case that claims have to be revised in light of new data or further evidence becoming available.

Collaborative group work

It is recognised that it takes time to train students in the skills needed for both effective argumentation and group work. It is recommended that when planning argumentation lessons teachers put thought into how they will group students together. This might include defining specific roles (for example scribe, timekeeper, chairperson/group leader) for group members, considering the role the teacher will take, and preparing questions to facilitate sustained argument.

For further support in the use of group work in science teaching see these links:

www.nationalstemcentre.org.uk/elibrary/resource/5305/strengthening-teaching-and-learning-in-science-through-using-different-pedagogies
The Department of Education document 'Strengthening Teaching and Learning in Science Through Using Different Pedagogies' consists of five teacher self-study units which were produced to offer practical suggestions for classroom. Unit 1 focuses on using group work and argument and includes ideas for how to arrange groupings, questioning prompts for both teachers and pupils and a literature review at the end of the document.

www.belb.org.uk/Teachers/i_learning_and_teaching.asp?m=9#CGWR
The Belfast Education and Library Board have published strategies for promoting effective collaborative group work. Their resources give examples of roles and prompt cards which could be used with students.

Section 4: The student's role in argumentation

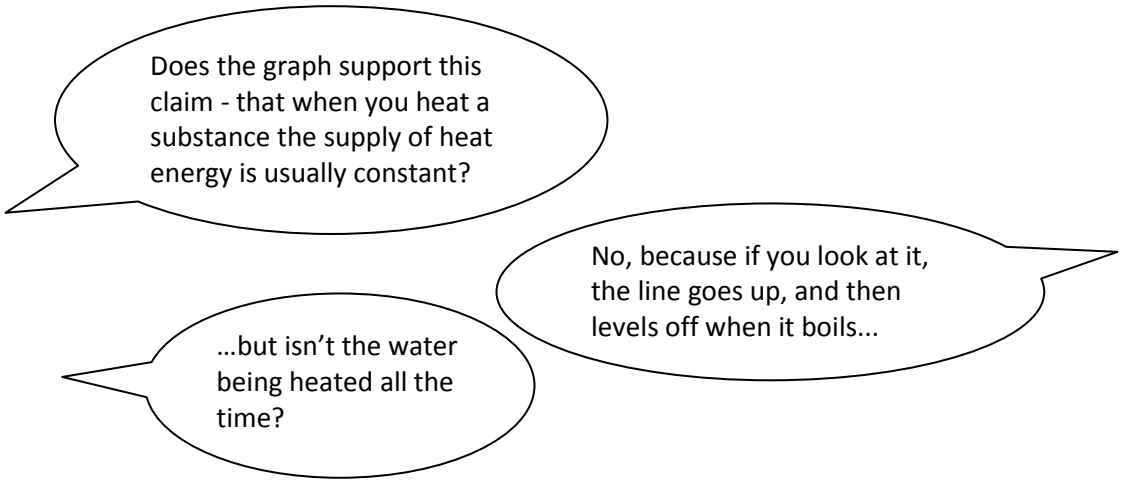
Students are at the centre of argumentation. Through collaborative group work and small group discussion, students are encouraged to reason for themselves the validity of any given claim.

When listening to discussion, there will be indicators which should suggest whether the students are engaging with argumentation process.

This list was adapted from the IDEAS project (Osbourne, Eduran and Simon, 2004):

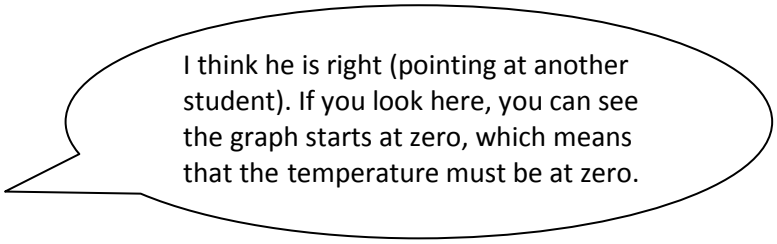
- Students questioning each others' ideas with reference to the data;

In this example, students are discussing temperature-time graphs.



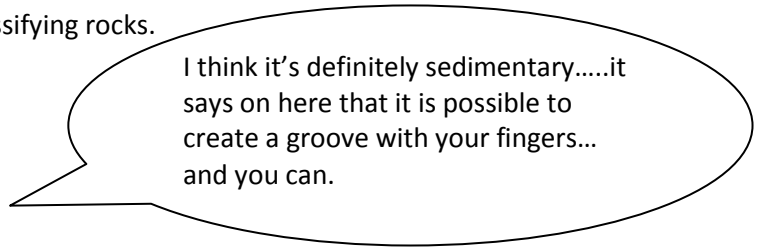
- Students building on other students' arguments through clarifying or modifying.

In this example, students are looking at a graph provided by the data in the previous example, but justifying the reason in a different way.



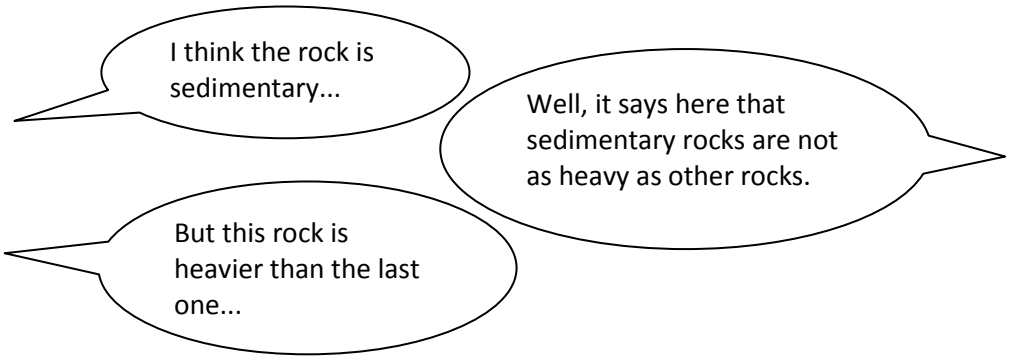
- Students reasoning and justifying ideas.

In this example students are talking about classifying rocks.



- Students evaluating other students' ideas for their strengths and weaknesses.

In this example students are following a rock classification exercise and their discussion led to them re-evaluating their theory.



(IDEAS 2004)

Here the role of the student is made clear. Whether they are questioning someone else's argument, or formulating one of their own, these lessons require students to interact and be proactive. Within lessons you may like to use student prompt cards with questions in to help structure their arguments, there are examples of lesson specific prompt questions embedded within the resource pack.

In order to really engage with the discussions, students will need to build their listening skills. At the same time, they will need to feel they are in a safe environment to make mistakes. It will be worth investing some time into these prior to starting on such an approach.

Section 5: Getting critical within argumentation

The argumentation process involves critiquing and evaluating arguments for their strengths and weaknesses. Bloom's taxonomy (Bloom 1956) describes critiquing and evaluating as high-order thinking skills.

Critiquing arguments

The critical analysis of arguments can take two forms: Osborne et al (2004)

1 Critically analysing the evidence presented which supports the claim. This can occur within small group work, and can be as simple as students asking questions of each other.

2 Considering counter-arguments. By acknowledging counter-arguments and assessing the strengths and weaknesses of these, students can develop the strength of their own arguments. More able students may be able to address counter-arguments in their written work.

Both of these allow students to demonstrate and experiment with ways of communicating not only why their claim should be accepted, but why other claims should not. This is critical to argumentation, and one of the key features which makes it stand out from other concepts (such as explanation).

Evaluating arguments

One way of encouraging students to evaluate arguments is through peer review. This can be structured by presenting students with a set of success criteria to check against:

Success Criteria	Comments
Is the claim clear?	
Has the claim been linked to evidence?	
Does the evidence support the claim?	
Counter argument: Have other arguments which could be made been suggested?	
Is there an explanation of why this particular argument is stronger?	

Success criteria such as these could potentially be used in any argumentation activity; presented at the start and evaluated against at the end.

Peer review of the arguments of others allows students to reflect upon what makes a strong and valid argument, and they can begin to learn what a good argument should include and how it could be structured. This fosters their own skill development, whilst giving another student constructive feedback.

Section 6: How does argumentation link to other aspects of Practical Work for Learning?

There is considerable overlap of research in the areas of argumentation and model-based inquiry, suggesting that these two pedagogical approaches share a clear link.

Stewart, Cartier and Passmore (2005) go further to suggest that argumentation is in fact a component of model-based inquiry, and that by using an argumentation process to analyse models, students become more involved in developing and critiquing the models they explore.

References

Abrahams, I., & Millar, R. (2008). 'Does Practical Work Really Work? A study of the effectiveness of practical work as a teaching and learning method in school science'. *International Journal of Science Education*, 30 (14), 1945-1969.

Bloom, B S.(1956). Taxonomy of educational objectives: Handbook 1: Cognitive domain. New York , Longmans.

Bevan, B. (2012). *Scientific argumentation approaches and orientations*. Seattle, University of Washington. [Online] Available at: www.research2practice.info. [Accessed 20 February 2012].

Berland,L.K.,& McNeill,K.L.(2011).Scientific argument and explanation: A necessary distinction? *Science Education*, *95*(4), 627---638.

Driver, R., Newton, P., & Osborne, J. F. (2000). 'Establishing the norms of scientific argumentation in classrooms'. *Science Education, 84* (3), 287–312.

Duschl, R. and Osborne, J. (2002). 'Supporting and Promoting Argumentation Discourse in Science Education', *Studies in Science Education*, 38 (1), 39-72.

Cross, R. and Price, R. (1998). 'Science teachers' social conscience and the role of controversial issues in the teaching of science'. *Journal of Research in Science Teaching.* 33 (3), 319-333.

Eley, A. and Price, R. (2009). *Talking Science: Improving KS2/3 transition through an argument based approach to teaching science***.** London, Borough of Richmond Upon Thames. [Online] Available at: http://azteachscience.co.uk/resources/materials/talking-science.aspx [Accessed 20 February 2012].

Ford, M. J. (2008). 'Disciplinary authority and accountability in scientific practice and learning'. *Science Education*. 92, 404-423.

Kelly, G.J., Druker, S., and Chen, C. (1998). 'Students' reasoning about electricity: combining performance assessments with argumentation analysis'. *International Journal of Science Education*. 20 (7), 849-871.

Nuffield Foundation (2012). Science and Society: teaching and learning. [Online] Available at: http://www.nuffieldfoundation.org/science-society/teaching-and-learning. [Accessed 19 February 2012].

Osborne, J., Erduan, S. and Simon, S. (2004). *Ideas, evidence and argument in Science* (IDEAS) In-service Training Pack, Resource Pack and Video. London: Nuffield Foundation

Osborne, J. F. and Patterson, A. (2011), Scientific argument and explanation: A necessary distinction?. *Science Education* 95: 627–638.

Osborne, J., MacPherson, A., Patterson, A. and Szu, E. (2012). 'Chapter 1 Introduction'. *In*: Khine, M.S. (Ed.), *Perspectives on scientific argumentation, Theory, practice and design*. London/ New York: Springer Dordrecht Heidelberg.

Sampson, V. and Clark, D.B. (2008). 'Assessment of the ways students generate arguments in science education: Current perspectives and recommendations for future directions'. *Science Education*, 92, 447–472.

Simon, S., Erduran, S. and Osborne, J. (2006). 'Learning to teach argumentation: Research and development in the science classroom'. *International Journal of Science Education.* 28 (2), 235-260.

Stewart, J,. Cartier, J. and Passmore, C. (2005). 'Chapter 12: Developing Understanding Through Model-Based Inquiry'. *In*: Donovan, M.S. and Bransford, J.D. (Eds.), *How students learn: Science in the classroom.* Washington D.C: National Academies Press, pp. 515-565.

Toulmin, S.E. (1958). *The uses of argument.* Cambridge: Cambridge University Press.

Venville, G. J and Dawson, V. M. (2010). 'The impact of a classroom intervention on grade 10 students' argumentation skills, informal reasoning, and conceptual understanding of science'. *Journal of Research in Science Teaching, 47* (8), 952–977.

Zohar, A., and Nemet, F. (2002). 'Fostering students' knowledge and argumentation skills through dilemmas in human genetics'. *Journal of Research in Science Teaching, 39* (1), 35–62.