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Facilitating the Focused Investigation

. Much of what you do as a facilitator is plain good teaching – listening and observing carefully, knowing when individual learners may need support and what kind of support will work well for them, being clear about your learning goals, and above all, showing respect for learners ideas and way of thinking.

Overview

Developing the art and skill of facilitating the focused investigation phase of an inquiry is central to providing good inquiry experiences for students. Although, some of the knowledge and skills that are necessary are specific to the particular topic and design of an inquiry, much applies to facilitating the focused investigation phase of any inquiry.

In this document, we provide strategies and techniques that we have learned and developed in over twenty years of doing inquiry science teaching. *Facilitating Investigations* presents general facilitation methods that work with the focused investigation phase of any inquiry learning experience. Facilitation information particular to specific investigations is provided in the guides to those inquiry sessions.

The Role of the Facilitator

In an inquiry-based approach to teaching science, rather than being the director of student learning, the facilitator becomes the supporter of student learning. During an investigation, the facilitator responds to what the learners are doing as they interact and experiment with materials. So in order to facilitate effectively, you need to develop the skills and knowledge to be able to determine the learner's thinking at a particular point and how best to help the learner make progress toward the learning goals for that investigation.

Scaffolding

In her book *The Teaching of Science in Primary Schools*, science educator and author Wynne Harlen discusses the concept of scaffolding as it applies to children. What is true for children in the classroom is also true for adult learners.

Scaffolding means supporting children in considering an idea or a way of testing an idea that they have not proposed themselves but are capable of making ‘their own.’ The judgment of when this is likely to be possible has to be made by the teacher, taking into account the existing ideas or skills of the children and how far they are from taking the next step. It often means the teacher making links for children between experiences and understanding they already have but have not linked up for themselves.

What the teacher does in scaffolding is to suggest the new idea and provide support for the children while they use it and, finding it helps to make sense, begin to incorporate it into their thinking. It is important to underline that scaffolding ideas is not the same as telling children the ‘right answer.’ It is essentially enabling children to take a further step in progress that is within their reach. It depends on teachers have a good knowledge of their children’s ideas and skills and using this in deciding the next steps and helping children to advance their thinking. p. 80-81

Respect for Learners

Respect for the way learners think and the way they learn is at the heart of effective facilitation.

Learners need to have “ownership” of the work they do and the ideas they construct during the inquiry.

Most often, supporting learners’ ownership of their work means letting them take the lead in

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determining what they will do next rather than superimposing your own ideas onto theirs.

Learners bring a lot of prior experience and their own ideas to their inquiries, and the facilitator needs to respect those experiences and ideas. Learners will have their own way of approaching questions, of experimenting, with

materials, of thinking about concepts and the facilitator must be careful not to show them a “better” way unless it is very clear they need and welcome that kind of advice.

Showing Respect for Learners

Respect for learners manifests itself during the inquiry process in the ways the facilitator interacts with them during their investigations. Here are three important ways in which the facilitator can show that respect:

- Be sensitive to when you should provide a suggestion, information, direction, when you should ask a question, and when you should move on without saying anything.
- Before you touch the materials people are working with, ask permission. If you move things, mark their positions so you can return them to where they were placed originally.
- Let people know they should ignore any suggestion you make if

Inquiry Facilitation – What are you trying to do?

The purpose of facilitation is to help move the learner move toward a set of learning goals.

Those leaning goals include the content, skills and attitudes that you would like the learner to get from the inquiry experience. In order to accomplish this purpose, the facilitator must:

1. **Find out what learners are doing and thinking.**
2. **Help learners progress along their individual path of learning based on what you found out.**
3. **Attend to social interactions.**

Keeping these three ideas in mind will help you to organize your thinking about facilitating the focused investigation phase of inquiry. They can form a core around which you can build your growing understanding of facilitation and provide you with a way of organizing your thinking about facilitation strategies.

Facilitation Strategies

As stated above the facilitator helps learners move toward the learning goals in an investigation by “finding out...,” “helping learners...,” and attending to social interaction. But how does a facilitator find out what learners are doing and thinking? Finding out can be cone by something as simple as asking a direct question or just taking some time to watch learners at work.

However, it is important to ask questions in a way that will get you the kind of information you need and to know what you are looking for when you observe. In the first part of this section, you will find very specific strategies for gathering evidence, some things you might do to find out about where learners are and where they seem to be going by observing their work and by asking them questions. We also point out some typical things you might notice as you gather that evidence.

From the evidence you gather, you will make inferences about learners’ thinking and decide what you can do to help them move closer to the learning goals and what processes they need help with in their investigation. In the second part of this section, on “helping learners,” we

describe specific ways you can assist learners in the early, middle and late stages of their investigations.

Since investigations are carried out in group settings and much of learning is social in nature, we use the final part of this section to provide you with facilitation advice about how to attend to and deal with various social issues that may come up as learners work with one another.

Finding out what learners are doing and thinking

Keep your learning goals in mind during your facilitation of the focused investigation. The strategies for gathering evidence about what the learner is doing and thinking and the interventions you make are used, to help the learner move toward these learning goals. In order to do a good job of this, you must gather a good deal of information about your investigation groups including what people are and have been doing and thinking and whether or not they need help. Finding out what learners are doing and thinking along the way in order to figure out the next steps for facilitating groups is actually a form of “formative assessment.” Formative assessment happens continually throughout focused investigations and is at the heart of inquiry-based teaching. The following gives some specific strategies for “finding out” and some ideas on what to anticipate seeing.

What You Might Do

Finding Out by Asking Questions

Asking questions is a primary means of gathering evidence. When you approach a group look for opportunities to enter into conversation with participants about what is going on.

When groups are starting their focused investigation ask and record the answers to:

- “What question are you investigating?” “Who are the members of this group?”

During the course of the investigation ask questions such as the following:

- “Tell me what you have been working on so far.” Or, “What have you done so far?”
- “How did you do that?”
- “What are you trying to find out?”

If you have doubts about their experimental design ask them to explain:

- “How do you think doing this will help you find that out?”

As the investigation progresses, learners may begin to develop tentative explanations of the phenomena that they observe. Elicit their thinking by asking:

- “What do you think is going on here?”

Stated this way, the question is a request for information about what the learner is thinking and avoids putting pressure on the learner to come up with the right answer.

Finding Out by Observing and Listening

Much evidence can be gathered by straight observation:

- Pay attention to what people say to each other. Listen to their conversations.
- Pay attention to what people do and how they act. Look at what groups are doing. Don't forget body language, facial expressions, posture, and tone of voice.

What You Might Notice (Early in the focused investigation)

- Right after the groups have formed they are often a bit uncertain about what it is that they are actually trying to find out. This is a normal part of investigations. Groups frequently need to spend more time exploring before they hit on a more focused course of action.
- In the first 15-20 minutes of the focused investigation, learners may bounce from question to question. This is typical when investigators are trying to find a focus for their investigations. Once they have focused on a question and their investigation is proceeding, they may change their initial question.. This may look “unfocused” but it may be a logical progression of questions. It is very common for the focused investigation of one question to lead learners to another question that they wish to investigate.
- Watch for groups planning too long and not starting to investigate soon enough. There is a range of ways that groups get started from those who jump right into action to those that think, talk and draw out plans before engaging with materials. If a group is taking significantly longer than the others, check in with them to help them determine if it might be more productive to start working with the materials rather than continuing to talk.
- Watch for learners getting analytical too soon. When they begin to make charts and tables and graphs before they have any real idea of why they are doing so, they can get caught up in collecting data and move no closer to genuine understanding.

- Sometimes it can seem as if learners are veering off track. But don't try to pull them back too soon. They may have come upon a way of thinking about their investigation that works for them, so wait and see before you attempt to redirect them.

Helping learners progress along their individual path of learning based on what you found out

When you find out what learners are doing and thinking, your job is to figure out what to do next to help the learner. It can be difficult to find the right balance between too much and too little help, between how much you support a group and how hard you challenge that group to go further. Sometimes the best kind of help is to do nothing at all. Anything you do would get in the way or lead investigators in an unproductive direction. Other times, you may step in and “work intensely” to help a group get beyond a point where they are stuck. In any case, it is critical to remember to respect the learner’s way of thinking and the choices she has made.

There are different facilitation strategies and techniques for assisting learners when facilitating different stages of the focused investigation. We’ve listed suggested techniques and strategies below according to when they might be

Providing Answers

In the process of focused investigation, you will see that learners are struggling to make sense of what they are working on and it can be tempting to step in and give an answer or an explanation.

Most often that doesn’t help. If you do so, the learner shifts from trying to understand particular phenomena to trying to understand the answer or explanation you provide. Even if the learner does understand what you tell her, she will no longer have the “cognitive benefit” of figuring out the answer/explanation for herself and it will be more difficult for her to connect what you have told her to the understanding of a phenomena that she already has.

There may be a time toward the end of an investigation when it is appropriate to provide information, an explanation or an answer, but in general, it is best to wait as long as possible before doing so.

What is true for facilitators is also true for other learners. There may be a group member who knows more than the others and is eager to step in and “solve the problem.” As facilitator, you need to remind the “science expert” to let group members struggle with their question because it is more important that they figure it out themselves than then to be given a “correct” answer.

most useful – early, when investigators are getting started and seeking a focus for their work; mid-investigation, when learners have settled on a question to pursue and are actively gathering information; and late, when learners are putting together all the information that they have gathered into explanations and new ideas about phenomena. But these categorizations are not hard and fast. You should feel free to use any of these strategies whenever you decide they would be appropriate

Helping learners early in the investigation

When groups have just formed people are still refining their questions and getting started on a path. They are also refining experimental design. You can help by:

- Explaining that it is fine to spend more time exploring if necessary
- Helping to clarify their question
- Helping learners to think through an experimental design (i.e. how to find out more about their question)
- Helping to identify all of the variables involved in the phenomenon of interest
- Helping to find materials, equipment and workspace
- Encouraging learners to write and draw in notebooks

When learners start getting analytical too soon you might try the following:

- Suggest that they keep notes but think about what notes might be most helpful to keep.
- Suggest that they clarify what they are doing and why they are doing it.
- Ask them to think carefully about how the information that they are gathering will be used to help them figure out an answer to their question.

Helping learners in mid-investigation

Simplify

One the most commonly used and one of the most successful suggestions is to ask people simplify their experimental designs. People frequently become interested in complex phenomena. When they try to figure out what is going on, simplification is vital. You can suggest simplifying and give some of the following strategies:

- Reduce the number of variables.

- Use simpler materials. (e.g. in shadow, use a rectangular block rather than a leaf as the shadow maker)
- Make sure that there are no uncontrolled variables.

Make suggestions by asking questions

One way of keeping the ownership of the investigation in the hands of the learner is to make suggestions by asking questions like:

- “Did you notice _____?”
- “Have you tried it this way?”
- “Have you tried it with _____?” (some new material)
- “What would happen if you _____?”
- “Have you thought about the effect of _____?”

Help groups struggling to build understanding

- Refer back to prior experiences
- Suggest making representations like drawings or models when the topic is appropriate
- Suggest testing explanations

If a group comes up with something that you think is incorrect you need to probe gently.

- Ask them to show you how you got that.
- Ask them to try testing it again.
- Use the phrase, “That has not been my experience.”

This indicates that you have doubts but are willing to consider what their idea.

Handling getting stuck or frustrated

Getting stuck is a natural part of focused investigations. You can describe two different kinds of getting stuck. In one case, a group tackles a question, makes quick headway and answers the question well before the investigation time is done. Then it seems that there is nothing

left to do. Another kind of getting stuck is making no headway on a question. In this case, no matter how long and hard learners try, they never seem to get any closer to understanding.

As facilitator, you can suggest that people who are stuck:

- Try to draw their ideas
- Take a break
- Go for a walk and talk about what they are doing with their investigation partners
- Look at what other groups are doing
- Talk with another facilitator

Helping learners toward the end of the investigation

Near the end of the investigation you work to help learners reach some satisfactory level of understanding of the ideas with which they are working. At this point, the path that a group has taken and the way that group members are thinking about phenomena has become clearer. Based on that information and on what you've seen them do up to that point, you may:

Help groups reach closure

- Provide more direction
- Give more information
- Give stronger hints to help people.

In the last 15 to 20 minutes of group investigation people should begin to consolidate their learning while preparing to share it with others. Consolidating learning means that the learners take the time in their investigation groups to reflect on what they have done, what they figured out, and how they got there. It is a time to take all of the pieces of what they have done and put them together to make broader generalizations. This often happens as groups are preparing to share their findings with others. Since sharing time is limited, groups are forced to determine the most salient points of their work and to figure out how to describe what they have found with general statements. Groups usually prepare charts, drawings, or other visual aids as part of their report. Making these representations requires some abstraction from their experience. This also strengthens the group's grasp on what they learned. To aid in this process you can:

Help groups prepare to share

- Encourage people to prepare to share. "How would you communicate what you found to others?" is a good prompt.
- Suggest that people use drawings, models, or demonstrations to help them communicate.
- Remind people that they should share the evidence and reasoning behind their conclusions.
- If a particular group has found something that clearly demonstrates a content learning goal, strongly encourage them to share that portion of their result.

Attending to Social Interactions

It is the responsibility of the facilitator to monitor the dynamics of each group and to intervene when necessary. Mediate social functioning of the groups and pull everyone into discussions, asking questions, and manipulating materials. This is particularly important early in the investigation.

What to look for.

- Are people working well together?
- Is one person taking over and others sitting back?
- Is one person doing all the manipulating of materials and others doing all the writing?
- Are there irreconcilable differences in the group?

What to do.

- If learners don't know how to work as a group, help them through the early stages of group decision making and planning then gradually pull out your support. For instance, you can begin by sitting down with the group and helping them decide how they will begin. Make sure everyone gets a chance to state her ideas. Model questioning to help with group decision-making. For example, ask, "How are we going to get started? What materials do we need?" Model making statements that open things up to group discussion. For example, "I think we need to think about [X variable]. Maybe we should try it more than once" As work proceeds, allow silences to wait for them to start asking each other these sorts of questions and making these sorts of statements. As they do, you can begin to say less and eventually, leave the group on its own.
- If you observe one person dominating in a group, step in and ask the group, "Can someone explain what you're working on here?" If the person who has been dominating answers, you can respond, "Great. Now can I hear from [this person] over here? Can you tell me what you've done up to now?" You can continue to ask more reticent group members for their explanations and their ideas about what to do next, so that everyone in the group has a chance to be heard.
- If group dynamics just aren't working out and your interventions don't help, remember that it is always possible to have learners change groups. You might pull the dominant person aside and suggest that they might be happier with a "stronger" group. Or suggest

that they are “leaping ahead” of the other members of their group and may make more progress working on their own.

- If two headstrong people have different ideas of what to do, suggest that they set up side-by-side experiments and share information.

Conclusion

There is quite a bit of information in this guide and it can be intimidating. But you don't need to know it all before you begin your work as an inquiry facilitator. You will internalize much of it with practice. To get started, there are just a few things to pay attention to. Remember that respect for the way learners think and the way they learn is at the heart of effective facilitation. Be clear about the learning goals for your students and that your goal is to help them achieve those learning goals. And finally, during the investigation, your job is to:

- 1) Find out what learners are doing and thinking.
- 2) Help learners progress along their individual path of learning based on what you found out.
- 3) Attend to social interactions

Keep these things in mind and you will be off to a good start.

I N S T I T U T E . F O R . I N Q U I R Y**Facilitation at a Glance**

*Respect for the way learners think and the way they
learn is at the heart of effective facilitation*

Help move the learner move toward the learning goals.

content skills attitudes

Find out what learners are doing and thinking.

- Ask questions
- Observe and listen

Help learners progress along their individual path of learning based on what you found out.

- Give learners time to define their investigation
- Simplify (questions, materials, variables)
- Make suggestions by asking questions (e.g. “Have you tried it this way?”)
- Reassure and help stuck groups
- Encourage groups who are struggling to figure things out. Resist “giving” them the “answer.”

Attend to social interactions

- Insure that all group members are active participants