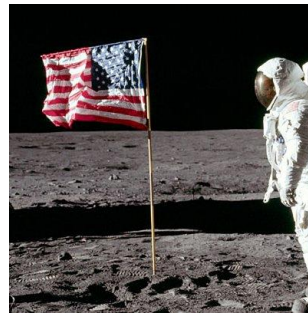
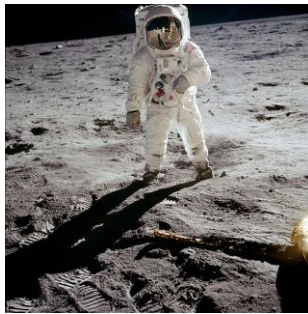


SHOULD I BELIEVE IT?

Robert Swartz

1. The Moon Landing: Did it Really Happen?



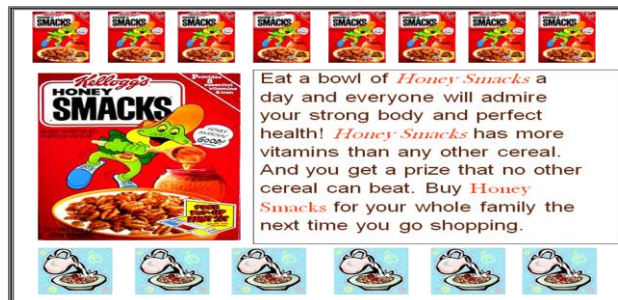
A 7th grade student whose science teacher had been teaching her students about the exploration of space and who had asked her class to write about one of the milestones in this enterprise, the first moon landing in 1969, went to the internet to get some information. He turned in his essay titled “Moon Landing – A Hoax”, after a website he found of the same name.

This student was doing what thousands – perhaps millions – of other students do when assigned an essay topic: they go to the internet, enter their topic on Google, and then open and either copy or paraphrase what they find in the first website they open. Sometimes they use websites that are reliable, sometimes not. The latter is exactly what happened in this case.

At first this student’s teacher, Sheryl Dwyer, was going to tell the student that this was not true and ask the student to rewrite the essay. But on second thought she decided to turn this into a learning experience for all of her students on judging the reliability of sources of information.

2. The Reliability of Sources of Information

It is not just in the classroom and it is not just with information from the internet that the reliability of sources of information is not considered. Take a look at this:



This sounds very appealing, as do the millions of other advertisements that people are exposed to every day. Do people usually question the reliability of information from such sources? Accepting or rejecting information of various sorts is often crucial in determining our choices, and many such choices are crucial for the quality of our lives, or even our lives themselves. How often do we make mistakes in our choices – mistakes that we ourselves eventually realize – because we have based them on misinformation? Buying a box of Honey Smacks may not be such an important decision (or it may be depending on the ingredients and the state of your health), but plenty of other decisions are, and plenty of these, regretfully, fall prey to this crucial failure.

In many cases the best way to check up on the accuracy of information we get is to check it out ourselves. If someone told me that there was a giraffe in the back yard I might laugh, but maybe there is. So I could go and look for myself. But in many cases I can't go and look for myself, or run tests to verify some more complex claim. From a practical point of view I simply can't take the time or invest the money or take the risk to go and check out whether the government of some country, previously thought to be supporters of human rights, is torturing members of the opposition, as I might read in a newspaper article. In these cases we are at the mercy of those who provide us with the information. But we have recourse: we can check out *the reliability of the sources that are producing that information*. And that is what the student who wrote about the "moon landing hoax" did not do.

3. Teaching Students How to Judge the Reliability of a Source of Information

People are not born with the inclination to question the reliability of information they are given. In good healthy families they learn just the opposite. They learn to trust their parents, and it is easy to extend this to the rest of the world. But they can be taught to be more careful. And this is what Sheryl, the teacher in this little story, decided to do for all her students. It is easy for parents to do the same with their children.

So what did Sheryl do? The next day Sheryl moved all of her students into a small viewing space where images can be projected from her computer. She said to them that she knows that they weren't even born in 1969 so she decided to show them a video put out by NASA about the moon landing. She then proceeded to show them, with loud musical accompaniment, those images of the first human to set foot on the moon descending the ladder and taking his first step on the moon – a "great step for mankind". The students were awed, including the student who had written the essay about this being all a hoax. "Wow!" Sheryl then asked them what they thought and she got more "Wow"s.

But then Sheryl said – "Wait a minute, though. I was searching the internet for more on the moon landing to show you when I found something very strange. Let me show you." She

then proceeded to show the students, again full screen, with music, the home page first of the web page that said “Moon Landing a Hoax”. The student who wrote the essay said “That’s what I found too!!!” and she proceeded to show them more, including the creator of the webpage saying that this was really a theatrical stunt put on by NASA to get more money from congress. He said that it really took place in the Arizona desert, and showed a circled rock in the NASA photo which he said was really a rock from Arizona. The students were awed and silent. There were no more “Wow”s, but many looked stunned.

Sheryl then said, “I don’t know what to believe. What do you think?” Many students said the same thing, and some said, “Yes, they’re always doing things like that!!”. But Sheryl said, “Let’s have open minds about this. Just because something is on the internet apparently doesn’t mean it is true, does it? These can’t both be true.” They all agreed. “But we don’t know which of these to believe, do we?” They all agreed again. “So, she said, let’s see if we can figure out how to find out which we should trust. Maybe it would be good to make a list of questions which we would want to get answers to which will help us decide. Let’s do that. Then let’s see if we can get answers to these questions so that when we choose one of these we will have good reasons for choosing it rather than that it sounds good. Ok?” Sheryl then wrote these steps on the board.

Sheryl was making explicit a basic thinking strategy here to help her students think in a more skillful way about the reliability of sources of information, and, like she did with other thinking strategy maps, she wrote this on the board to guide the students. It looked like this:

**SKILLFULLY JUDGING THE RELIABILITY
OF SOURCES OF INFORMATION**

1. What is the source?
2. What information is it important to get that is relevant to how reliable the source is?
3. When you try to get this information what actual information do you obtain?
4. Based on this information, is it likely, unlikely, or uncertain, that the source is reliable?

Sheryl was now teaching a *thinking-based learning* lesson. And the instructional strategy she used was based on another TBL lesson she had seen another teacher teach on the reliability of written sources of information. Let’s look at that lesson in some detail.

4. Giant Worms 11 Feet Long at the Bottom of the Ocean

In this lesson a class of 10th grade students in Biology are shown a clipping that reports that a discovery has been made that reveals that there are giant worms 11' long at the deepest part of the ocean. This sounds like science-fiction to many of them – how could there be life that survives and functions under 6 miles of water? They are prompted to be open minded, though, and use the thinking strategy for judging the reliability of sources that they just developed, similar to the one Sheryl was going to develop with her students. They make a list of questions the answers to which will help them judge whether a written source of information is likely to be reliable, unreliable, or its reliability uncertain. This is the list of questions they developed – a list they will now use as a checklist.

<p style="text-align: center;">A CHECKLIST FOR JUDGING THE RELIABILITY OF WRITTEN SOURCES</p> <p><u>The Report</u></p> <ul style="list-style-type: none">• What is the date of the report and how soon after what it reports?• What are the circumstances in which the report was written? <p><u>If Published: The Publication</u></p> <ul style="list-style-type: none">• When was it published?• What is the reputation of the publication?• What kind of publication (e.g. factual report, fiction)• Did someone else edit it? Who, and his/her expertise? <p><u>The Author</u></p> <ul style="list-style-type: none">• The background of the author?• How much does the author know about the subject?• Does the author have biases or prior expectations about what he/she is reporting? Explain.• What is the reputation of the author?• Is the author going to get some benefit if you accept what he/she says? Explain.• Where did the author get his or her information? How reliable is that source? <p><u>Others/Corroboration</u></p> <ul style="list-style-type: none">• Did anyone else report the same thing? If so what do they say?• Did anyone who reported the same thing know or have contact with the author?

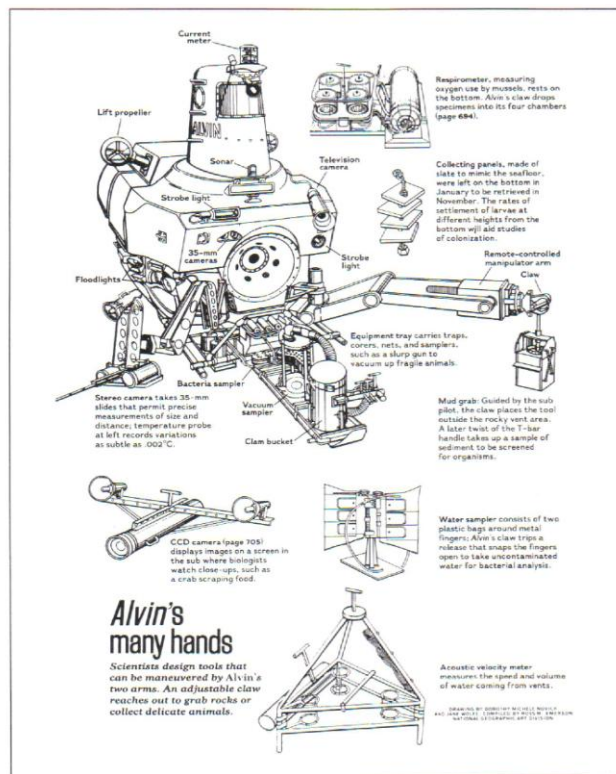
The teacher then gives them a magazine in which there is an article describing these worms and asks the students to record their checklist on a special graphic organizer that has places to record the answers they get to their questions and a place next to each answer to indicate what the answer shows about the reliability of the source. A “+” indicates that it tends to show that the source is reliable, a “—“ that it is unreliable, and a “?” that its reliability is uncertain. The magazine is The National Geographic Magazine, published in the USA, and

the article is “The Incredible World of Deep Sea Oases” by Robert Ballard and J. Frederick Grassle from the July, 1979 issue. He asks them to first look at the table of contents to determine whether there is anything there that provides answers to any of the questions. Here is the entry for this article.

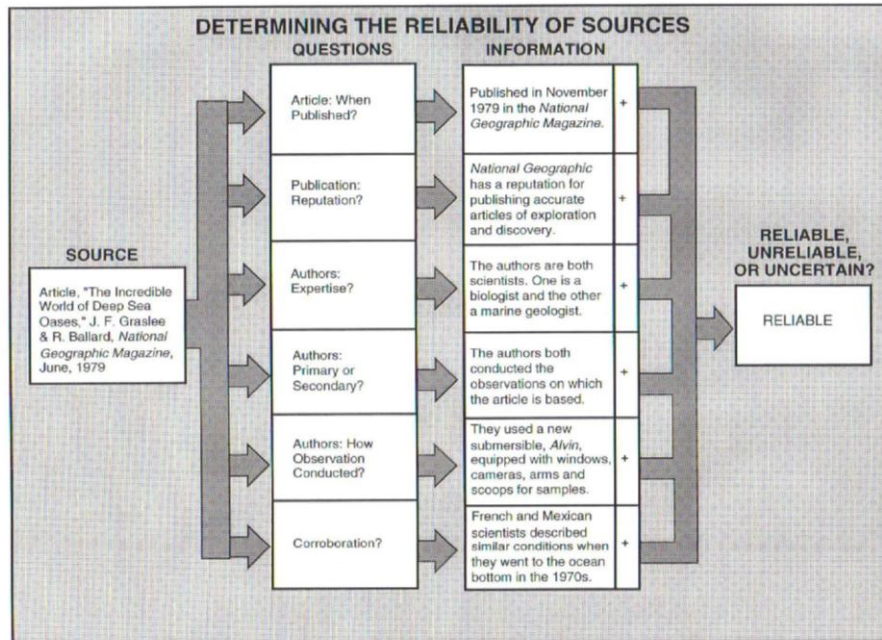
Incredible World of Deep Sea Rifts P. 680

Marine geologist Robert D. Ballard and biologist J. Frederick Grassle describe mineral-spewing chimneys and newly discovered creatures living in warm-water oases in ocean floor vents.

There is clear information in this entry that provides answers to the questions about the expertise of the authors and they all know of the reputation of the National Geographic. But this isn't enough – magazines with a good reputation have published articles by authors with expertise that still are not reliable. More is needed. So the teacher asks them to turn to the article. One of the things in it that they discover is a description of how the authors gathered their information. They used a research vessel called “The Alvin” – something new and interesting the students now learn. Here is an excerpt about The Alvin. You can see how it gives them an answer to one of their crucial questions.



Here is one of their completed graphic organizers:



These students were quite startled by the way this turned out but now, when they tell people that 11' long worms have been discovered at the bottom of the ocean, and they are challenged with a "Come on!! How do you know that?" they can reel off all the positive evidence that supports this as accurate information from a reliable source.

These students are now learning a key critical thinking skill that they can draw upon for the rest of their lives. In my judgment this is a most important critical thinking skill: we may reason with precision, develop inferences impeccably, and carefully weigh the pros and cons in making decisions, but if the information we start with is inaccurate or incorrect our conclusions, inferences, and decisions will be no better than what we start with. Only the application of this type of careful thinking will reverse this.

5. Some Reflections About This Lesson

When we think about this example two things should be clear:

- (1) What the students have developed, with the teacher's help, is something that, with enough practice, can become a habit of thinking that will benefit these students for the rest of their lives

(2) In the immediate context of what they are studying, when these students subject the information they are acquiring to this test for credibility they learn and understand the material in much greater depth and with much deeper understanding than if they just accepted it because the teacher told it to them.

These two outcomes are the instructional results of what I have been calling “Thinking-Based Learning”. Thinking-based learning involves infusing the teaching of critical and creative thinking skills into regular content instruction. This can occur in any context in a curriculum, from individual lessons to problem-based units, and in my judgment, it *should* occur everywhere, K – 12, and in every subject area in which we teach.

There is one very special and final point I wish to make about this lesson. Notice that this teacher also, like Sheryl, tries to help her students practice an extremely important mental attitude, open-mindedness. Such attitudes have mistakenly been called “thinking dispositions” and “habits of mind” to contrast them with thinking skills. They as much involve behaviors that can be identified and taught to students, like holding off and suspending judgment until you investigate, so that they develop the habit of engaging in them in appropriate circumstances. Practicing open-mindedness is as much an active part of critical thinking as developing and habitually using the strategy I have just sketched is, and it needs to be addressed just as directly and explicitly in teaching critical thinking lessons as does this important strategy. But open-mindedness is only one component in critical thinking. Learning and practicing such strategies as those I have described related to judging the reliability of sources of information are crucial and cannot be ignored if we are to truly teach our students to be good thinkers.

6. And Now a Critical Thinking Challenge

Why don't you do exactly what I described in the lesson on the bottom of the ocean with regard to *sources of information on the internet*, like Sheryl did with her students, and apply the checklist you develop to make an open-minded judgment about whether the information on the internet about the moon-landing as successful and authentic or the information there about its being a hoax is the more reliable information. Which should we believe? Why?

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