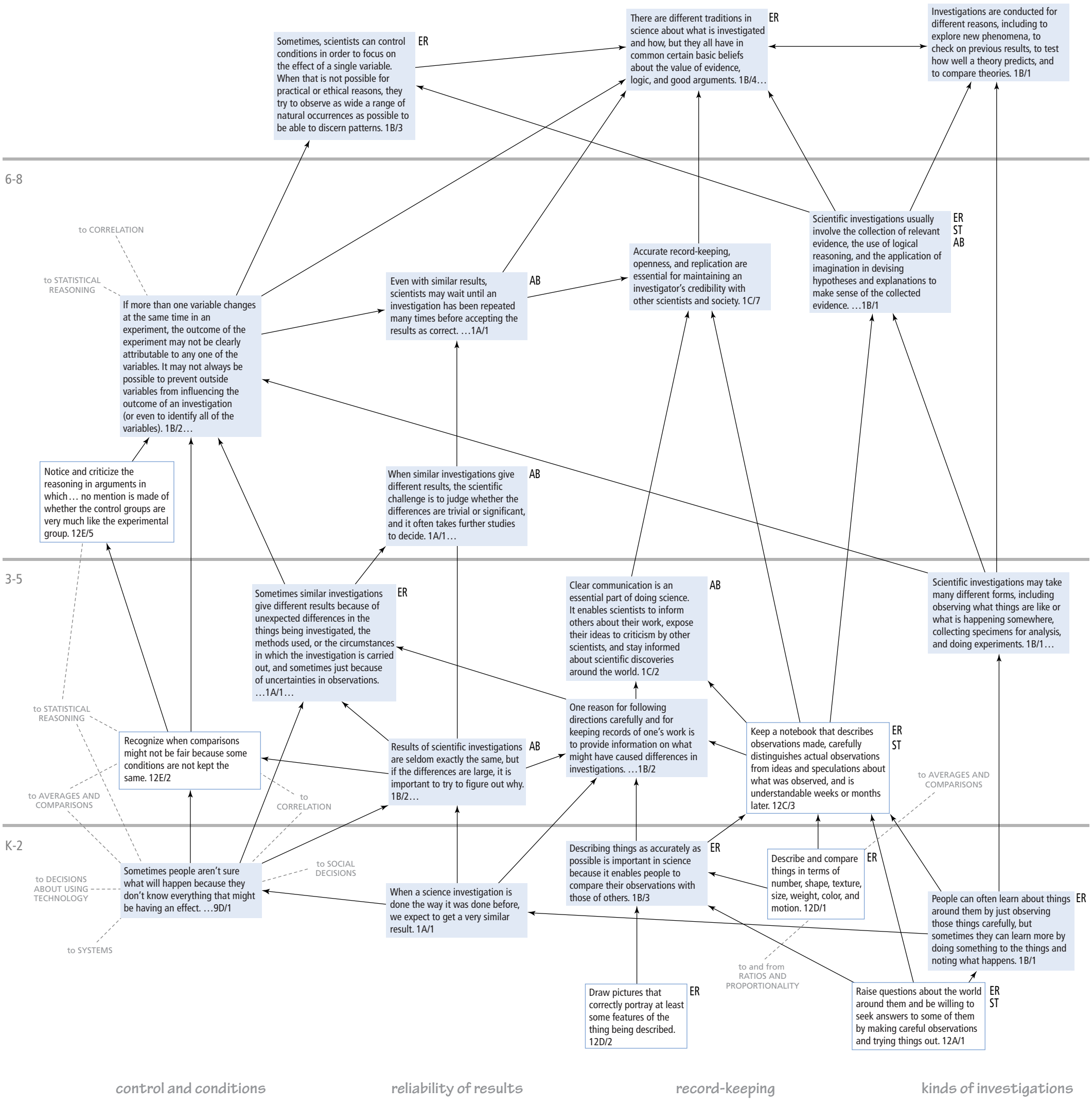
9-12
6-8
3-5
K-2
Sometimes, scientists can control conditions in order to focus on the effect of a single variable. When that is not possible for practical or ethical reasons, they try to observe as wide a range of natural occurrences as possible to be able to discern patterns. 1B/3
ER
There are different traditions in science about what is investigated and how, but they all have in common certain basic beliefs about the value of evidence, logic, and good arguments. 1B/4…
ER
Investigations are conducted for different reasons, including to explore new phenomena, to check on previous results, to test how well a theory predicts, and to compare theories. 1B/1
to CORRELATION
to STATISTICAL REASONING
If more than one variable changes at the same time in an experiment, the outcome of the experiment may not be clearly attributable to any one of the variables. It may not always be possible to prevent outside variables from influencing the outcome of an investigation (or even to identify all of the variables). 1B/2…
Even with similar results, scientists may wait until an investigation has been repeated many times before accepting the results as correct. …1A/1
AB
Accurate record-keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society. 1C/7
Scientific investigations usually involve the collection of relevant evidence, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected evidence. …1B/1
ER
ST
AB
Notice and criticize the reasoning in arguments in which… no mention is made of whether the control groups are very much like the experimental group. 12E/5
When similar investigations give different results, the scientific challenge is to judge whether the differences are trivial or significant, and it often takes further studies to decide. 1A/1…
AB
Sometimes similar investigations give different results because of unexpected differences in the things being investigated, the methods used, or the circumstances in which the investigation is carried out, and sometimes just because of uncertainties in observations. …1A/1…
ER
Clear communication is an essential part of doing science. It enables scientists to inform others about their work, expose their ideas to criticism by other scientists, and stay informed about scientific discoveries around the world. 1C/2
AB
Scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments. 1B/1…
to STATISTICAL REASONING
Recognize when comparisons might not be fair because some conditions are not kept the same. 12E/2
to AVERAGES AND COMPARISONS
to CORRELATION
Results of scientific investigations are seldom exactly the same, but if the differences are large, it is important to try to figure out why. 1B/2…
AB
One reason for following directions carefully and for keeping records of one's work is to provide information on what might have caused differences in investigations. …1B/2
Keep a notebook that describes observations made, carefully distinguishes actual observations from ideas and speculations about what was observed, and is understandable weeks or months later. 12C/3
ER
ST
to AVERAGES AND COMPARISONS
to DECISIONS ABOUT USING TECHNOLOGY
Sometimes people aren't sure what will happen because they don't know everything that might be having an effect. …9D/1
to SOCIAL DECISIONS
to SYSTEMS
When a science investigation is done the way it was done before, we expect to get a very similar result. 1A/1
Describing things as accurately as possible is important in science because it enables people to compare their observations with those of others. 1B/3
ER
Describe and compare things in terms of number, shape, texture, size, weight, color, and motion. 12D/1
ER
People can often learn about things around them by just observing those things carefully, but sometimes they can learn more by doing something to the things and noting what happens. 1B/1
ER
to and from RATIOS AND PROPORTIONALITY
Draw pictures that correctly portray at least some features of the thing being described. 12D/2
ER
Raise questions about the world around them and be willing to seek answers to some of them by making careful observations and trying things out. 12A/1
ER
ST
control and conditions
reliability of results
record-keeping
kinds of investigations