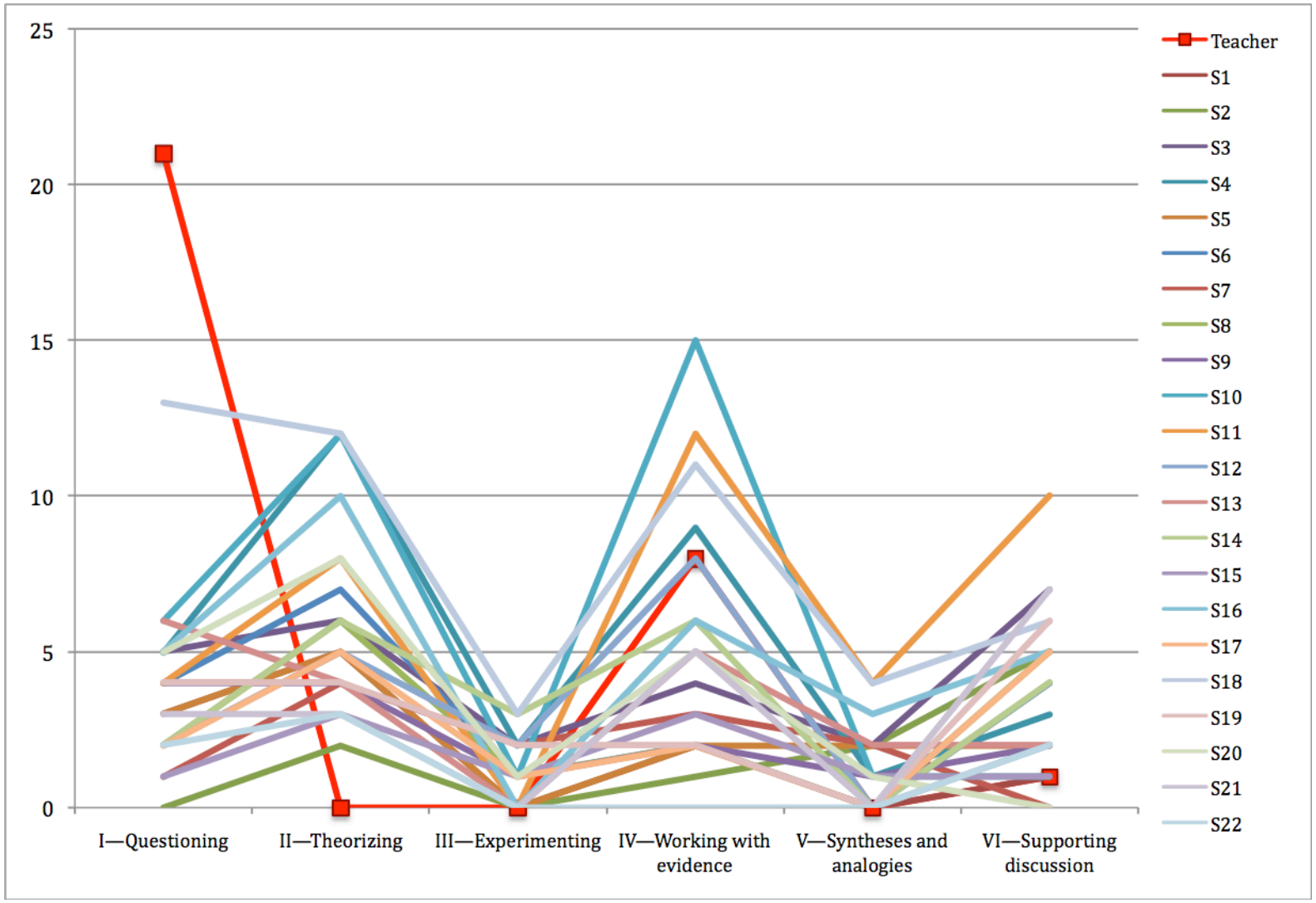
Figure 1.

Individual profiles: Total number of contributions for each participant



Appendix A: Coding guide

Major category	Sub-category	Description of the category	Example
Formulating thought-provoking questions	1—Explanatory questions	Questions asking "why does it happen" and "how does it work"?	My problem of understanding I thought worms do not have eyes, so then how do they sense light?
	2—Design questions	Questions asking "how can we prove/ test something?"	I need to understand how can we prove light travels in zig-zag's, waves, or a straight line, because we can't see it under a microscope to see if it goes the way it goes?
	3—Factual questions	Questions asking "what", "who" and "when"?	What are the primary colors of light?
Theorizing	4—Proposing an explanation	Student proposes a theory that explains certain phenomena for the first time	My theory is that light travels in a straight line unless an object is intercepting its path.
	5—Supporting an explanation	Student supports an already existing theory (i.e. theory that has been proposed by another student) and provides a justification	It is true light travels in a straight line. I got evidence from the internet and it says light travels in a straight line.
	6—Improving an explanation	Student improves an already existing theory through elaborating, specifying details and using new evidence	My theory is that light travels in a straight line but the energy is wavy. I also think that light travel in a straight line because people are always saying that light waves are too small to see.
	7—Seeking an alternative explanation	Student looks for a different explanation	I think that light travels in a serpentine manor because I did an experiment on it.
Designing an experiment	8—Proposing/ describing an experiment	Student proposes/describes an experiment to test an idea	Light travels in a straight line. If you don't believe me try it by putting a flashlight in a shoebox, make a hole in the shoebox were you're going to put the flashlight, turn off the lights, turn on the flash light and put baby powder were you are flashing the light at. Then you'll see light travels in a straight line.
	9—Identifying a design problem	Student describes an experiment that did not work, and identifies possible causes why it did not work	We did all those experiments for nothing I guess, because I think that light travels in waves, and if it did light waves are smaller then ultra violet waves and ultra violet waves are invisible to our eyes, so our lousy experiment didn't do much.
	10—Thinking of design improvements	Student tries to fix design problems and proposes a new/improved experiment	Maybe the flashlight could not go through the many layers of cellophane because the orange light ran out and the rest couldn't keep going either. Why don't you try red cellophane?

Working with evidence	11—Asking or looking for evidence	Student asks or looks for evidence to support a particular idea	I need to understand what your evidence is for your theory that worms do not see red light?
	12—Providing an evidence or reference to support a particular idea	Student provides evidence that comes either from his own experience or from authoritative sources to support a particular idea	My theory Is that light travels in wavy lines. My evidence is: HYPERLINK "http://www.factmonster.com" www.factmonster.com. There was a sheet of information that said that in 1864 a man named James Maxwell proved that light was part of the electromagnetic spectrum, thus proving that light travels in wavy lines.
	13—Providing an evidence or reference to discard a particular idea	Student provides evidence that comes either from his own experience or from authoritative sources to discard a particular idea	I disagree because if light travels in a wavy line would not it go around an opaque object and fill in the shadow?
	14—Finding new facts	Student brings up new interesting facts that do not support or discard previous ideas, but complete previous knowledge	New information: Light travels at the same rate as radio WAVES!!!
Creating syntheses and analogies	15—Synthesizing available ideas	Student synthesizes available ideas to create a better understanding of phenomena.	When we had the class debate, I was the one and only student who was not on a side because my theory was light travels in waves, but the waves go in a strait line and the debate was between straight line and waves. And now we have lots of ideas from the debate and we don't know which one is right. My theory now is light travels sort of like this: Light travels in a straight line but appears to be wavy or light travels in waves but appears to be straight. That means that light has aspects of both straight lines and waves. Evidence It depends on how you look at it. Or what your experiment is trying to prove. In our class we have seen experiments that prove both that light travels in straight lines (box with powder and shadow experiments) and wavy lines (Thomas Young experiment).
	16—Creating analogies	Student moves to a higher level of understanding by creating an analogy to explain a particular phenomenon.	When you see a propeller on a plane go 'round and' round you can't really see it. But when it stops you can see it. I think that light doesn't have a shape since you can concentrate and expand light. And it is going so fast that you can't see it. But when it stops it disappears. Unlike a propeller, light is not opaque. It is a vapor.

	17—Initiating a rise-above entry	Student summarizes previous ideas by integrating multiple notes into a rise-above note.	This rise-above is about whether we can see without light or not. These are the notes: *Judy* [1] a theory- Can you see well in a movie theter[2] [3] CAN YOU SEE WITHOUT ANY LIGHT?[4] Do We Only See Light?[5] Adjusting your eyes to the darkness[6] no light[7] movies and seeing[8] Seeing without light[9] cant adjust to nothing[10] Outlines[11] can we see in dark?[12] Can you see without light?[13] Can eyes adjust to the dark if there is no light in the room. Chris asked *"if we can see without light. I read a reading that said you can only see with light. "*([12] Can you see without light?) Natalie did an experiment and she wrote: *"I was shut in a small clost for 15 minuts and my cousin was in it to. after 15 minuts we still could not see anything. Sois that your eyes will not be able to ajust to a picth black room."*([11] can we see in dark?) But others like Rebecca and Clare think that your eyes do adjust: *"our theory is that your eyes must adjust to the light because when you are in a really dark room and you can see your furntie."*([8] Seeing without light) What we still do not understand What we still need to understand is whether we can see without light? Do our eyes make light?
Supporting discussion	18—Using diagrams to communicate or support ideas	Student draws diagrams to communicate or support ideas.	Any kind of graphical representation.
	19—Giving an opinion	Students gives his/her opinion, but no explanation or justification is provided	I think light travels in a wavy line.
	20—Acting as a mediator	Student supports discussion by focusing on social roles rather than ideas.	The only reason R. said light travels in zig-zags was to get us to say something important about light in cross talk.