Physics Integration Lesson 2 – Epistemology and How Do We Know That We Know What We Know

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A Cedarville history professor from years ago explained epistemology with the question, "How do we know that we know what we know?" This question implies that we know 'something' and that we know that we know it. But, what are our reasons for believing that this 'something' is correct and has value? This question is significant because what we believe to be true will affect how we live our lives. If we fail to evaluate the legitimacy of what we know, we will be open to deception from others and from ourselves.

More formally, epistemology is the theory of knowledge. Knowledge can be obtained through multiple means, but ultimately one needs to know the source, validity and applicability of the knowledge gained. This is true of disciplines as widely varied as biblical studies and physics. In biblical studies we establish the Scriptures as an inerrant source of knowledge, that was conveyed through prophets by the Holy Spirit and is authoritative to direct our lives (2 Timothy 3:16,17). In physics we observe and test physical phenomena to discover the lawfulness of God's creation in order to be good stewards of the resources entrusted to us in this physical realm.

Since physics uses mathematics to model physical phenomena, quantitative methods are essential for its success. One method is to restrict an experiment to a small number of controlled variables and look for patterns between those variables. Once enough numerical data is collected, one variable is plotted against a second variable to visibly identify a pattern. This pattern is then fit to a mathematical curve, such as a straight line, parabola, etc. This process provides no explanation why one curve is superior to another. Explanations come from developing a comprehensive theory that is anchored in clear definitions and then verified by finding consistency between theoretical predictions and experimental results.

1. What controlled variables are measured in this week's experiment and what set of equations provides an explanation for the results you obtained?
2. Are quantitative methods superior to other means of gaining knowledge? Why or why not?