

# Additional Resources: Module 1

## Articles and videos on mathematical argumentation, justification and proof/proving.

Cioe, M., King, S., Ostien, D., Pansa, N., & Staples, M. (2015). Moving Students to “the Why?” *Mathematics Teaching in the Middle School*, 20(8), 484–491.

McDonald, J., Mohr, N., Dichter, A. & McDonald, E. (2003). *The power of protocols: An educator's guide to better practice*. New York: Teachers College Press.

Mejía-Ramos, J. P., & Inglis, M. (2009). Argumentative and proving activities in mathematics education research. In F. Lin & F. Hsieh (Eds.). *Proceedings of the ICMI Study 19 conference: Proof and Proving in Mathematics Education* (Vol. 2, pp. 88-93), Taipei, Taiwan. Retrieved from [http://140.122.140.1/~icmi19/files/Volume\\_2.pdf](http://140.122.140.1/~icmi19/files/Volume_2.pdf)

Monte Python's *Argument Clinic*.

<https://www.youtube.com/watch?v=kQFKtl6gn9Y&feature=kp>

We have used the first 3:50, but do not play 0:38 – 1:16 (which is not relevant and involves some questionable language). It is interesting to note that the actors are arguing about what counts as arguing. Two quotes worth noting are:

1:55 “This isn't an argument - it's just contradiction!”

2:15 “An argument's a collective series of statements to establish a proposition.”

Olmstead, E. A., (2007). Proof for Everyone. *The Mathematics Teacher*, 100(6), 436–439.

Otten, S., Herbel-Eisenmann, B. A., & Males, L. M. (2010). Proof in algebra: Reasoning beyond examples. *The Mathematics Teacher*, 103(7), 514–518. Retrieved from <http://www.jstor.org/stable/20876681>

Stylianides, A. J. (2007). Proof and Proving in School Mathematics. *Journal for Research in Mathematics Education*, 38(3), 289–321. Retrieved from <http://www.jstor.org/stable/30034869>

**Online video-based module:** An online video-based module (in development as of 7/27/16) discusses many of the same ideas presented in this module. This online module is well suited for individuals to work through or for pairs. It could provide a way for someone to “catch up” with a group if they have missed a session. It could also be used as supplementary material for this module, or as a means to reinforce or refresh the ideas.  
<<Link to be inserted upon completion.>>

## Additional Resources to Support the Structure of Arguments, Particularly Warrants

If facilitators or participants want to dig in deeper with mathematical argumentation, or have additional opportunities to make sense of these ideas, they may find the following set of narrated slides useful. Please *download* and then use “Play from Start” under the SlideShow menu in order to hear the narration. The four narrations are in this folder

<https://drive.google.com/folderview?id=0B4mQL9do5xayM3RGSUJBS1RjaDg&usp=sharing> and a link to each narration is provided here as well.

1. **Argumentation Introduction:** [2:05] This narration provides a basic overview of what a mathematical argument is.

<https://drive.google.com/open?id=0B4mQL9do5xayZnRtMUhhdWRXdIE>

2. **Argumentation: Toulmin and Warrants** [8:05]

This narration provides an introduction to Toulmin's model and language for arguments: *claim*, *evidence*, and *warrants*, which is then applied to three examples (Micah, an everyday example, Angel). Extra attention is given to the concept of *warrants*.

<https://drive.google.com/open?id=0B4mQL9do5xayQVV2OVNhTHVvcUE>

3. **Argumentation: Focus on Procedural** [13:05]

This narration gives a closer look at how problems that seem to be more procedural or computational and involve only "showing your steps" are opportunities for argumentation. Sharing warrants/reasons can turn an explanation of steps into an argument.

<https://drive.google.com/open?id=0B4mQL9do5xayeTjYajd0ZnZDQzg>

4. **Argumentation – The Warrant is Missing!** [3:06]

This narration uses every day examples to help clarify warrants.

<https://drive.google.com/open?id=0B4mQL9do5xaycE85Mzd5cXY0V0k>