DISCOVERING THE ART OF MATHEMATICS
MATHEMATICAL INQUIRY IN THE LIBERAL ARTS

TPSE 2015: Discovering the Art of Mathematics

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MATHEMATICAL INQUIRY IN THE LIBERAL ARTS

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Our Vision:
Mathematics for Liberal Arts students will be actively involved in authentic mathematical experiences that:

- are both challenging and intellectually stimulating,
- provide meaningful cognitive and metacognitive gains, and,
- nurture healthy and informed perceptions of mathematics, mathematical ways of thinking, and the ongoing impact of mathematics not only on STEM fields but also on the liberal arts and humanities.

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We developed:

- A library of 11 free inquiry-based learning guides - each at least semester long - for Math for Liberal Arts courses. (Dance, Patterns, Geometry, Art and Sculpture, Infinite, Music, Games, Knot Theory, Number Theory, Truth and Certainty, Calculus)
- A website with extensive resources to support teachers/facilitators to include inquiry in their classrooms (e-book with lots of videos)
- Monthly teaching blog with new ideas
- Free traveling workshops to support departments in changing their culture and community of teaching

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Excerpt from the Origami Chapter:

30. Find a way to fold the quadrilateral in Figure 9(a) so that you could cut it out with a single straight cut.

31. Find a way to fold the pentagon in Figure 9(b) so that you could cut it out with a single straight cut.

32. Find a way to fold the ***non-convex hexagon*** in Figure 9(c) (six sides, segments between some of the vertices fall outside the shape) so that you could cut it out with a single straight cut.

33. Once you know how to fold and cut these shapes, make another folded copy of each but *do not cut it out.* Carefully unfold it, making sure to note which of the fold lines were used in your final version, and which were not. Clearly mark all the fold lines that were needed for your final version.

34. Writing Assignment: Using the marked and labeled shapes you created in Investigation **33** as resources, clearly describe a geometric way in which these folds relate to the original lines of the polygon. Write a complete and careful summary of your observations and findings.

Student Quote:

I don't dread walking into this class in the morning nor do I refuse to do the work out of spite for the subject. I'm more interested in math than every before. This class makes me think. It doesn't just drill information into my head causing an overload. These bit and pieces of math we're doing are intriguing and make me want to continue with the work.

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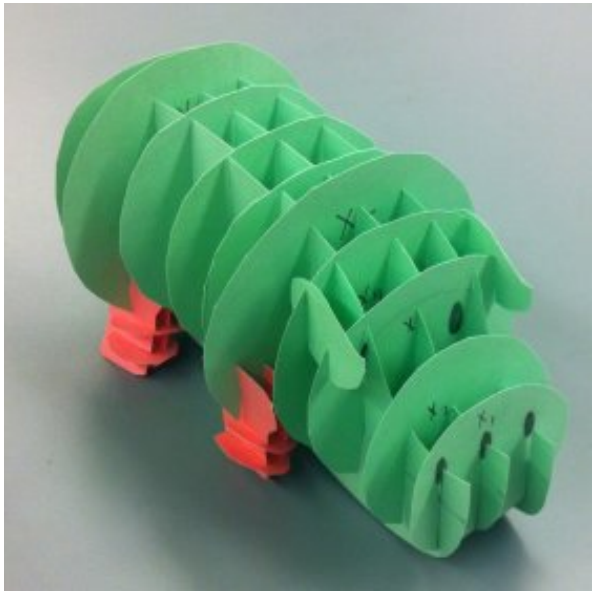

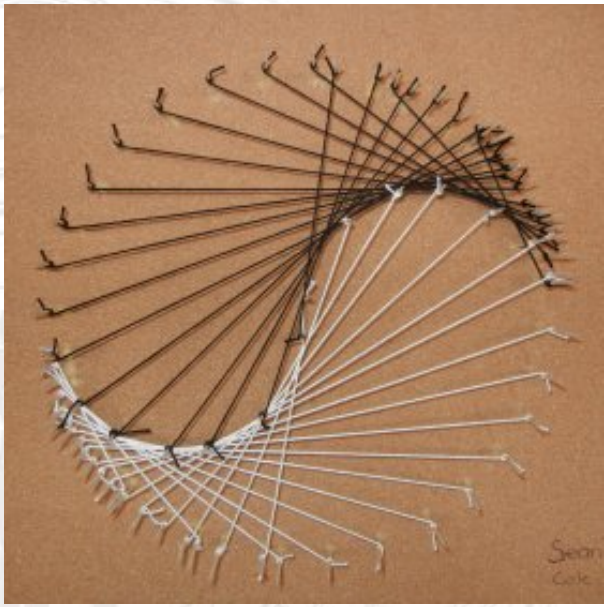

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Our Inquiry Classroom

- 80% of class time is spent working in groups. The facilitator observes and guides as needed.
- 20% of class time is used for whole class discussions and student/group presentations.
- The course is driven by a carefully built sequence of investigations that guide rediscovery, see www.artofmathematics.org.
- The teacher is acting as a facilitator**, there is no lecture**.

You can join a typical class by watching videos on our website...

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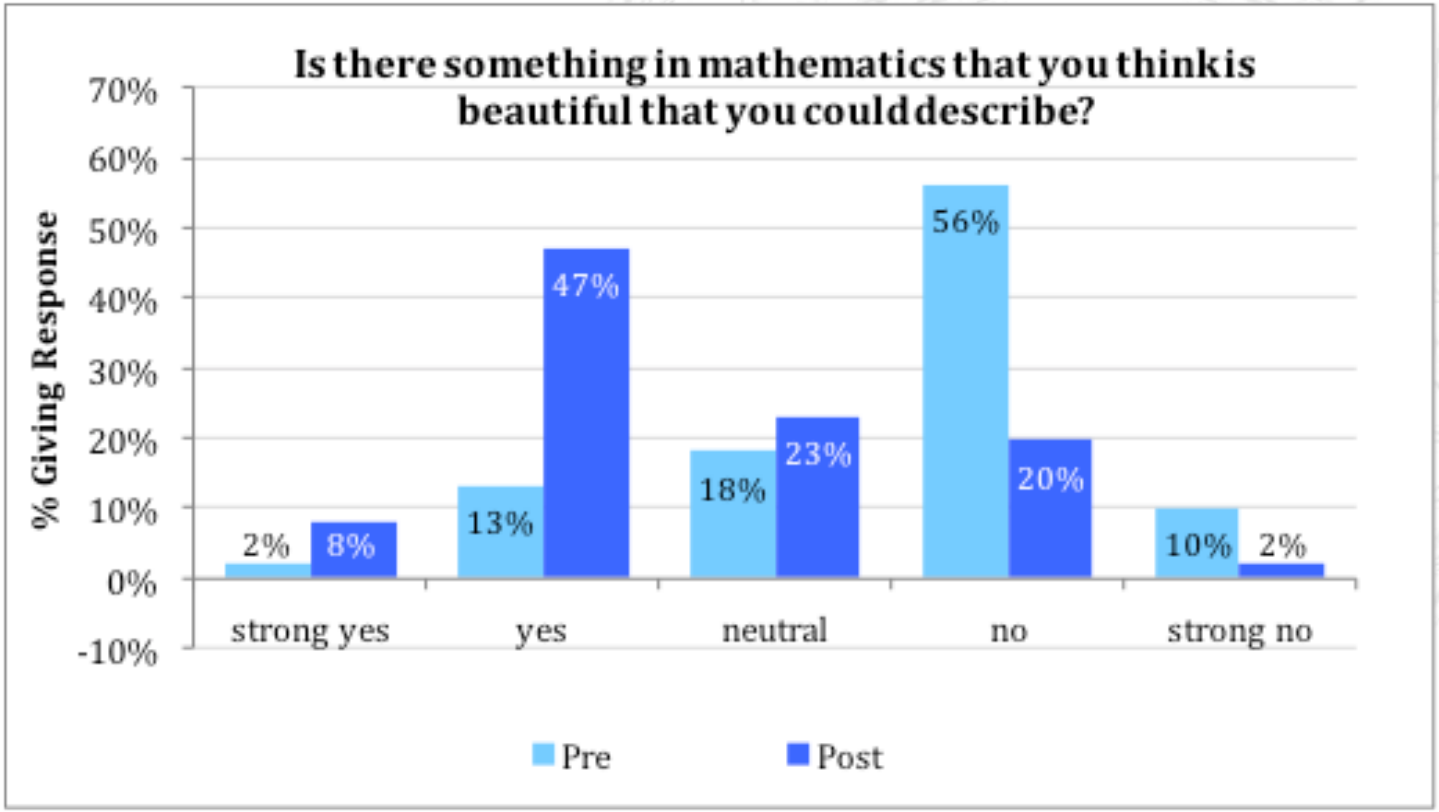
Evaluation:

We developed a beliefs and attitudes survey and are working on assessing other meta skills (problem solving…)



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Future Work:

- Working on providing more teacher materials supporting the use of our books. (The books alone are not enough…)
- The inquiry-based teaching ideas are relevant for all classes K-16.
- Traveling workshops through PRODUCT (new NSF grant with AIBL)
- Continuing Assessment and Evaluation…

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