Resources for Connecting Levels of Learning

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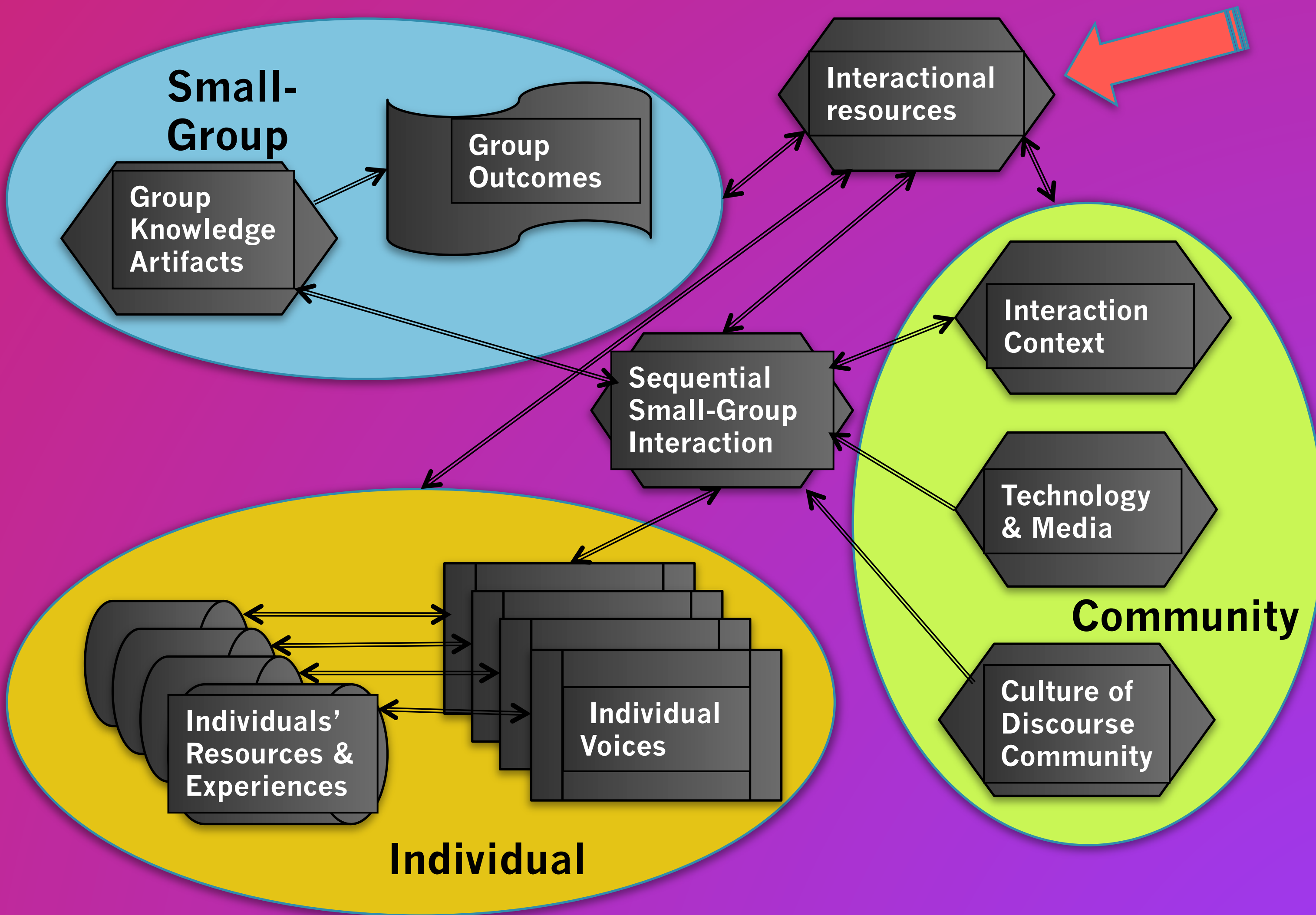
Diler Öner



Levels of analysis connected by interactional resources

- In a series of sessions, a particular math topic connects group work to traditional mathematical content and elicits individual contributions; it guides & structures both small-group interaction and the group's trajectory of work

- Interactional resource = problem of inscribed triangles
- Individual level = 2, 3 or 4 participants
- Small-group level = dyad or triad or quad
- Community level = school math practices and geometry content – introduced in the classroom by the teacher and in the culture by enculturation

Öner (2013) contrasted social/collaborative/relational resources with content-related resources:

- Text chat versus shared-whiteboard graphics: Çakir, Zemel & Stahl, 2009
- Building a joint problem space (JPS) versus solving a problem: Roschelle & Teasley, 1995
- A relational space versus a content space: Barron, 2000
- Diachronic content versus temporal dimensions of the JPS: Sarmiento & Stahl, 2008
- Project discourse versus mathematical discourse: Evans et al., 2011
- Spatio-graphical observation (SG) versus technical reflection (T): Laborde, 2004

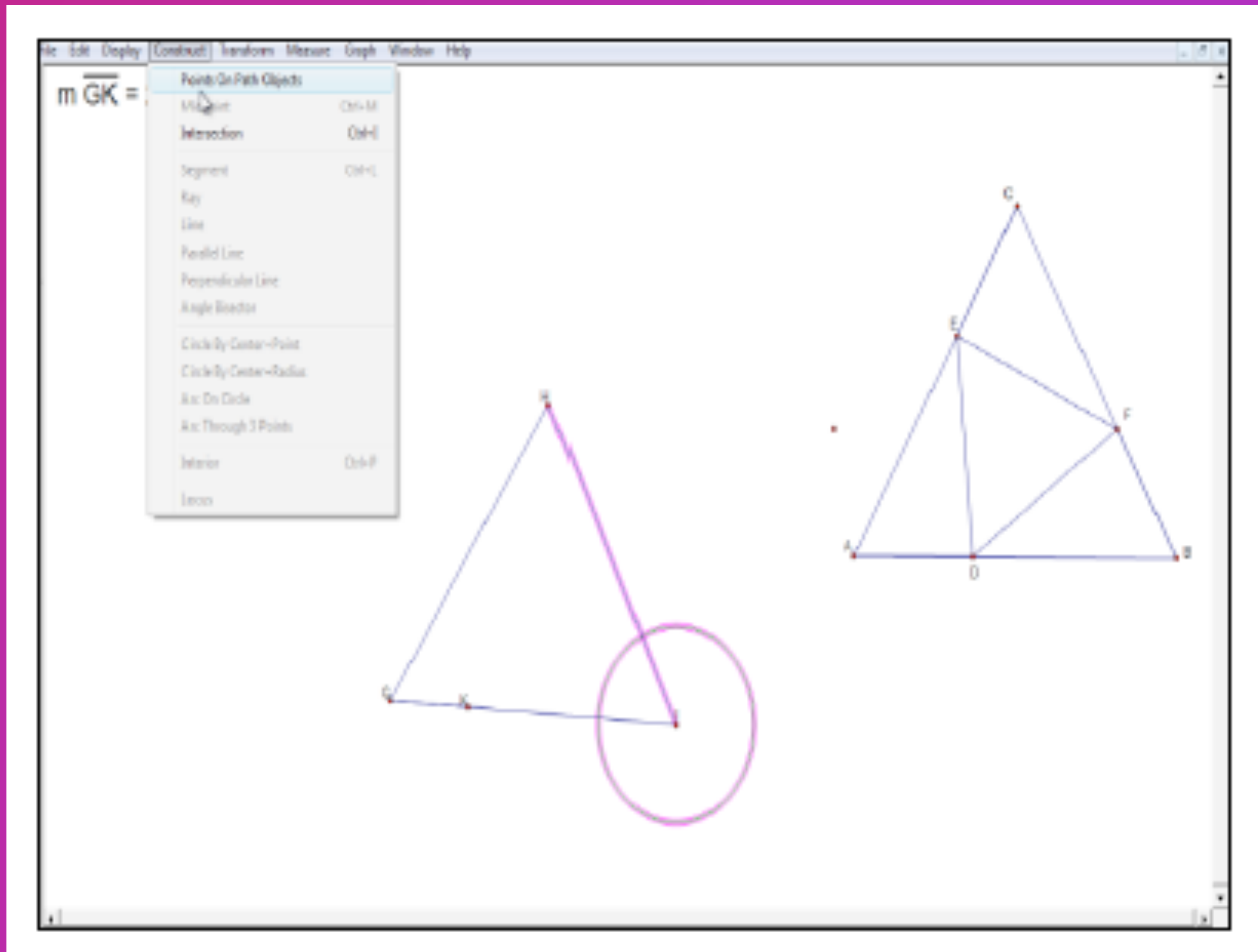
- Öner's (2013) analysis focuses on small-group processes (discourse, relationships, observation, shared attention) vs. math practices (defining problem, solution steps, solution path)

- Stahl (2013) construes the math problem as an integrating resource:
- dragging to discover vs. constructing to create dependencies

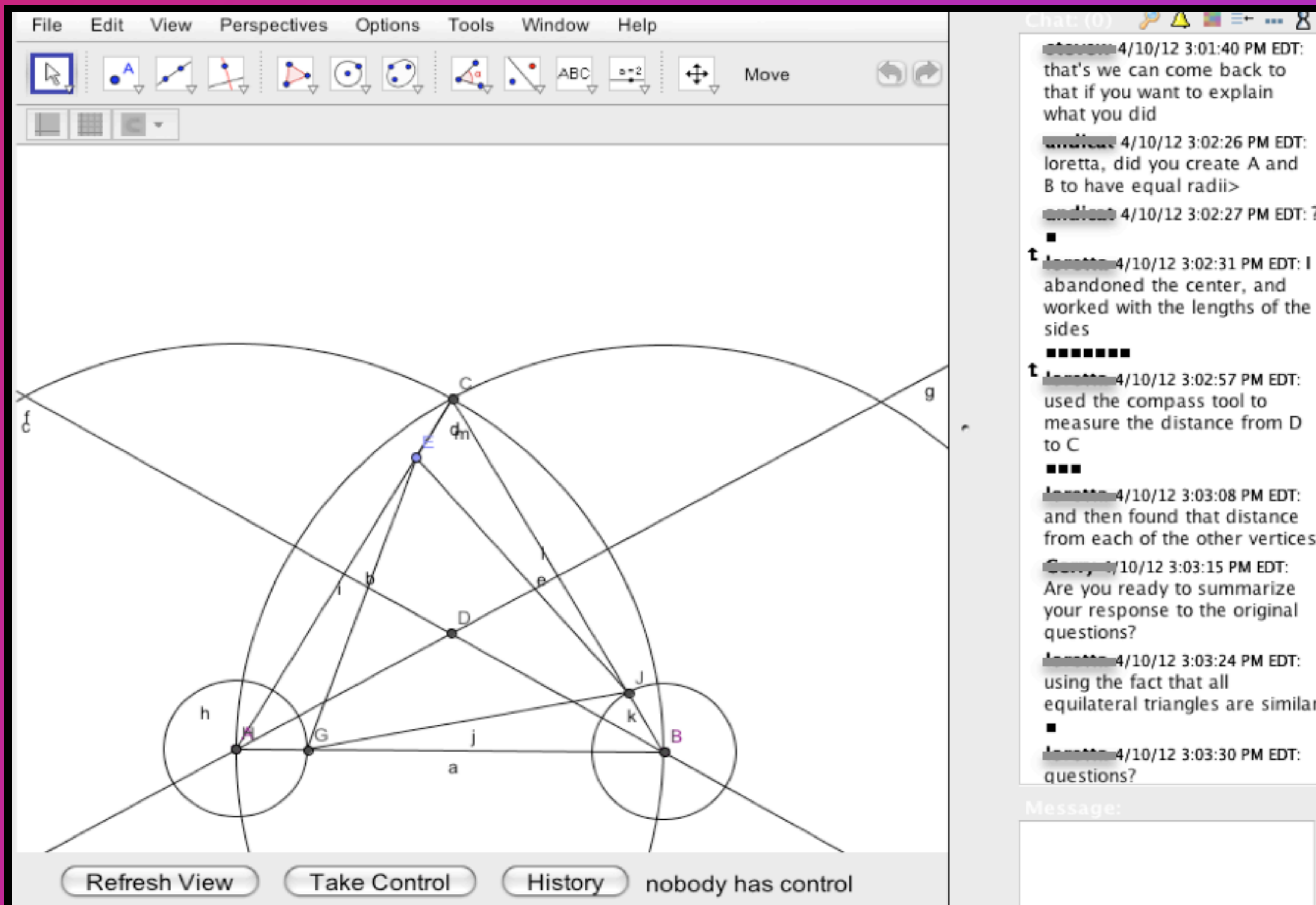
- In 4 experiments with a variety of groups, all successful groups use dragging to explore for constraints, exploratory construction to search for solution, design of dependencies;

- The inscribed-triangles problem is a resource that guides the group processes of meaning making and those of math solving

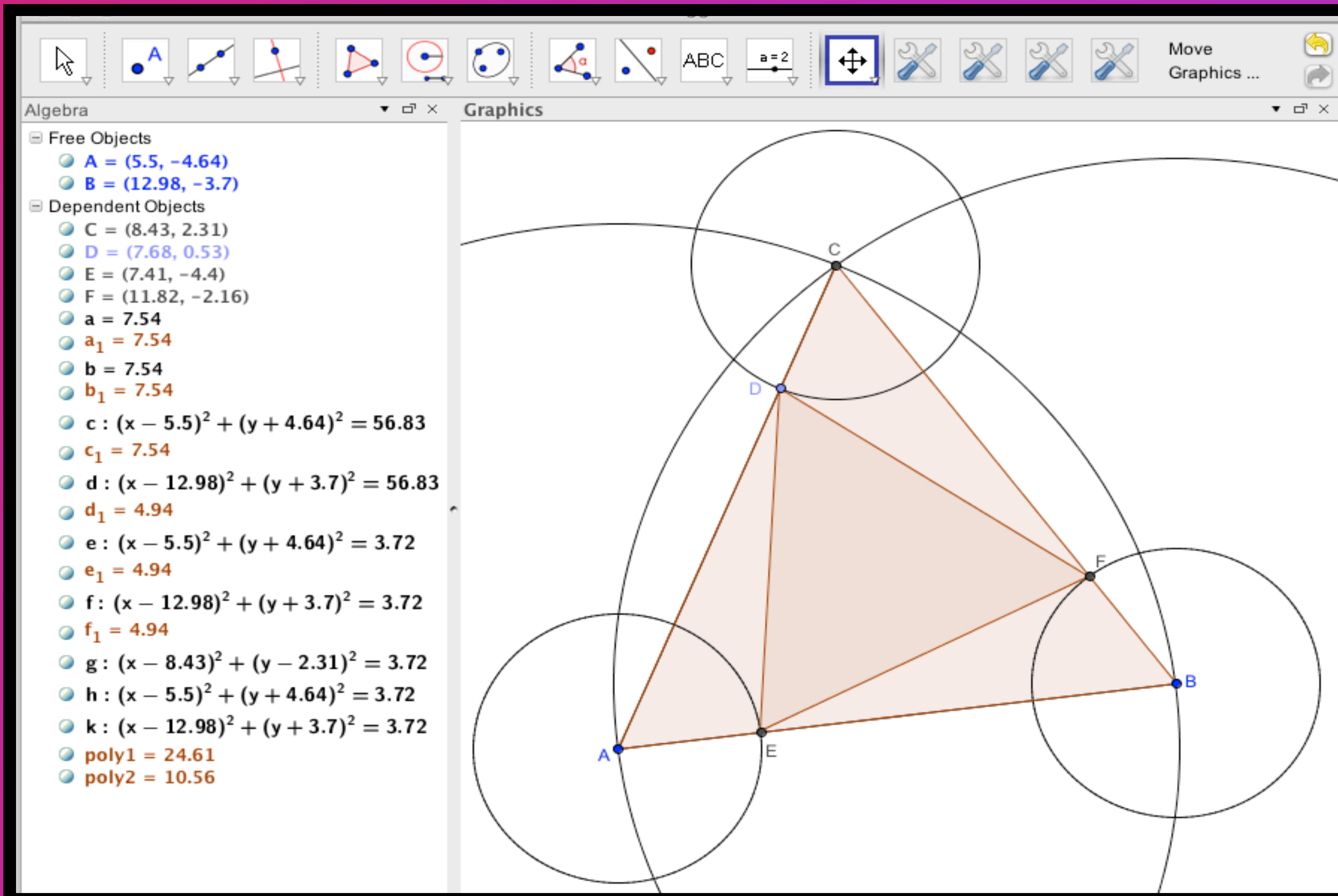
- Öner (2013) : F2F with Geometer's Sketchpad and grad students



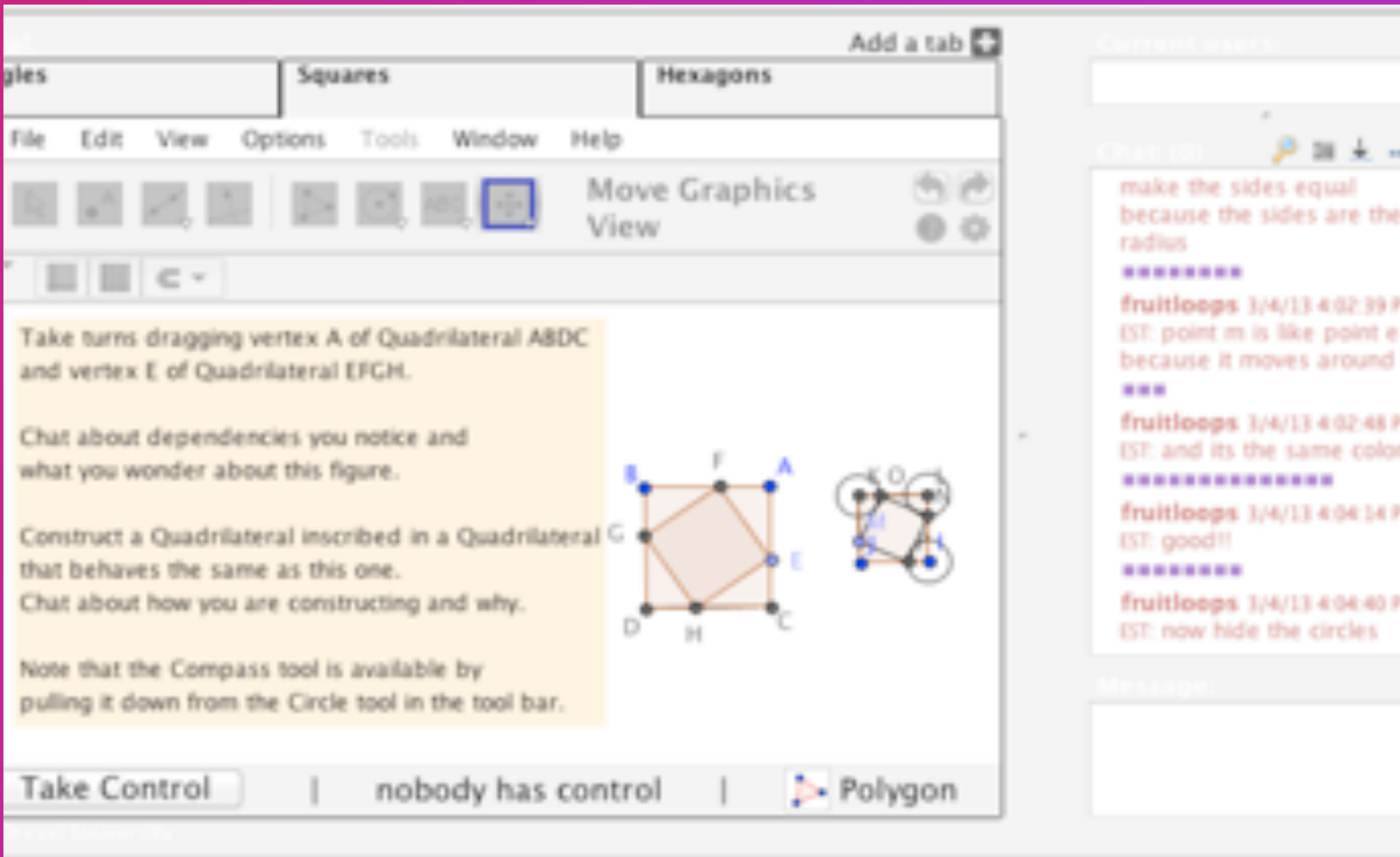
➢ VMT with GeoGebra with researchers



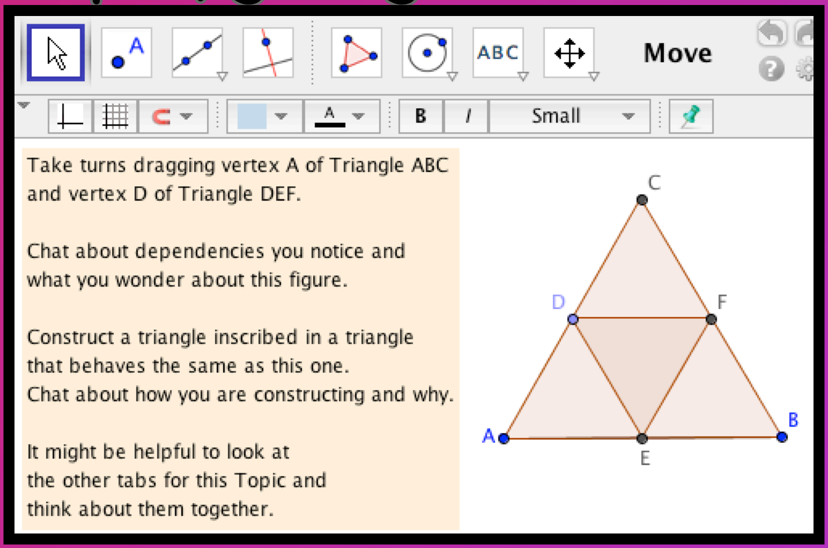
➢ VMT with math teachers

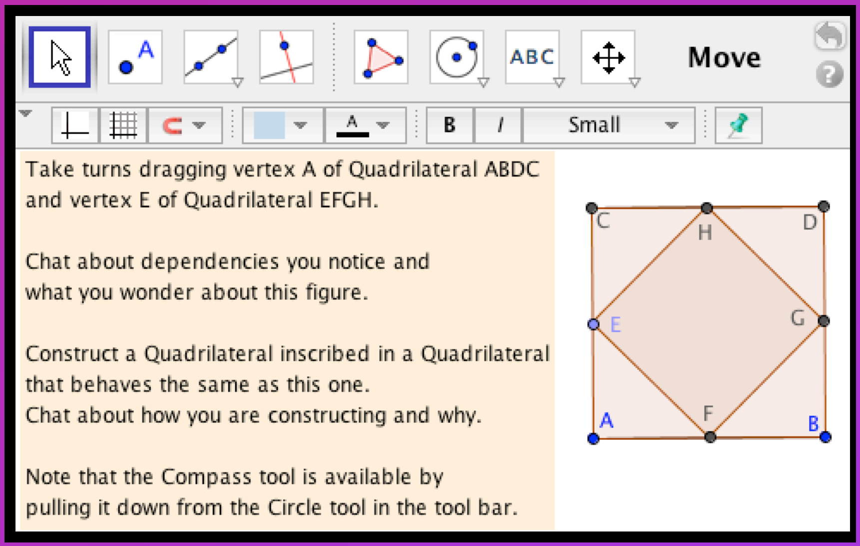


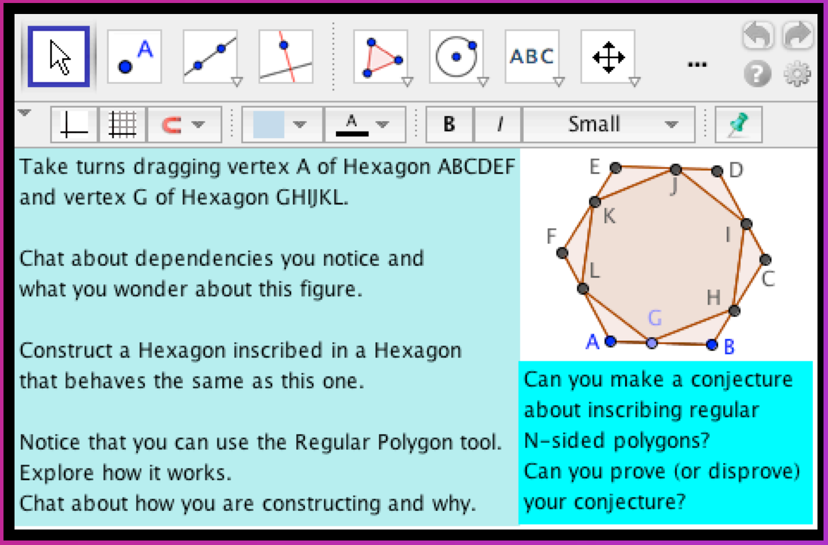
- VMT triangles and squares with middle school students

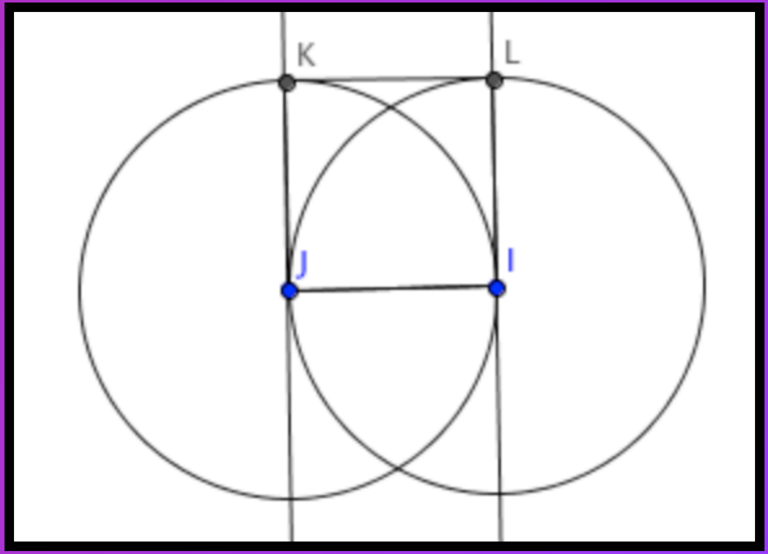


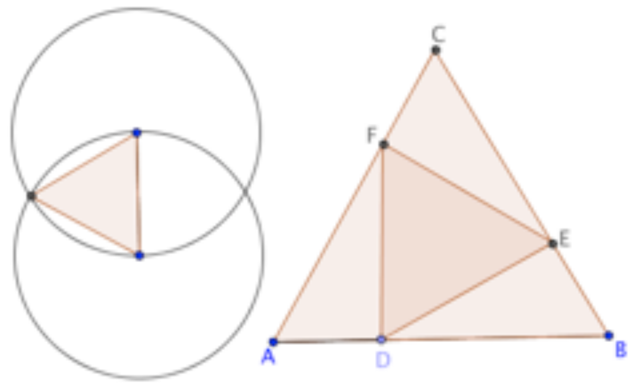
➢ VMT Topic with triangles, squares, hexagon polygon generalization

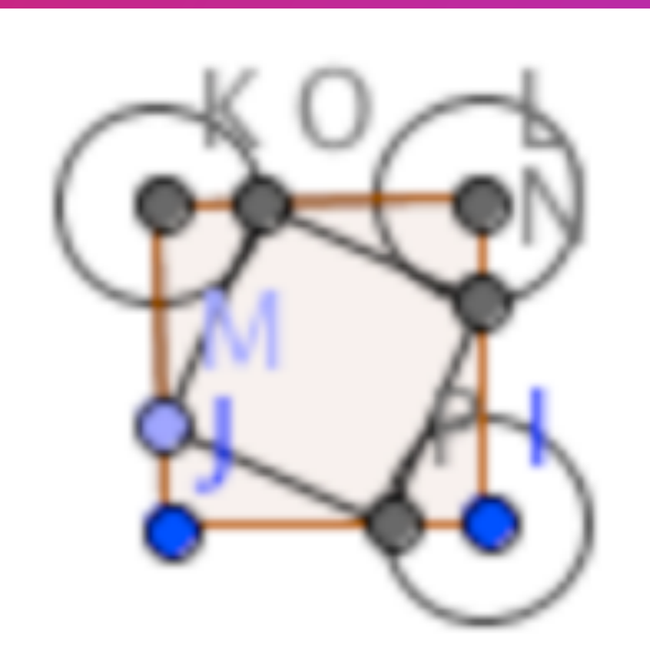












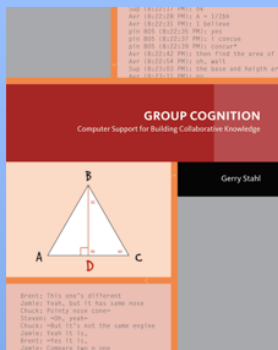
- Community: Euclid's 1st proposition (construct equilateral triangle), problem of inscribed triangles, definitions of regular polygons.
- Individual: perception of equal lengths, coordinated movements, explorative dragging, memory of similar problem solutions
- Small group: group practices of taking turns, dragging, coloring, naming, discussing
- Group cognition: shared attention, collaborative discourse, joint solution

Further Reading

- Öner, D. (2013). Analyzing group coordination when solving geometry problems with dynamic geometry software. *ijCSCL. 8*(1).
- Stahl, G. (2012). Traversing planes of learning. *ijCSCL. 7*(4).
- Stahl, G. (2013). Learning across levels. *ijCSCL. 8*(1).
- Stahl, G. (2013). Transactive discourse in CSCL. *ijCSCL. 8*(2).
- Stahl, G. (2013). *Translating Euclid: Creating a human-centered mathematics*: Morgan & Claypool Publishers. Web: http://gerrystahl.net/elibrary/euclid.

The Virtual Math Teams Trilogy

Group Cognition (2006)



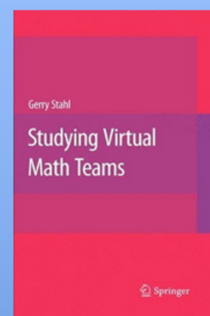
Computer Support for Building Collaborative Knowledge

MIT Press, 510 pages
Available for Kindle

The theory of group cognition emerges from several studies of CSCL and CSCW technologies. Analysis of interaction. Theory of CSCL.

www.GerryStahl.net/elibrary/gc

Studying Virtual Math Teams (2009)

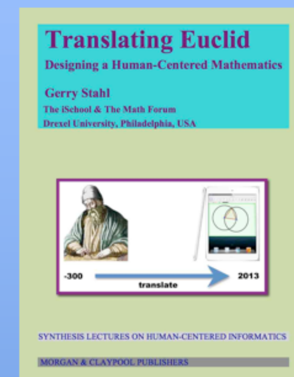


Springer Press, 626 pages
CSCL Book Series, paperback

Studies of the VMT Project technology, pedagogy, analysis, theory by team members and international collaborators

www.GerryStahl.net/elibrary/svmt

Translating Euclid (2013)



Creating a Human-Centered Mathematics

Morgan Claypool Publishers, 325 pages, e-book & paperback

Latest results of this design-based CSCL research from many perspectives.

www.GerryStahl.net/elibrary/euclid