# Multi-User GeoGebra with Virtual Math Teams

The Math Forum @ Drexel University
www.mathforum.org
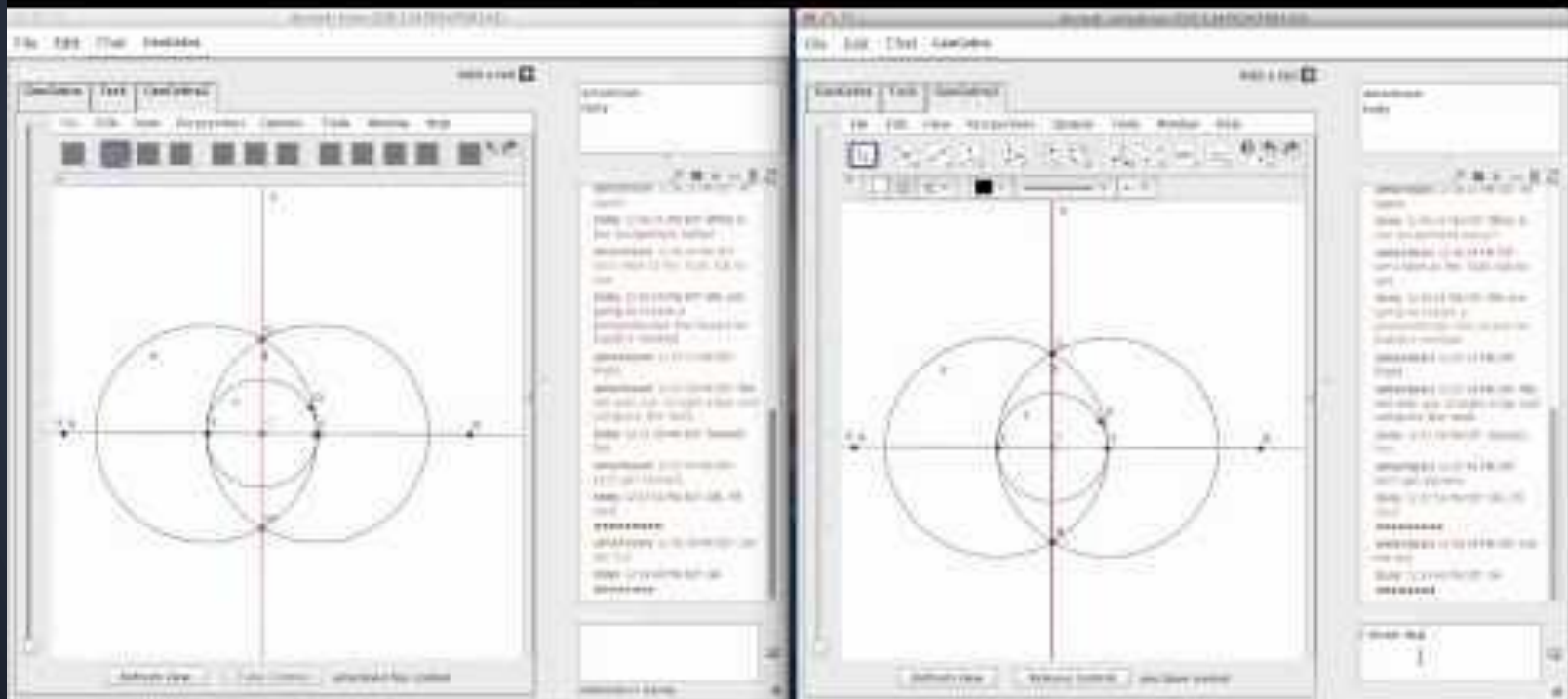vmt.mathforum.org

# Virtual Math Teams (VMT)

- VMT is an online environment for students to work on and discuss math problems synchronously.

- VMT combines support for dynamic geometry with media for collaborative learning.

# Integration with GeoGebra

- Remote students can synchronously work on a shared construction together.
- Users can take turns manipulating the construction.
  - Adding, deleting, modifying and moving objects
- The construction will stay in sync on each user's screen.
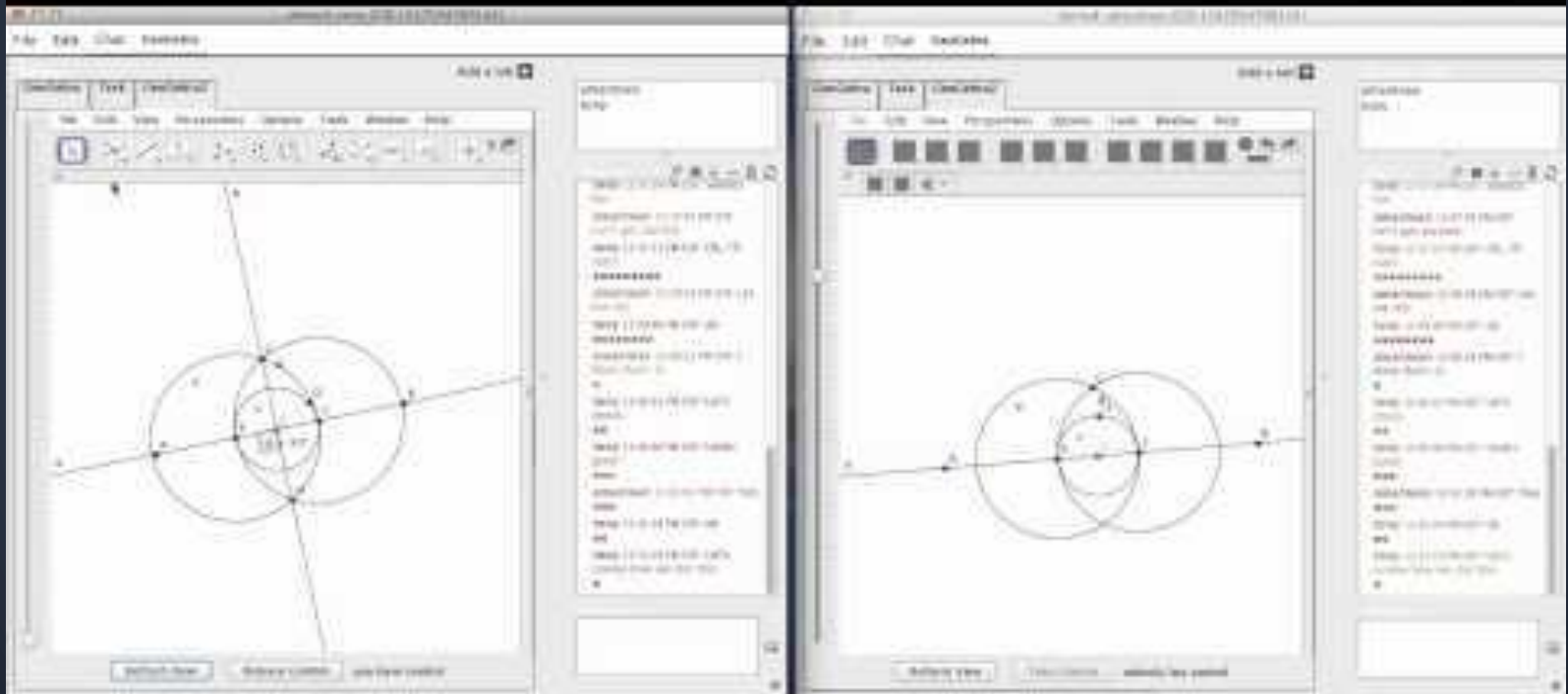- Users can chat about the problem as they work.

# Integration with GeoGebra

# History Tracker

- Built in history tracker allows users to scroll back and forth in time to see how the construction developed.

- Shows everything that happened including style changes and object movements.

- Each GeoGebra workspace is tracked separately.

# History Tracker In Action

# Other Shared Tools

- Shared Whiteboard
  - o Users can doodle on the shared whiteboard
  - o Draw simple shapes
  - o Summarize work, draft shared statements, note observations or hypotheses in text boxes
  - o History of the whiteboard is also tracked.

- Web browser
  - o Simple web browser
  - o Can be used to show instructions for the student's assignments or other related information on the web.

# VMT has built in tools for session analysis

- VMT records every chat, and action in the session.

- Provides a session replayer to go back and forth through the session step by step.

- Chat, whiteboard, and GeoGebra events all playback in the order they occurred in the original session.

# The VMT Session Replayer

# VMT has built in tools for session analysis

- Spreadsheet log files can be downloaded for each VMT room.

- Log files and the VMT Replayer provide unique insights for teachers and researchers.

- Allows teachers to go back and see anything they missed during class.

# Session Log Files

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | Line | Date | Start Time | Post Time | Duration | EventType | tony | amantoan |
| 2 | 1 | 09/06/2012 | | 10:38:42 | 00:00:00 | chat | joins the room | |
| 3 | 2 | 09/06/2012 | | 10:39:54 | 0:1:12 | chat | | joins the room |
| 4 | 3 | 09/06/2012 | | 11:24:49 | 0:44:55 | chat | Hello | |
| 5 | 4 | 09/06/2012 | | 11:25:07 | 0:0:18 | chat | | Hi.  Lets start by looking at the task description. |
| 6 | 5 | 09/06/2012 | | 11:25:11 | 0:0:4 | chat | Ok. | |
| 7 | 6 | 09/06/2012 | | 11:25:31 | 0:0:20 | chat | Alright, I'll start. | |
| 8 | | 09/06/2012 | | 11:25:42 | 0:0:11 | Geogebra:GeoGebra | added point:Point "A" | |
| 9 | | 09/06/2012 | | 11:25:44 | 0:0:2 | Geogebra:GeoGebra | added point:Point "B" | |
| 10 | | 09/06/2012 | | 11:25:44 | 0:0:0 | Geogebra:GeoGebra | added line:Line "a" | |
| 11 | | 09/06/2012 | | 11:25:50 | 0:0:6 | Geogebra:GeoGebra | added point:Point "C" | |
| 12 | | 09/06/2012 | | 11:25:52 | 0:0:2 | Geogebra:GeoGebra | added point:Point "D" | |
| 13 | | 09/06/2012 | | 11:25:52 | 0:0:0 | Geogebra:GeoGebra | added conic:Circle "c" | |
| 14 | | 09/06/2012 | | 11:26:01 | 0:0:9 | Geogebra:GeoGebra | added point:Point "E" | |
| 15 | | 09/06/2012 | | 11:26:02 | 0:0:1 | Geogebra:GeoGebra | added point:Point "F" | |
| 16 | 7 | 09/06/2012 | | 11:26:18 | 0:0:16 | chat | | Great, I'll take it from here. |
| 17 | | 09/06/2012 | | 11:26:29 | 0:0:11 | Geogebra:GeoGebra | | added conic:Circle "d" |
| 18 | | 09/06/2012 | | 11:26:33 | 0:0:4 | Geogebra:GeoGebra | | added conic:Circle "e" |
| 19 | | 09/06/2012 | | 11:26:40 | 0:0:7 | Geogebra:GeoGebra | | added point:Point "G" |
| 20 | | 09/06/2012 | | 11:26:43 | 0:0:3 | Geogebra:GeoGebra | | added point:Point "H" |
| 21 | | 09/06/2012 | | 11:26:52 | 0:0:9 | Geogebra:GeoGebra | | added line:Line "b" |
| 22 | 8 | 09/06/2012 | | 11:27:00 | 0:0:8 | chat | | That;s it. |
| 23 | 9 | 09/06/2012 | | 11:27:04 | 0:0:4 | chat | Lets check. | |
| 24 | | 09/06/2012 | | 11:27:15 | 0:0:11 | Geogebra:GeoGebra | added angle:Angle "?" | |
| 25 | 10 | 09/06/2012 | | 11:27:21 | 0:0:6 | chat | Looks good. | |
| 26 | | | | | | | | |
| 27 | | | | | | | | |

Sheet1

# Classroom Materials Available

- The VMT research team has developed materials specifically for collaborative use of GeoGebra.

- Developed by leading researchers in Computer Supported Collaborative Learning (CSCL) at Drexel University

- http://GerryStahl.net/vmt/activities.pdf

# VMT Is Publicly Available

- VMT is open source.

- Our Math Forum VMT server is available for all to use – vmt.mathforum.org

- Anyone may set up their own VMT server.

# For More Info

- Tony Mantoan, lead VMT software developer
- Steve Weimar, director of the Math Forum
- Gerry Stahl, PI of the VMT research project

tony@mathforum.org

steve@mathforum.org

gerry@mathforum.org