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

• **Web browser**
  - Simple web browser
  - 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

<table>
<thead>
<tr>
<th>Line</th>
<th>Date</th>
<th>Event Time</th>
<th>Duration</th>
<th>EventType</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>09/06/2012</td>
<td>10:38:42</td>
<td>00:00:00</td>
<td>chat</td>
<td>joins the room</td>
</tr>
<tr>
<td>2</td>
<td>09/06/2012</td>
<td>10:39:54</td>
<td>0:1:12</td>
<td>chat</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>09/06/2012</td>
<td>11:24:49</td>
<td>0:44:55</td>
<td>chat</td>
<td>Hello</td>
</tr>
<tr>
<td>4</td>
<td>09/06/2012</td>
<td>11:25:07</td>
<td>0:0:18</td>
<td>chat</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>09/06/2012</td>
<td>11:25:11</td>
<td>0:0:4</td>
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<td>Ok</td>
</tr>
<tr>
<td>6</td>
<td>09/06/2012</td>
<td>11:25:31</td>
<td>0:0:20</td>
<td>chat</td>
<td>Alright, I'll start.</td>
</tr>
<tr>
<td>7</td>
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<td>11:25:42</td>
<td>0:0:11</td>
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<tr>
<td>8</td>
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<td>11:25:44</td>
<td>0:0:2</td>
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<td>added point: Point &quot;B&quot;</td>
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<tr>
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<td>11:25:44</td>
<td>0:0:0</td>
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<td>added line: Line &quot;a&quot;</td>
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<tr>
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<td>11:25:50</td>
<td>0:0:6</td>
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<td>added point: Point &quot;C&quot;</td>
</tr>
<tr>
<td>11</td>
<td>09/06/2012</td>
<td>11:25:52</td>
<td>0:0:2</td>
<td>Geogebra: GeoGebra</td>
<td>added point: Point &quot;D&quot;</td>
</tr>
<tr>
<td>12</td>
<td>09/06/2012</td>
<td>11:25:52</td>
<td>0:0:0</td>
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<td>added conic: Circle &quot;c&quot;</td>
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<tr>
<td>13</td>
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<td>11:26:01</td>
<td>0:0:9</td>
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<td>added point: Point &quot;E&quot;</td>
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<tr>
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<tr>
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<td>0:0:16</td>
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<tr>
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<tr>
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<tr>
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<td>added line: Line &quot;b&quot;</td>
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<tr>
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<td>added angle: Angle &quot;?&quot;</td>
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<td>11:27:21</td>
<td>0:0:6</td>
<td>chat</td>
<td></td>
</tr>
</tbody>
</table>

Hi. Let's start by looking at the task description.
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](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
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](http://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](http://www.GerryStahl.net/elibrary/svmt)

**Translating Euclid (2013)**

*Creating a Human-Centered Mathematics*


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

[www.GerryStahl.net/elibrary/euclid](http://www.GerryStahl.net/elibrary/euclid)