# Cognitive Walkthrough - Graspable Math

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| **Product Name:**<br>Graspable Math (https://graspablemath.com/) |
| **Task Name:**<br>Onboarding |
| **Date and Time of Study:**<br>03 June 2019 |
| **Experimenters' Names:**<br>Carl Klutzke, HCI Masters Student, IUPUI |

## Task Description:

As a math teacher, I want to know if this system will be a good resource to use with my students. In order to do so, I need to find out:

1. What does it do?

2. What evidence indicates that it works well?

3. How does a student interact with it?

4. How do I set up an activity for my students to learn from?

## Task Process:

1. Find a link to the Graspable Math website.

2. Navigate to the Graspable Math website.

3. Find evidence that the system is effective.

4. Observe a demonstration of the system in use.

5. Experiment with using the system as a student would.

6. Experiment with creating an activity for students to learn from.

1. **User's Intention: Find a link to the Graspable Math website.**
   **Desired System Response: Display a link to the web site.**

| CW Question | Issue? | Notes |
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| *Do I know what I need to do?* | | Web search on "graspable math". |
| *Does what I want to do seem to be available?* | | yes |
| *If I take action, do I get confirmation that I am getting the results I want?* | | GM website is the first link in Google search results, with descriptive tagline: "Explore algebra online. Move terms fluently to solve equations and explore the power of algebra without the frustration – for free! Explore Algebra!" |
| *General Notes:* | | 1. Descriptive tagline says "Explore Algebra" three times. I'm not sure "fluently" is the right adverb for this sentence, since it's generally reserved for ability with language, and not with the verb "move". "Without the frustration" reminds me of negative associations: emphasize positive instead. Do I know what a "term" is in this context?<br><br>There are videos linked here from IU and WPI that I could go to directly for info, rather than the website.<br><br>2. YouTube, Twitter, and Facebook links help establish credibility. |

2. **User's Intention: Navigate to the Graspable Math website.**
   **Desired System Response: Display the web site.**

| CW Question | Issue? | Notes |
|---|---|---|
| *Do I know what I need to do?* | | Click the link. |
| *Does what I want to do seem to be available?* | | yes |
| *If I take action, do I get confirmation that I am getting the results I want?* | X | GM logo and name are prominently displayed in upper left of landing page, but that's smaller than the main banner, which doesn't show the name of the site.<br><br>How is the logo related to algebra, or to graspability? It looks like a check mark connected with another symbol I don't recognize. Is it supposed to be an X, like I am solving for in my equations? |
| *General Notes:* | | 1. Main banner gives a summary description, like the search results description. Below the three action buttons (Learn More, Classroom Materials, Explore Projects) I see more introductory text ("Graspable Math allows students to…") if my screen is tall enough. Text is good and drawings are cute, but I'd prefer to see video of it in action. The drawings look like they are supposed to match the GM logo, but they don't quite do so: that's a little confusing.<br><br>2. The only thing I see on the landing page that tells me anyone recommends GM is where the bottom banner says it's supported by IES.<br><br>3. "Learn Graspable Math" looks like a place to see how the system works. The link for "Games and Integrations" with a button that says "Explore Projects" is confusing: those don't seem like things that all belong together. But the Games might be something to engage my students.<br><br>4. "Teacher Resources" and "Classroom Materials" seem promising. |

3. **User's Intention: Find evidence that the system is effective.**
   **Desired System Response: Display social proof, awards, user statistics.**

| CW Question | Issue? | Notes |
|---|---|---|
| *Do I know what I need to do?* | | Looking for information about the company, awards, principles of how the system works, etc. |
| *Does what I want to do seem to be available?* | | The About link is clearly visible in the header. |
| *If I take action, do I get confirmation that I am getting the results I want?* | X | The "Our Story" describes a mission and philosophy that seems supportive. But I see no external corroborating evidence. |
| *General Notes:* | | 1. The videos here have information I was looking for on the landing page.<br><br>2. I don't see any references or awards or recommendations from other sources on the About page to establish credibility. But the videos showing the system in action are encouraging. And the photos and bios of the team members establish credibility and a personal connection.<br><br>3. The videos show the system in action.<br><br>The STEM showcase video shows a girl playing a game at the 1:00 mark. Is that something available to my students? Is it the same as the game in the WPI video? How are the games related to Graspable Math? |

4. **User's Intention: Observe a demonstration of the system in use.**
   **Desired System Response: Provide a video or interactive overview of the system and how to get started.**

| CW Question | Issue? | Notes |
|---|---|---|
| *Do I know what I need to do?* | | Looking for an overview or demo. |
| *Does what I want to do seem to be available?* | X | The landing page has two different links to the Learn page. There's some potential ambiguity in the word Learn: is this where I go to learn GM, or where I go to learn algebra (i.e. launch the app)? |
| *If I take action, do I get confirmation that I am getting the results I want?* | X | On the Learn page I see a selection of specific Tutorial Videos, but I want a more general overview video. The videos on the About page are helpful, but I want something more focused on the screen, walking me through some example interactions. |
| *General Notes:* | | 1. The names of the Tutorial Videos describe different things I can do with GM.<br><br>3. "Scrubbing" numbers is confusing terminology: it seems like a way to remove numbers. "Spinning" seems more like what that feature does. (The UI control that works in a similar manner is called a "spinner".)<br><br>4. I see a tutorial on Saving, Loading, and Sharing: is that relevant to creating activities? |

5. **User's Intention: Experiment with using the system as a student would.**
   **Desired System Response: Provide an example activity or tutorial.**

| CW Question | Issue? | Notes |
|---|---|---|
| *Do I know what I need to do?* | | Find a tutorial. |
| *Does what I want to do seem to be available?* | X | On the landing page I see "Explore Algebra", which seems like a place to start. <br><br> I don't see the word "tutorial" but I see "Learn Graspable Math". <br><br> I don't see any example activities to try. |
| *If I take action, do I get confirmation that I am getting the results I want?* | X | If I Explore Algebra, I see a blank canvas with a slightly highlighted Help button. <br><br> • First item in the Help menu is Introduction, which provides a helpful overview, but I can't look at it and try things on the canvas at the same time. <br> • Second item shows Learning Resources: are those tutorials, or classroom activities? <br> • Third item is a cheat sheet. It has a lot of tiny text with abbreviations I don't know. <br><br> If I click Learn, I see a list of tutorials. Most of these are non-interactive text and demo descriptions of specific features. That's a good start. But many of the tutorials don't guide me through an example, or let me experiment with or solve a real problem interactively. |
| *General Notes:* | | 1. The Tutorial list shows me what GM can do. It would be better if each item on the list was described with a verb: e.g. "Getting Started" instead of "Canvas Basics". <br><br> 2. If the tutorial list shows a list of things I want to be able to do, then that is evidence that the tool is useful to me. |

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| | 3. The Gesture Library and Cheat Sheet buttons are not labeled with actions, and thus cannot match the action I want to perform. And a "Library" doesn't seem like what I'm seeking.

4. I don't see much here about creating activities. Maybe "Saving, loading, and sharing" and "Google classroom integration"? Maybe the teacher tutorials are separate from the student tutorials? |

6. **User's Intention: Experiment with creating an activity for students to learn from.**
   **Desired System Response: Provide an example activity.**

| CW Question | Issue? | Notes |
|---|---|---|
| *Do I know what I need to do?* | | Looking for information on creating activities. |
| *Does what I want to do seem to be available?* | | I assume this is under Teacher Resources / Classroom Materials. |
| *If I take action, do I get confirmation that I am getting the results I want?* | X | I see a list of Materials. Are those the same as activities?<br><br>Most of them are not in my language: Chrome even offers to translate the page.<br><br>I don't see any information here on creating activities. |
| *General Notes:* | | 1. The Materials area seems like a great place to showcase features and activities. I'd like to see some GM-created activities that walk me through what the system can do.<br><br>2. The Materials area is a bit confusing and intimidating. But it's also encouraging to see that it is being used internationally!<br><br>3. Are these materials for teachers or for students?<br><br>4. Are the materials here for me to show my students? How do I do that? Most of the activities in my language don't describe what they are demonstrating / teaching, or how I should interact with them. Where can I find a tutorial that walks me through creating an activity, just like walking me through the other system features? |

## Potential relevance for Graspable Math:

Here we summarize how the results of this walkthrough might be relevant to a redesign of the Graspable Math website, especially in answering the test user's questions.

### 1. What does it do?

"Explore Algebra!" sounds like a great tagline for *From Here to There*, which is presented in the form of a journey, but is "explore" the right verb for what you do with GM? How can our taglines emphasize the literal and figurative way in which "graspable" applies to GM? "Take control of algebra"? "Play with Algebra"? "Seize Algebra"?

The logo doesn't help me understand the product.

We should experiment with making the brief description, visible both in search results and on the landing page banner, more clear and more emotionally engaging. The landing page banner text should contain the words "Graspable Math" to ensure that people know they've arrived at the right place, and to associate the brand with the description.

Moving videos from the About page to the landing page would help immediately answer the "What does it do?" question. (Text is useful too, though. In particular, foreign visitors might be better able to read English text than to understand spoken text in the videos.)

As a new visitor I want to see the answer to "What does it do?" without even touching a scroll bar.

### 2. What evidence indicates that it works well?

Can we create a small Wikipedia page that will display along with the search results, without violating their policies of self-promotion? cf Desmos, GeoGebra. It looks like Google calls these extra results "Knowledge Panels". Woot Math search results show a panel for Simbulus Inc. This might be from setting up information in Google My Business (https://www.google.com/business) or it might just be a result of their algorithms.

On the landing page, below a description of what the system does, I want to see testimonials and awards that give me confidence that the system does what it does well.

The About page has good information about the company mission, and how its people are qualified to do what they do. But I also want to see external corroborating evidence.

Seeing the founders' faces and bios on the About page is engaging: why don't the other employees have photos?

### 3. How does a student interact with it?

The response to clicking "Explore Algebra" is a blank canvas. Many people will find this intimidating. There are options there to select, but we can probably take a new user more directly by the hand and walk them step-by-step through a sequence of video demos and interactive activities immediately. Perhaps the first time a user sees the canvas, we could pop up a dialog offering a tour.

The canvas Help menu item "Learning Resources" is potentially confusing. Maybe it should be "Learn Graspable Math".

The Learn Graspable Math description on the landing page might be more attractive if it explicitly mentioned demos, examples, and tutorials.

The top of the Learn page would be a great place for an overview demo. The existing videos tell us about the system, now I need a video that *shows* me the system, focusing more on the actual screen interactions.

Buttons should be labeled with an action the user wants to take. "Gesture Library" is not an action. "Learn Gestures" might be better, and removes the somewhat confusing term "Library". (But see below.)

The best GM tutorials combine the text and video demo overview, then provide show-and-do examples and exercises. It would probably be better if all the Gesture Library examples were set up this way instead of being separated on their own.

The tutorial names should likewise be named with actions that I want to take as a user.

Is the term "scrubbing" clear to our audience? Would some other term ("spinning"?) be more clear?

The cheat sheet could be a useful reference to help someone who has already started using the system, but it's intimidating to a beginner.

"Games", "Integrations", and "Projects" don't seem to belong together. If there's a game using GM that teaches my students algebra in an engaging way, that deserves highlighting all by itself!

### 4. How do I set up an activity for my students to learn from?
Buttons should be labeled with an action the user wants to take. "Classroom Materials" is not an action.

The term "materials" might be better replaced with "activities".

I'd like to be able to filter the activities by certain characteristics. What language are they in? Who made them (especially those made by GM itself)? What words are in the description? Are there a set of keyword tags or topics that can be assigned? Which ones are the most popular? What experience / classes will my students need to understand the activity?

I want to see some really shiny activities that wow me with what the system can do!

As a teacher, I'm looking for tutorials that show me how to create activities and share them with my students. I might look for such tutorials on the Learn page or on the Materials page.  (Carl now understands that activities are basically just saved canvases that are made public, but as a new user I don't know what to expect. And if we add features to make activities more searchable, there might be more to the process.)

If I've just come to this site to check it out, I'd like to try things without sharing my personal information. Is there some way I can save and load a canvas without giving GM my Google account information? If I give GM my Google account info just to try something, will I be hounded with advertisements? What if I don't have a Google account?

The number of foreign language activities created by users indicates a wider potential audience. Can we embrace that by making the site multi-lingual?