TEACHER MANUAL FOR ACTIVITY 3

This manual provides guidelines to teachers on how to teach with G-v-G. It contains instructions on how to set up the Leap motion controller as also lesson plans for teaching with G-v-G. The content of this manual is arranged in the following sequence:

Q1) How do I set up Leap motion controller with G-v-G?

1. Peel off the sticker from the Leap motion controller
2. Connect the device to your computer with the USB cable provided with it
3. The shiny side of the controller faces up and the green light faces towards you
4. Download the leap motion driver for appropriate operating system from the links provided above.
5. Double click the downloaded folder and install the driver. You may have to click "next" button a number of times to get it installed.

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Q2) How do I run G-v-G on my system?

1. Click on the "Download Zip folder" button on the home page to download the G-v-G folder.
2. Click on the downloaded folder to extract it on your system
3. Plug in the Leap motion device to your computer
4. Click on index.html from the Geometry via Gestures 2.0 folder
5. Get started with G-v-G

Or

1. Click on the "Run" button on the home page
2. This will direct you to the activities of G-v-G
3. Plug in the Leap motion device to your computer
4. Get started with G-v-G

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Q3) How does the G-v-G code work?

When the sliding/upward gesture is sensed by the controller, it will be verified by the application code if the gesture has been associated with any action with the current model on-screen. If specific action is associated, as in this case, then the rectangles can be made to move like a 3D cycle wheel. This will enable the student to associate the 2D rectangle primitive with the 3D right circular cylinder (Figure 2).

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Q4) What are the Screen Components of G-v-G?

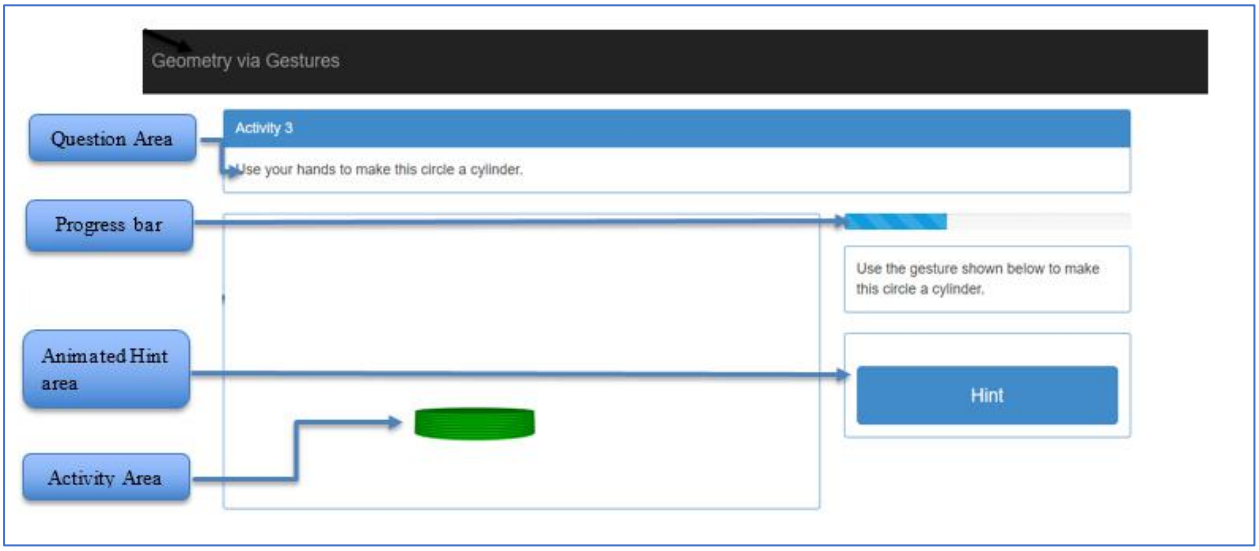

Figure 1. Screen components of G-v-G application

The activity screen of G-v-G application, is divided into the following areas as can be seen in Figure. 1. A brief description of the same is provided in the table below.

Screen components	Description
Question Area	The space on the screen where the activity question is provided to the learner.
Progress bar	Indicates the progress of the activity
Animated Hint Area	The space on the screen where hints are given on the type of gestures to be used to do the activity. The hint can be used at any time during of the activity.
Activity Area	The space on the screen where the learner initially sees a 2D shape. Based on the learner's gestures, transformation occur in this area and finally a 3D structure is formed

Resources required: Leap motion controller

G-v-G requires the Leap Motion Device to recognize gestures. You can purchase it here: https://www.amazon.in/Leap-Motion-Gesture-Controller-MAC/dp/B00E3CP9UM/ref=sr_1_2?ie=UTF8&qid=1522055470&sr=8-2&keywords=leap+motion&dpID=310zzpBz0eL&preST=_SY300_QL70_&dpSrc=srch

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Q5) How do I conduct student activities with G-v-G (lesson plan)?

Activity 3

Title: Construct & Connect - II

Learning Objective: Student will be able to construct the formation of 3D right circular cylinder by the translational movement of a disc.

Educational level: High school students **Topic:** Visualizing 3D shapes

Activity Context:
This activity enables the student to construct a 3D object from known 2D primitive and think of volume of cylinder in terms of area of a circle.

Lesson Plan:

Sr. no.	Time duration (minutes)	What will teacher do?	What will student do?	G-v-G feature to be used
1	10 mins	Pose recall questions/activity for properties of a circle like, what is the area of circle, what is its circumference. • What is meant by 2D circle? • What are the 2D circular structures you see in real life? • Tell me few properties of a 2D circle? • What is its area? • What do you mean by circumference? • Now tell me circumference of a circle.	Recall the 2 D structure and state its properties like formula of area, circumference.	-
2	5 mins	Ask the students to do the Construction Activity	Student will use the G-v-G application to construct the 3D object (cylinder) from a disc.	Construct & Connect Activity (C2 -2) Refer Figure 6
3	5 mins	After 5 mins the teacher asks about the progress of the activity. You could ask the following questions • Do you see the Hint feature in the G-v-G application?	Student will either respond that we are unable to do /unable to see the progress bar move/ see that the	• Progress bar in the G-v-G application • Hint feature

		• You might want to use the hint feature in the G-v-G application • What is the gesture that you did so that the progress bar moves?	progress bar has moved	
4	5 mins	Teacher will ask the students to continue so that the progress bar shows activity completion	Students will use the Hint feature to figure out gesture/ Their peers might point out the gesture	Construct & Connect Activity (C2 -2)
5	5 mins	The teacher will ask the students their progress bar status By now, the students would have completed the task, if not the teacher could go to the individual student to help. Or ask the peer who have completed to help the others	Students would report their progress status.	Construct & Connect Activity (C2 -2)
6	15 mins	Once the task is complete teacher would ask a set of questions to connect to the learning objective • What was there initially on the screen? • What happened on the screen when you used the gesture? • What changes did you notice to the 2D circle while doing the gesture? • What parameters remained unchanged • even after the gesture was made? • After the activity completion how did the screen structure look like? • What do you infer from the activity? • Can you now derive the volume of the cylinder? • Some of the 3D shapes that you previously mentioned how will • you construct them?	Students will reflect on the question/Discuss with peer/ Answer the question in a notebook	Refer Figure 7

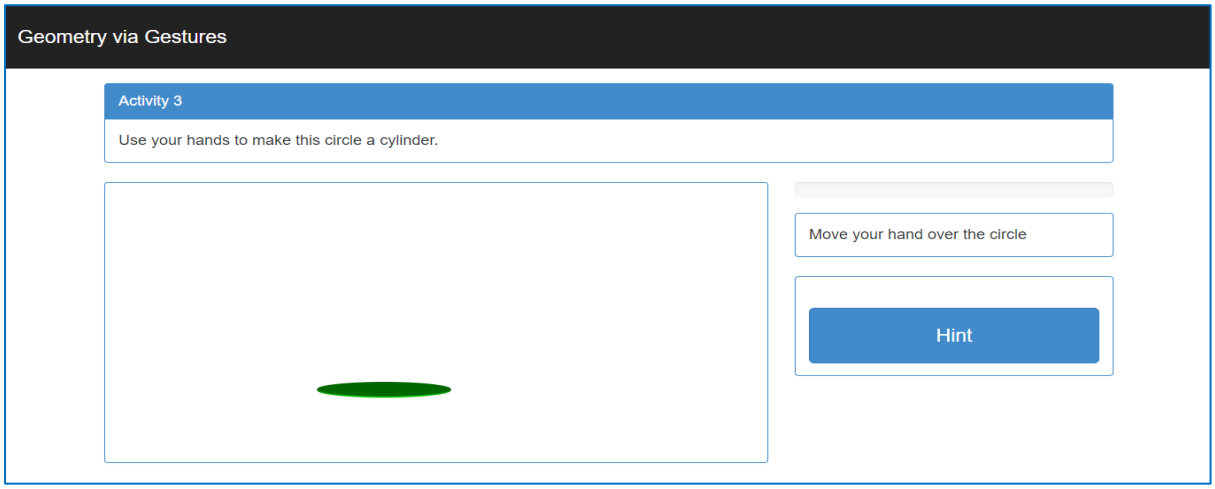

Figure 6: 2D circular sheet

The initial screen of activity 3 will appear as Figure 6.

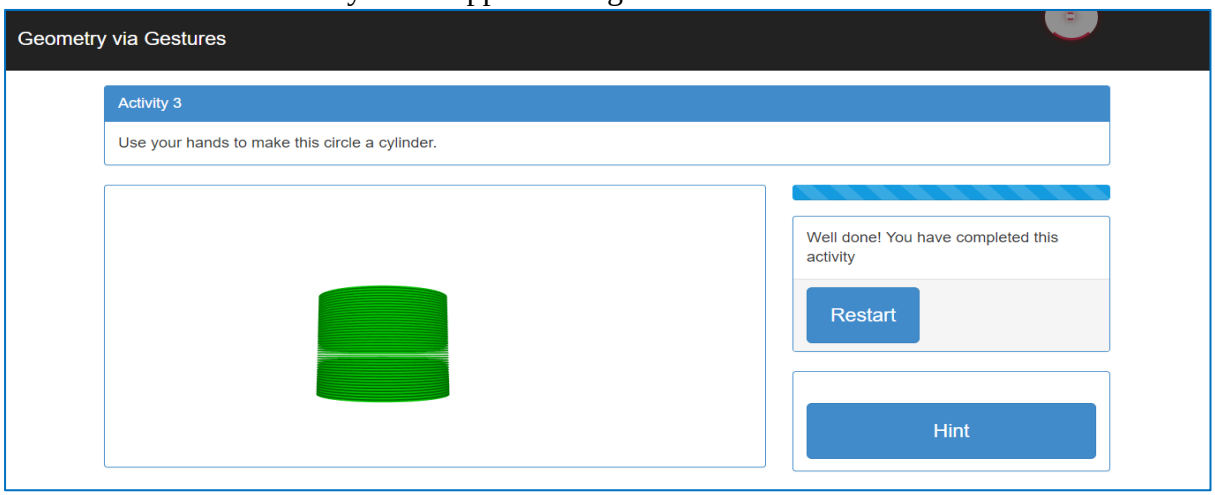

Figure 7: 3D circular cylinder

The final screen of activity 3 will appear as Figure 7.

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Q6) What are the precautions to be considered while using Leap Motion Controller?

Let the students and the instructors play around with leap motion controller for maybe a week before the activities.

- Leap Motion Controller sensors are very sensitive to direct light. When exposed to direct light the sensors will be unable to detect the hand gestures of the students. We advise the instructors the following:
    - Avoid using leap motion controller in direct sunlight
    - Avoid harsh lighting (powerful/photography lighting) directly on the leap motion controller

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