# Accessible transcript

This transcript is roughly ordered by slides. Bold text is alternate text for images and animations.

## 1

Precise Animations for the STEM Classroom

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**On the top right, UCL Chemistry Education Research logos.**

## 2

1. Background

## 3

Visualisation skills

* Interpretation
* Creation
* Introspection

J. Gilbert, M.Reiner and M. B. Nekhleh, Eds., *Visualization: theory and practice in science education*, Springer, New York, 2008.

**On the right, a swinging pendulum.**

## 4

Johnstone’s triangle

1. H. Johnstone, *J. Chem Educ.*, 1993, **70**, 701.

**A triangle with each point labelled as “Symbolic”, “Submicroscopic”, and “Macroscopic”. Respectively, the labels have show the chemical formula NaCl, the crystal structure of rock salt, and a salt shaker.**

## 5

Dynamic visualisation platforms

* Blender: Great for 3D
* Geogebra: Interactive
* Matplotlib: Programmable
* Powerpoint: Widely used
* Using your hands: Cross-platform and renders quickly

## 6

Manim

* Python-driven mathematical animations
* Free, open-source
* Created by Grant Sanderson (3Blue1Brown)
* Maintained by Manim Community

## 7

1. Examples

## 8

Motion

**Two pink circles connected by a white line.**

**Below, a plot showing a parabola with a dot at the minimum.**

**The two circles start oscillating in and out as the dot moves along the parabola.**

**The parabola changes into a Morse potential, and the oscillation changes accordingly.**

## 9

Algorithms

**An animation of two blue circles moving along an axis. There are also equations for the position, velocity, and acceleration of the circles, and a numbered list of instructions. As an each equation is used, three boxes circle respectively the equation, the instruction, and the circle being affected.**

## 10

3D

**A 3-dimensional surface with a blue sphere on top of it. At the bottom, three circles connected by two lines marked r12 and r23 are moving. The surface has r12 and r23 coordinates, and the sphere on the circle navigates synchronously with the circles moving at the bottom of the page.**

## 11

1. Demonstration

## 12

**A block of Python code using the manim library.**

## 13

**An animation showing a red circle being created, then morphing into a white square, then shifting, down, rotating, and finally fading out.**

## 14

1. Advice

## 15

Strengths

* Precisely controllable
* Well documented
* Interoperable with Python code
* Attractive-looking defaults

## 16

Weaknesses

* Needs Python expertise
* Long development time
* Involves additional editing
* Passive learning experience

## 17

Recommendations

* Re-use as much as possible
* Collaborate
* Publish your source code
* Use in flipped classrooms

## 18

Student quotes

* …videos for this topic were incredibly detailed and well put together…
* Visual materials in the the videos were exceptionally good.
* Introductory lectures were very well done
* The mini-lectures (youtube videos)…were helpful.

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Python in Chemistry: pythoninchemistry.org

Presentation source code: github.com/m-rivera/vicephec\_2024