edulab 21 Gravity interactive Chapter by guided inquiry by Innova Junior College

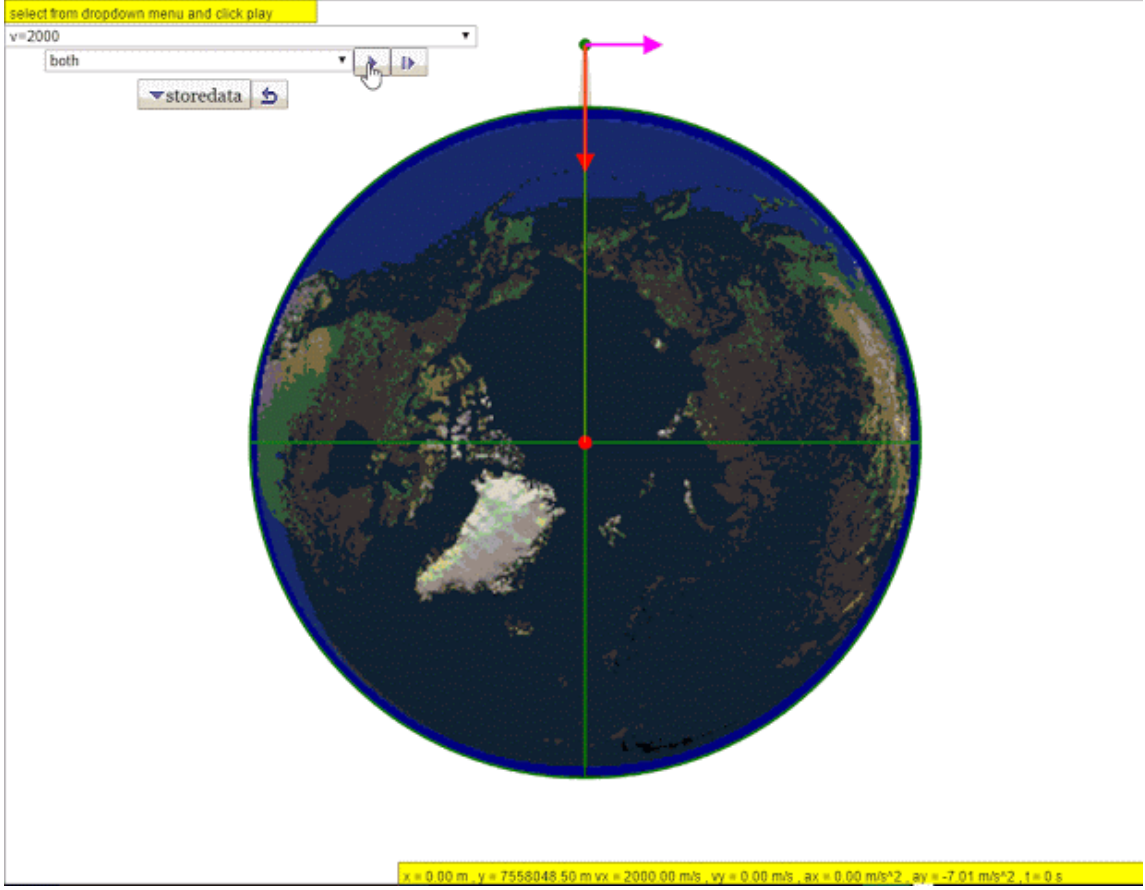
Specific Instructional Objectives

Students should be able to:
show an understanding of the concept of a gravitational field as an example of field of force and
recall and use Newton's law of gravitation in the form |F|=GM1M2/r^2
recall and apply the equation g=GM/r^2 for the gravitational field strength of a point mass to new situations or to solve related problems.
show an understanding that near the surface of the Earth g is approximately constant and equal to the acceleration of free fall.
analyse circular orbits in inverse square law fields by relating the gravitational force to the centripetal acceleration it causes.
show an understanding of geostationary orbits and their application.

Lesson Outline

The lesson was tested & carried out with JC1 as a research edulab21 Modelling-Inquiry Enabled Interactive Textbook
http://edulab.moe.edu.sg/edulab-programmes/existing-projects/nrf2015-edu001-el021
In this lesson,
Gravitational Field Inquiry-based and Simulation-based Lesson,
students are guided to access, download the resources on their computing devices, and work through the simulations and worksheet, thinking like scientists.
Activities encouraged include:
ask questions,
use the simulations
plan the investigation (teacher worksheet guided)
collect data
think using mathematics/computers
argue using evidence (peer group discussion)
explain using evidence
communicate understanding (worksheet)
student independent learning (reviewing the eBook on their own)
More info can be found on
http://ictconnection.moe.edu.sg/professional-learning/edulab-1/communities/ict-in-science

actual resources are available here.
http://iwant2study.org/ospsg/index.php/interactive-resources/physics/02-newtonian-mechanics/08-gravity



ebook link
http://iwant2study.org/lookangejss/epub3/20160707gravity.epub

Assessment of Students' Learning

Students work were captured in the worksheet.

Teacher Professional Reflection.
"I have conducted a lesson on the geostationary satellite where the students explored the different scenarios of satellites orbiting around the Earth using the worksheet that I shared. Some students loaned out iPads from the school while others brought their devices. Students were observed to be exploring the different scenarios and the animations with the relevant equatorial plane and Earth's axis helped students in understanding the concept of geostationary better.

	I have also used the simulation in the eBook to share with students on the escape velocity and what happened when the object is released from rest. The simulation on the Earth-moon system has helped the students to better understand the meaning of the resultant field strength as I could show the field strength of the Earth and the Moon separately. This provides students with the necessary visualisation that helped them to better appreciate the system. I have used the simulations when I lectured the topic on Gravitational Field. I thought it has helped the students in understanding the motion of the satellite around the Earth much better."
Year of Implementation	2016
Subjects	Science, Physics, Science as an Inquiry, Gravitational Fields, Acceleration of free fall, Centripetal acceleration, Geostationary satellite, Gravitational field strength, Gravitational fields, Gravitational vs electric field, Inverse square law, Newton's Law of gravitation, Potential, geostationary orbit, equation for potential, equation for gravitational field strength
Keywords	inquiry, modeling
Language	EN
Education Level	Post-Sec,Tertiary
Cluster	N7
Used By	All,EO,AED,Student
Creator	Ong Chee Wah / ong_chee_wah@moe.edu.sg / Innova Junior College
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Name of Co-Creator(s)	Leong Tze Kwang/ LEONG_Tze_Kwang@moe.gov.sg/ Curriculum Planning & Devt Div 1 Wee Loo Kang/ WEE_Loo_Kang@moe.gov.sg/ Technologies For Learning
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Develop Competencies In	Curiosity and Creativity,Effective Collaboration,Effective Communication,Global Awareness,Management of Information,Managing Complexities and Ambiguities,Metacognition
Project (If Any)	eduLab,ICT in Science Learning Community

photo 1

Multimedia

photo 2

Multimedia

photo 3

Multimedia

photo 4

Lesson Plan

worksheet

Worksheets