

Teaching learning methodologies practiced in the

Department of Geology

Following are 3 methods used :

I. Title : Teaching with Google Earth

Concept: Earth is a free, downloadable application that works as a browser for all sorts of information on Earth. Google Earth provides an immersive and interactive experience for students to learn about our earth. We have used Google earth platform to cover the topics such as "Morphology of the ocean floor" in Marine Geology and Physical geology Courses.

These courses deals with the physical features on the Earth's surface which are usually described elaborately in words however the setback here is not every student has the ability to imagine and make a mental image based on the theory. This tool reduces the possibility of incorrect interpretation as it helps in direct visualisation in 3-dimension and also helps to understand the scale.

Objective:

The technique helps students for better understanding of its dimensions by 3D visualisation of the geological features.

The teaching method would provoke critical thinking among students.

Procedure:

Sample 1.

1. Google earth platform was used to study the bathymetry of the ocean floor. The imagery provided insights into the shape, size and features present in the ocean basins, the locations of various ocean features such as mid-ocean ridges, seamounts, locations of hotspots, trenches, ocean islands, and volcanic arcs were very apparent in the imagery provided by Google earth.
2. Vector Layers of earth surface model, plate boundaries, recent earthquakes, volcanoes in KML format were then overlaid on base map to study relationships of these ocean features to their tectonic settings.
3. The instructor may give a set questionnaire to the students to solve to assess their understanding and to promote/guide the interactive activity.

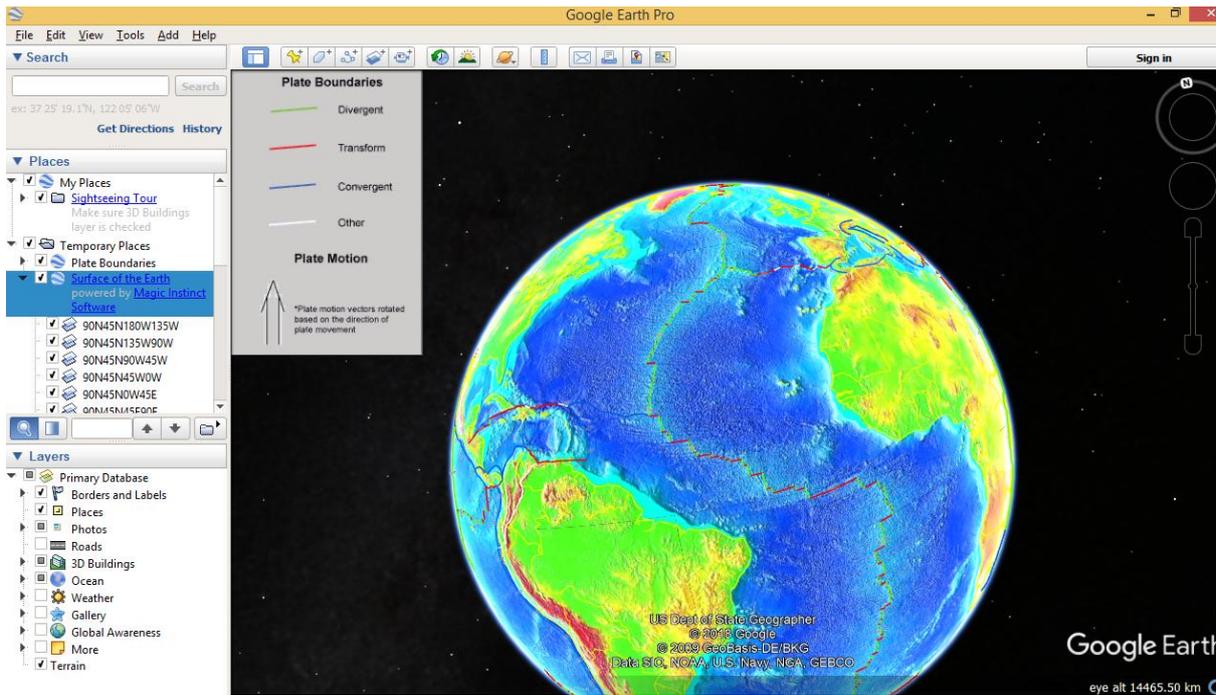


Figure 1: Mid-Ocean ridges. Earth surface model and plate boundary kml overlaid on Google earth depicting plate boundaries and their relation to ocean features

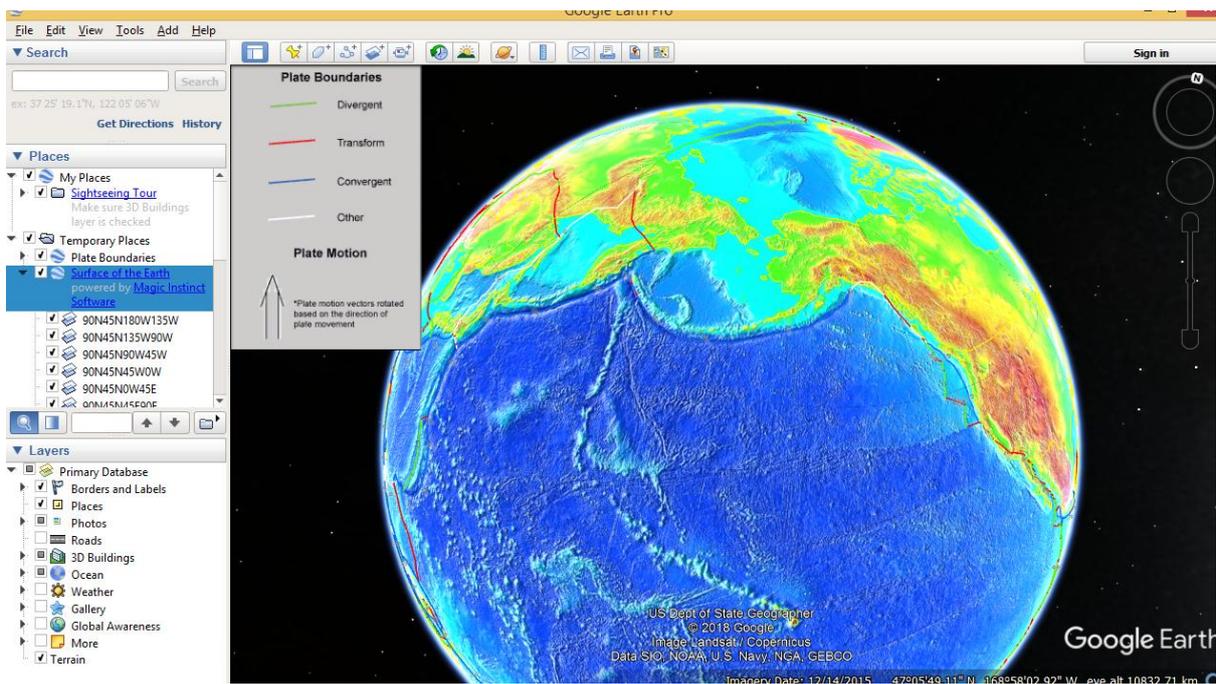


Figure 2: Linear chain of ocean islands and Volcanic arc. Earth surface model and plate boundary kml overlaid on Google earth depicting plate boundaries and their relation to ocean features

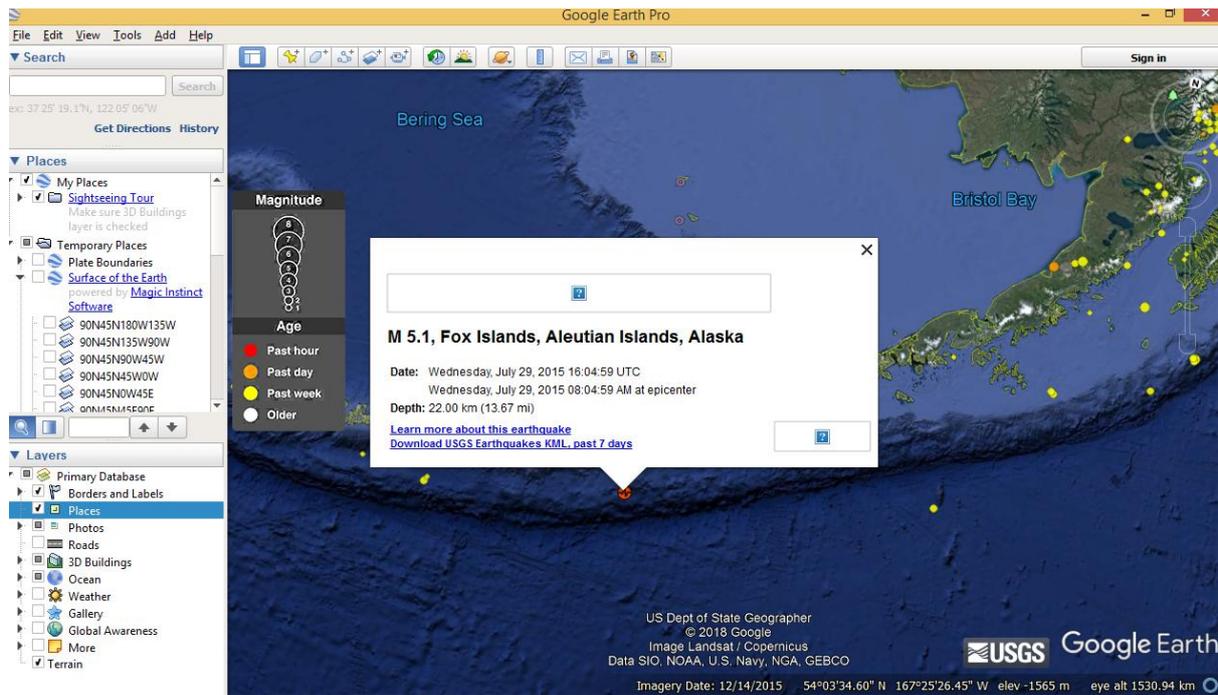


Figure 3: Imagery showing the location of epicentre of latest earthquake, kml updated by USGS.

Outcome: The students were able to actively engage in discussions with one another using the interactive Google Earth platform.

The students were able to access more information about the various attributes of features, such as magnitude time and place of Earthquake, volcanoes etc.

Challenges Faced: Method depends on Internet connection for live interaction of the features and therefore the process could slow down in the case of poor network.

Infrastructure development, involving a dedicated computer Lab with internet connection is required to enhance the experience.

Feedback: This above illustration was conducted by Mr Malcolm Afonso for one of the topics in course of Marine Geology. It resulted in enhanced interaction within the students and brought about new ways of critical thinking evidenced by the nature of questions that they were able to generate.

“The activity as fun and we enjoyed it”, One of the students from Second year 2016-17, Mr Rizlon Quadros commented.

II. Collaborative Learning: Flipped classroom

Concept:

Collaborative Learning is a teaching approach where the teacher facilitates learning by making the students engage in activities (in class or out of class) e.g. Group discussions, Debates, Group projects, Online Video, online discussion forums, online chats etc. In this kind of approach the students interact, evaluate, assess and guide one another to learn from each other as a group and create new knowledge.

Objective: To encourage students to express their views/ideas on the given concept/topic. It also helps to them to learn and appreciate other person's perspective. Thereby enhancing their communication skills and helps them identify gaps in learning.

The method is also very effective in building new ideas, testing them and providing solutions.

Prerequisite:

Content for the topic example Case studies, Documentaries, demonstration videos references, etc. Should be provided to the student.

Procedure: There are various methods by which Flipped classroom can be implemented. Following is one such illustration using "3 Step Interview".

Illustration: 3 step Interview

The said method was conducted the course "Natural hazards and Management" for the second year BSc Geology students by Malcolm Afonso on the topic -" Tsunami".

1. Documentary of the 2004 Indonesian Tsunami, titled "The wave that shook the world" <https://www.youtube.com/watch?v=3YOf44bNzw4> was screened in the classroom.
2. Apart from this additional links were provided to the students to study more about the topic.
3. In the classroom students were divided into groups of three.
4. In each group one student was assigned the role of Investigator, one responder and one note and time keeper.
5. The students were encouraged to ask open ended questions.
6. After a set time of five minutes the students were asked to change roles and the process was repeated.
7. The notes generated were then summarised by one representative from each group.
8. The instructor then guided the discussion to emphasise/clear certain aspects that may have been missed out or may have been misinterpreted.

Some of the other methods include "Team-Pair Solo" and "Round Robin". Refer to blog post of Mr Malcolm Afonso for more details:

<https://newageprofessor.blogspot.com/2017/11/collaborative-learning-flipped.html>



Team-Pair Solo



Three-Step Interview



Round Robin

Outcome:

This resulted in enhanced communication skills like Listening skills and expression through verbal communication and note keeping.

Students were able to identify gaps in their understanding of the concepts

Practiced By / for: Mr Malcolm Afonso for the course “Natural hazards and Management”, “Marine Geology” and “Surveying and Field Geology”.

III. Field based Teaching and Assessment

Concept:

Geology been a field based subject, students are exposed to field training at various places of geological interest within and outside the state of Goa. The training includes field mapping and exposure to the different aspects of Structural Geology, Petrology, Mineralogy, Stratigraphy

Objective: For understanding of theoretical concepts and its variation in field.

Prerequisites: Knowledge of basic concepts in Structural Geology, Petrology, Mineralogy and Stratigraphy.

Procedure:

The basic concepts required for making meaningful field observations are taught in the first two years of the BSC Geology Programme.

These are supplemented with occasional field visits and identification of the features and making necessary measurements of the geological attributes.

In the Third year the students are taken for an exhaustive field study where in they are expected to identify the features at megascopic and microscopic level and correlate it with the concepts learnt earlier, thereby understanding the mode of thier formation.

An field report with all the findings and conclusions is mandatory based on which the student performance is assessed.

Outcome: The understanding of theoretical concepts and its variation on field

Challenges Faced: Currently the field study which is an essential requirement for the subject of geology is self funded by the students so the number of field studies are thereby limited.

Practiced By : Mr. H. S Nadkarni, Dr Meghana Devli, Ms Swati Ghadi, Mr Malcolm Afonso and Ms Magnolia Miranda (Department of Geology).