Open Access Historical Geology Lab Manual

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Rationale & Goals

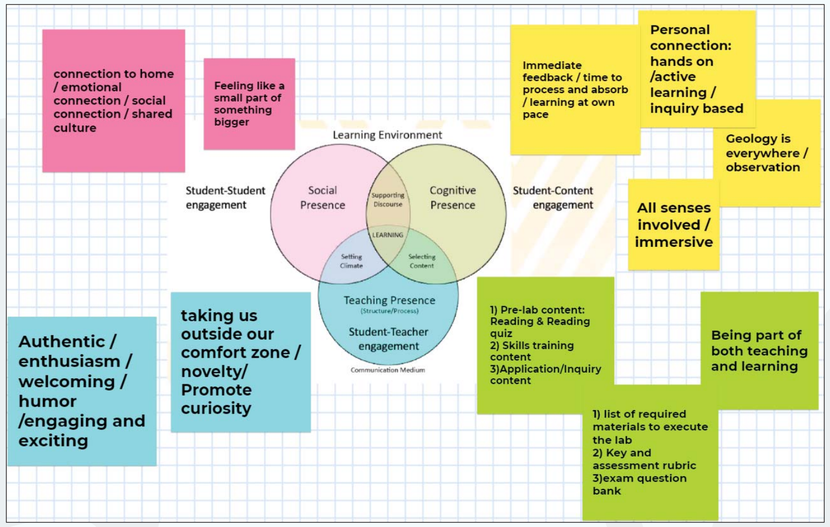
I have drafted an open access Earth history laboratory manual that contains user-friendly exercises that emphasize geological thinking: observations at wide ranging temporal and spatial scales in geographic context and as part of an integrated earth system.

An overarching goal in desiging the manual is to maximize accessibility of instruction. So far I have accomplished 2 primary goals:

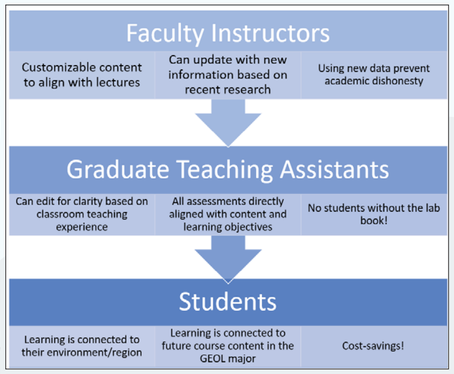
1) blend of low-tech (done with paper and pencil) and digital format, including data aquisition from internet sources and analysis using basic tools to engage students in a vareity of activities that develop diverse skills

2) incorporate content and issues of societal relevance to encourage students attraction to and connection with the geosciences

RIGHT: Meetings with the OER group inspired the development of this jamboard that guided development of the lab manual



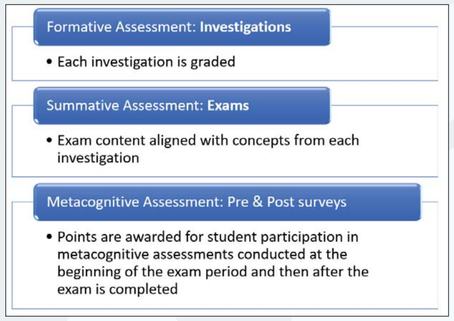
Added Benefit to Instructors and Students:



-I will circulate the lab manual among my colleagues for input regarding content and emphasis and edit according to this feedback.
-Ultimately this will lead to greater cohesion between lab content and lecture/major content

-Graduate student feedback has and will continue to be used to improve lab investigations.
-Having control to edit/customize lab content will improve instruction and no students will be without the manual!

-Students will have a better experience engaging in content that is related to the location of WVU, that links to potential career paths and that is FREE!



This lab manual will be aligned with several assessment mechanisms:

-The investigations themselves will be graded according to keys and rubrics that accompany the manual

-An exam bank will be compiled and aligned to each investigation

-Surveys regarding student attitudes and perceptions as well as reflection on their engagement with material will be developed for Pre- and Post-exam use.

Table of Contents

The lab manual is currently a Google Doc.
It contains 13 laboratory exercises referred to as "investigations"; most investigations have multiple parts.

These activities are currently able to be completed remotely, but plan to adapt the manual fo in-person use in Spring 2022

TABLE OF CONTENTS

Example of Linked Investigations

PART 1: Sedimentary Structure Examples

Instructions:

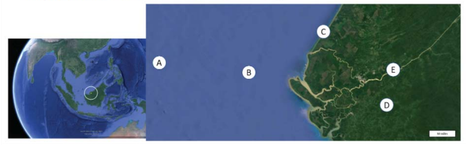
- Identify and sketch each sedimentary structure in the box on the **left-hand column**. Then answer the question/ follow the directions in the right-hand column. You can complete your sketches on a separate piece of paper so you do not have to print out the lab as long as you adequately label your drawings. It may also be helpful to download a gif viewer to view the samples; here's one option. Remember: **draw the sedimentary structure, not just the rock.**

1) Horizontal stratification **(Sample scale: ~6 in./30 cm)**	What environmental conditions produced this horizontal stratification?

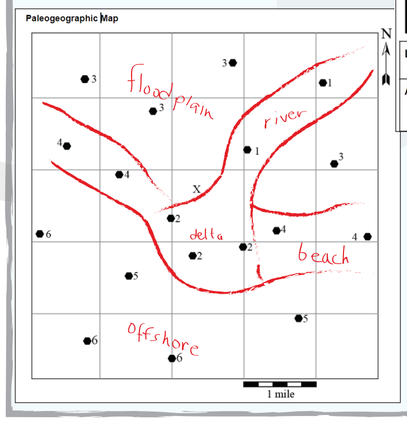
LEFT: Part 1 of Investigation 4 guides students in identification and interpretation of sedimentary structures using digital rock modes in lieu of physical samples

PART 2: Environment of Deposition & Sedimentary Structures

- Below is a Google Earth satellite image of the Rajang River delta located in Malaysia. You have likely never visited this region, but you can discern what types of sedimentary structures are likely to form in the various locations of this delta shown below labeled A-E.
- Examine the map provided and predict which of the sedimentary structures listed would be most likely to be found at the locations indicated on the map.



Location	Environment	Depositional Conditions	Which sedimentary structure would you find there?
A	Offshore	Deep water normally characterized by quiet water conditions at the seafloor; sedimentation mainly occurs during strong storms	



ABOVE: Part 2 of Investigation 4 asks students to consider an unfamiliar area and infer the sedimentary structures that would form based on what they have learned from Part 1

LEFT: In Investigation 5, students are given "unknown" rock samples keyed to locations on the map. They must describe and identify the sedimentary structures in these samples then use that information in spatial context to recreate an ancient delta environment from this synthetic rock record.

Planned Additions:

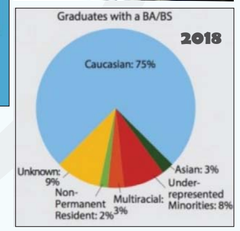
Planned implementation is for Spring 2022; several efforts will be completed before initial use of the lab manual:

1) Finalize investigations and compile aligned instructional materials: powerpoint presentations, intructional guide, answer keys and grading rubrics
- these materials exist in various forms, but need to be developed as a single resource to standardize GTA instruction across lab sections

2) Compile exam questions aligned to each investigation
-will created test bank from current exam questions so they are tied to each investigation

3) Develop surveys for students and instructors to assess metacognition

4) Incorporate information about career pathways that includes diverse representations of geoscientists to aid development of "science identity" and foster sense of belonging among diverse student groups
-hope to get more ideas from a workshop I will help facilitate this summer!



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And thanks to the other OER grant recipients for sharing their thoughts and experiences along the way!