The Evolution of Student Engagement, Interest, and Perception of Geoscience During Challenge-Based Courses: Insights from the GeoFORCE Texas Program

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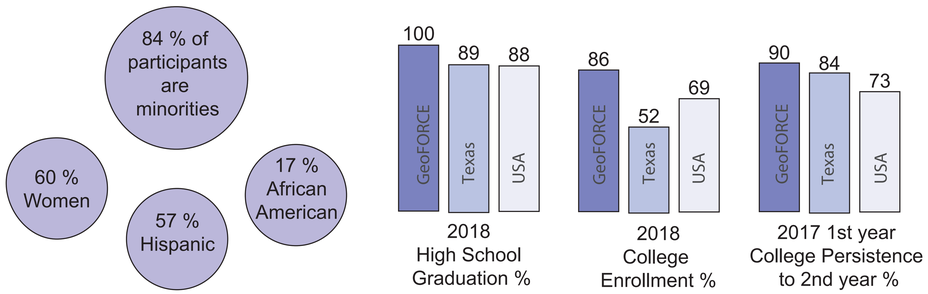
where to find me

GeoFORCE Texas is an out-of-school time K-12 geoscience program that succesfully increases diversity of students pursuing STEM majors. Although 43 % of GeoFORCE alumni in college are STEM majors, relatively few pursue the geosciences. Could geoscience retention rates be improved by teaching in a way that more closely resembles the students' cultures?

GeoFORCE students graduate high school, enroll in college, and remain in college for at least 2 years at a rate that is higher than the average in the United States and Texas.

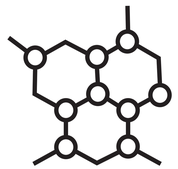


Geology is a less popular college major. How can we improve this?

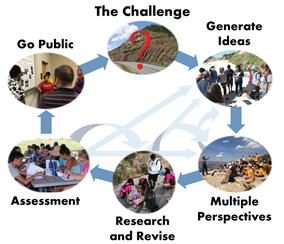
8 % Typically Declare Geology as a College Major

10 % Typically Declare Engineering as a College Major

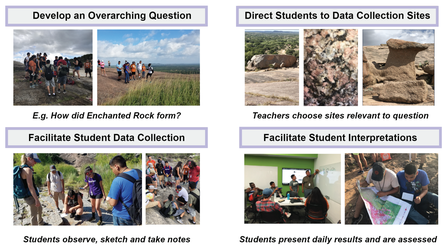
11 % Typically Declare Biology as a College Major



We hypothesized that students prefer learning from group-activities, which more closely resemble their cultures. We test this by modifying the legacy cycle challenge-based pedagogical model to include both group and individual learning activities.



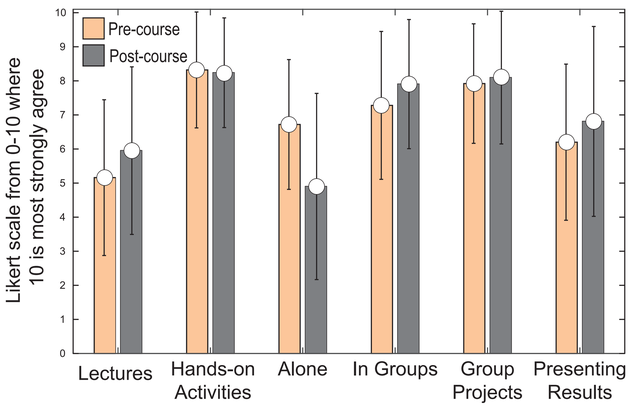
STAGES IN THE LEGACY CYCLE



FIELD PEDAGOGY TECHNIQUE

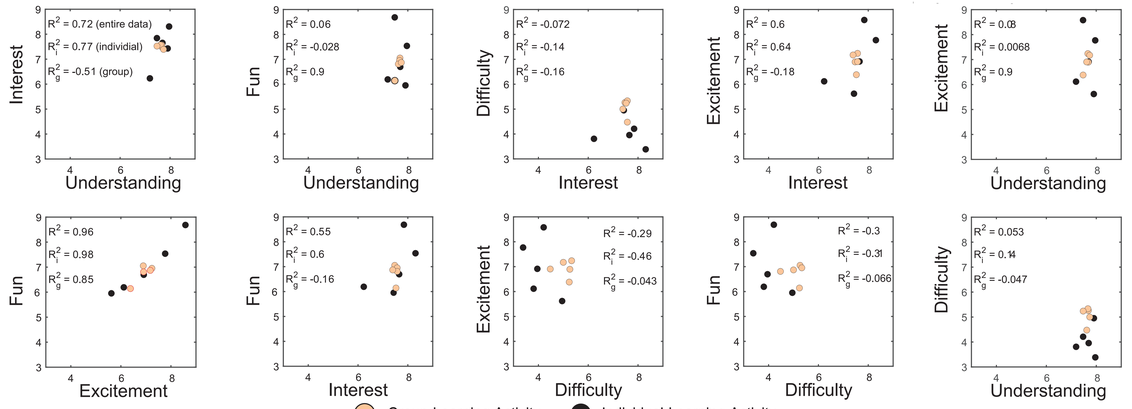
Minority students within the studied cohort (n = 28) prefer learning by doing group activities.
Individual learning activities are less reliable ways of enaging (i.e. exciting and peaking the interests) minority students.

Students prefer learning in groups where they get to engage in hands-on activities.



Survey Questions (n = 28): Do you prefer learning using lectures, hands-on activities, or in groups? How fun are group projects and oral presentations?

Students' response to individual-learning activities was more varied than to group-learning activities.
Difficulty can be increased for group-learning activities without sacrificing student interest, excitement and fun.

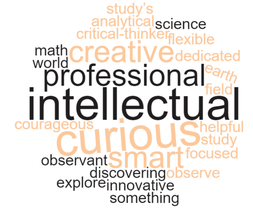


Survey Questions (n = 28): How interested are you in learning more? How fun was this activity? How much did you feel you understood? How difficult was this activity? How exciting was this activity?

Students' perceptions of a geoscientist broadened to include a scientist who not only studies the earth but its history and governing processes.

Pre-Course Responses
A scientist is:

Post-Course Responses
A scientist is:



A geoscientist
Discovers new formations and its causes
Looks at rock to learn about the earth
Infers rock formation
Studies earth and how it functions
Researches oil, gas and rocks

A geoscientist:
Learns about the formation of geologic features
Looks at earth processses and tracks history
Studies the earth, its processes,and how it works
Observe rocks and find their histories
Studies the age and creation of rocks

Prompts: Describe a scientist in three words (Word cloud).
Briefly describe a geoscientist's job description (Quotes).