Geoscience in Two-year Colleges

Katherine Kulick
The College of William and Mary

Supporting Student Success
Teaching English Language Learners in Geoscience courses
States with the largest English Language Learning populations
States with the fastest growing ELL populations (> 200% growth)

States reporting 100-200% growth in ELL population

National Clearing House for English Language Acquisition
2010 Migration Policy Institute
Spanish is the most frequently reported first language for ELLs in the U.S. (43 states)
<table>
<thead>
<tr>
<th>Language</th>
<th>Code</th>
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<tbody>
<tr>
<td>Chinese</td>
<td>zh</td>
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<tr>
<td>Vietnamese</td>
<td>vi</td>
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<tr>
<td>Arabic</td>
<td>ar</td>
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<td>Hmong</td>
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<td>Korean</td>
<td>ko</td>
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<td>Haitian creole</td>
<td>kreyòl</td>
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<tr>
<td>Russian</td>
<td>ru</td>
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<tr>
<td>Tagalog/Filipino</td>
<td>pilipino</td>
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<tr>
<td>Navajo</td>
<td>Diné Bizaad</td>
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</table>
How long does it typically take English language learners to acquire English?
English Language Learners are a very diverse group.
Migrant students
May have significant educational experience, sporadic educational experience, or none at all

Immigrant students
Usually literate & educated in L1
Need help with conversation and listening comprehension

Generation 1.5 students
Non-native speakers of English, graduated from US high school
Spoken English is very strong, need help with writing English

International students
May or may not be literate in L1

Migrant students
Previous educational experience often ‘choppy’ & may have gaps

English Language Learners are a very diverse group.
Teaching English Language Learners in content disciplines

Expectations & assumptions

Culturally relevant pedagogy
Non-verbal behaviors are culturally-acquired.
Non-verbal behaviors are culturally-acquired.

- Eye contact
- Head nodding
- Smiling
- Personal space
- Silence
Roles & expectations in the classroom reflect cultural perspectives
 Roles and expectations reflect cultural perspectives

- Class participation
- Collaborative tasks
- Concepts of time *monochronic / polychronic time orientation*
- Narrative styles
Narrative Styles

Approaches to the study & teaching of science vary among cultures
Approaches to teaching science vary among cultures

‘The rules of science inquiry (...) may be incongruent with the values and norms of cultures favoring social consensus, shared responsibility and respect for authority.’

[Fradd & Lee, 1999]
Students face challenges with scientific notation, vocabulary & syntax
Notations for common functions vary

Brazil, Venezuela, Colombia

France [Wikipedia, 2013]
Words may be used interchangably to refer the same function

**Addition** – *add, plus, and, in all, sum, total, combined together, increase by, more than*

Everyday vocabulary takes on new meaning

E.g. *table, mass, crust, funnel, product, scale, pressure*
Vocabulary challenges

- Homophones create confusion
  e.g. dual/duel, rows/rose, sum/some, sine/sign, cosine/cosign, plane/plain, etc.

- Transition words and words describing logical relationships can be difficult; ELLs often miss (or misinterpret) important signal words
The number ‘a’ is six less than the number ‘b’

\[ a = b - 6 \]  

There are six times as many students in the geology dept as teachers.

\[ 6t = s \]
In 3 more years, Miguel’s grandfather will be six times as old as Miguel was last year. When Miguel’s present age is added to his grandfather’s present age, the total is 68. How old is each one now?
In 3 more years, Miguel’s grandfather will be six times as old as Miguel was last year. When Miguel’s present age is added to his grandfather’s present age, the total is 68. How old is each one now?
Activate student background knowledge

Connect to the real world

Connect to personal experience

Connect to previous study
Provide Scaffolding Support
The geosciences already incorporate many important forms of scaffolding support: photographs, diagrams, models, hands-on laboratory and field experiences.
Essential to provide scaffolding support

- Bridging
- Point out contextual clues
- Developing metacognition
- Schema building
- Modeling
TITLE:
The effect of __________________ on __________________
  independent variable  dependent variable

HYPOTHESIS:
If __________________, then __________________.
  independent variable  dependent variable

There are __________ levels of the independent variable.

The constants are _______________ and _______________.

Number of trials: This experiment will be performed __ times.

The results will be measured by ____________________.

Kleiber & Walsh, 2010
CONCLUSION:

Our results demonstrate that the effect of ____ on ___ is ___.

I will record _____ on the x-axis and _____ on the y-axis.

The graph/table/chart shows _____________________.

If we had __________, then ________ might have been ________.

There may be _____________ errors in our data.

In our data, the hypothesis was (not) confirmed by ________.
Use graphic organizers systematically, to teach *both* relationships among concepts *and* the language needed to express those relationships. [Tang, 1992]

<table>
<thead>
<tr>
<th>Venn diagram</th>
<th>Cause &amp; effect</th>
<th>Cycles</th>
<th>Semantic web</th>
<th>T-Charts</th>
</tr>
</thead>
<tbody>
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<td>Comparing &amp; contrasting two entities</td>
<td>Illustrating a Relationship</td>
<td>producing a series of connected events or a process</td>
<td>Connecting categories to themes or topics</td>
<td>Sorting or Categorizing objects or concepts</td>
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We each view the world through our own cultural lens.
From your perspective, what are the challenges that ELL students encounter in geoscience courses?

What are the challenges that you face in teaching this group of students?

Supporting Student Success: English Language Learning Students