Development of a Knowledge Assessment for an Introductory Petrology Course

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What is a knowledge assessment?

- Cover all course modules.
- Completed online on Connect.
- Students do not answer the questions.
- Students assess their ability to answer the question.

What do phenocrysts and porphyroblasts have in common?

A. I do not understand the question, I am not familiar with the terminology, or I am not confident that I can answer the question well enough for grading purposes at this time.

B. I understand the question and (a) I am confident I could answer at least 50% of it correctly, or (b) I know precisely where to find the necessary information and could provide an answer for grading in less than 20 minutes.

C. I am confident that I can answer the question sufficiently well for grading purposes at this time.

When are the knowledge assessments completed?

Pre: before the start of the module

Post: at the end of the module; due right before the midterm

What content do the knowledge assessments cover?

- Igneous rocks
- Sedimentary + igneous rocks
- Metamorphic + sedimentary rocks
- All modules

- ~20 questions per module

Why did we develop a knowledge assessment?

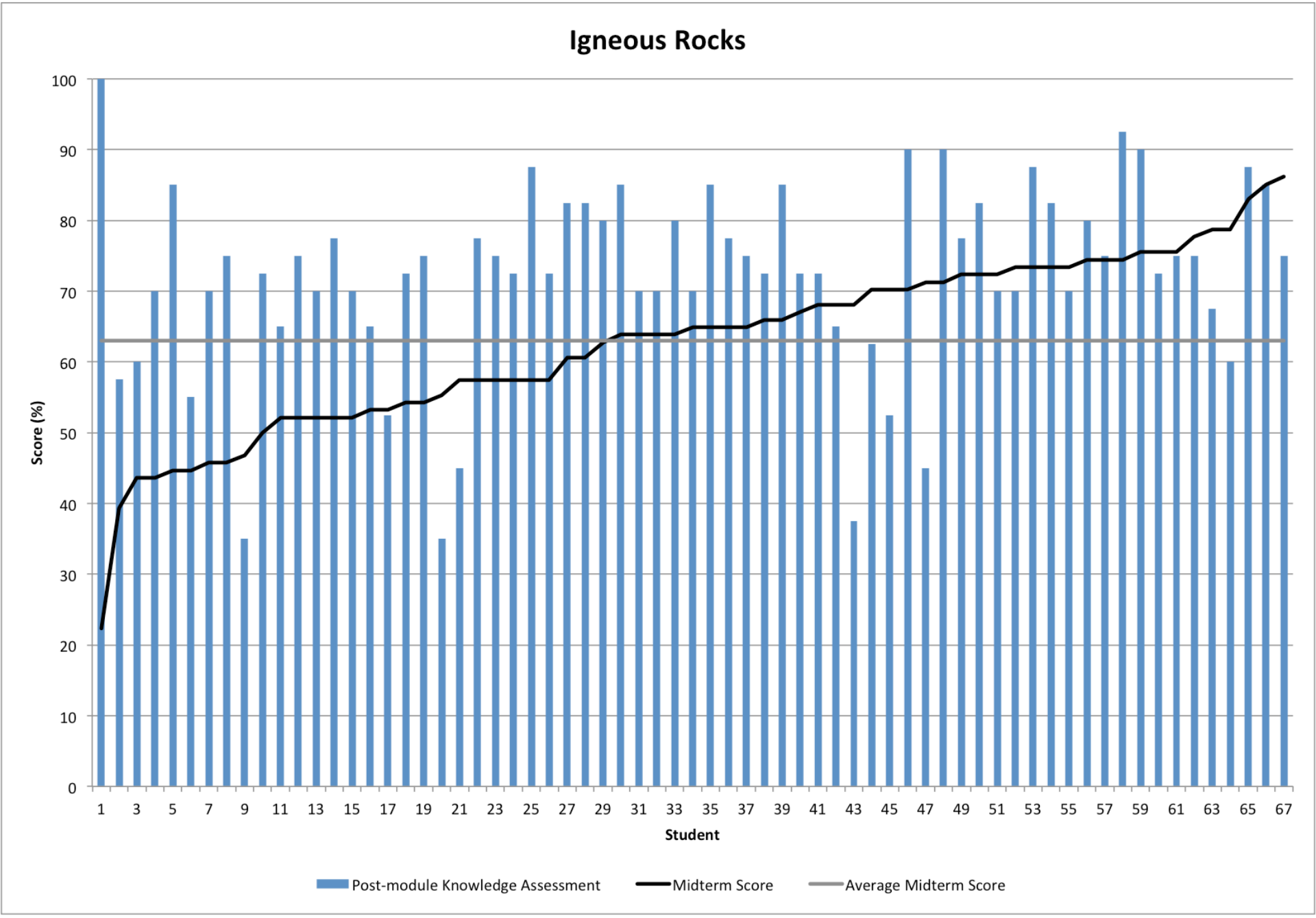
- Course content is explicit before beginning of the module
- Useful study guide
- Tool to self-assess preparation for an exam

To answer the following questions...

How accurately can students assess their ability to answer questions?

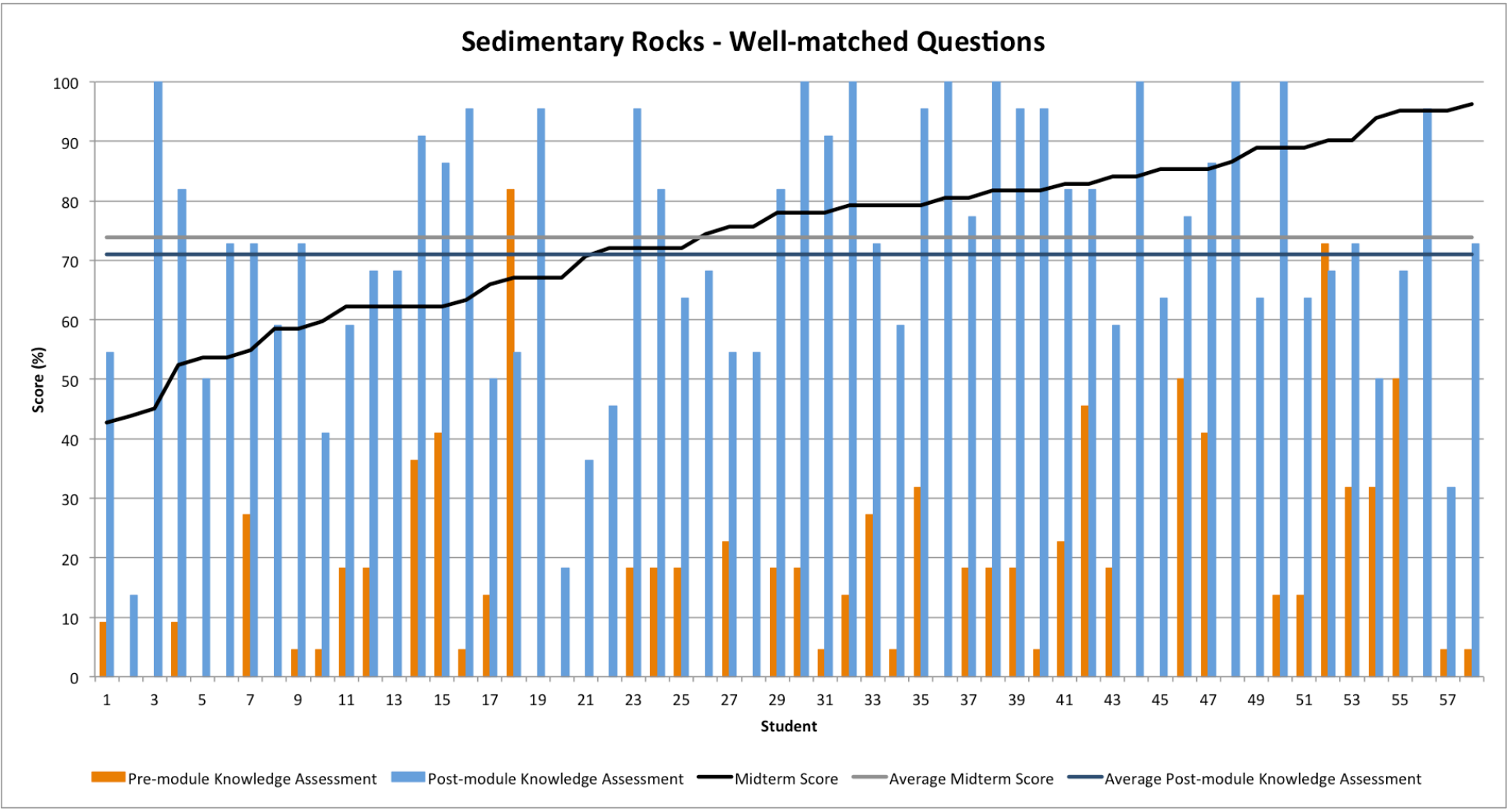
Does their ability to self-assess increase throughout the term?

Can knowledge assessments be used to measure learning gains?


Igneous Rocks
100
90
80
70
60
50
40
30
20
10
0
Score (%)
1
3
5
7
9
11
13
15
17
19
21
23
25
27
29
31
33
35
37
39
41
43
45
47
49
51
53
55
57
59
61
63
65
67
Student
Post-module Knowledge Assessment
Midterm Score
Average Midterm Score

Observations: Igneous Rocks

- Approximately one-third of students accurately assessed their knowledge.
  - Students with higher midterm marks were better at self-assessing.


Sedimentary Rocks - Well-matched Questions
Score (%)
100
90
80
70
60
50
40
30
20
10
0
1
3
5
7
9
11
13
15
17
19
21
23
25
27
29
31
33
35
37
39
41
43
45
47
49
51
53
55
57
Student
Pre-module Knowledge Assessment
Post-module Knowledge Assessment
Midterm Score
Average Midterm Score
Average Post-module Knowledge Assessment

Observations: Sedimentary Rocks

- Students think they can answer more questions correctly from pre- to post-module KA
  - Rarely, their perceived ability decreases (e.g., student 18)
- Some students accurately assessed their knowledge on the post-KA (e.g., student 41)
- Some students completed the KA before studying, lack self-assessment skills, or lack confidence in their abilities (e.g., student 20)
- Some students lack self-assessment skills, don't perform well in exams, or completed the KA inaccurately (e.g., student 14)

Conclusions

- How accurately can students assess their ability to answer questions?
  - Approximately one-quarter of students accurately assessed their knowledge on the sedimentary midterm.
- Do students' abilities to assess their knowledge increase throughout the term?
  - More data is needed.
- Can knowledge assessments be used to measure learning gains?
  - If the question concepts are matched with a portion of the questions on the exams, then yes.