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Specifications Grading in a First Course in Abstract Algebra

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Specifications Grading in a First Course in Abstract Algebra

Abstract

Specifications grading offers an alternative to more traditional, points-based grading and assessment structures. In place of partial credit, students are assessed pass/fail on whether or not they have achieved the learning outcomes being assessed on a given piece of work according to certain specifications, with limited opportunities for revision of non-passing work. This talk will describe the learning outcomes and specifications grading system I used in my Fall 2016 abstract algebra course, as well as student responses.

Keywords

abstract algebra, testing, learning, college students

Disciplines

Algebra | Higher Education

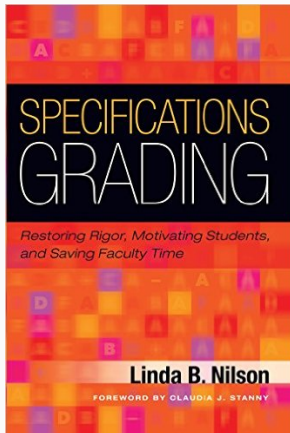
Comments

Presented at the 2017 Joint Mathematics Meetings in Atlanta, Georgia, on January 4, 2017.

SPECIFICATIONS GRADING IN A FIRST COURSE IN ABSTRACT ALGEBRA

Mike Janssen
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INTRODUCTION



THE MAIN QUESTION

What do you want students to learn, and how will you know when they've learned it?

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What do you want students to learn, and how will you know when they've learned it?

Or:

What are the (explicit) student learning targets, and what assessments will you use to gauge student progress toward mastering these learning targets?

Grade your assessments Pass/No Pass according to set *specifications*, allowing sufficient opportunities for revision, according to whether students have met the learning targets.

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- Solutions to proofs and problems should be free of errors.
- If you wish to use a result we have not proved in class or you have not proved on an earlier homework problem, it should be stated as a lemma and proved independently.
- All solutions must be typeset using the free, open-source mathematical typesetting system, \LaTeX .

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The specifications are designed to encourage *self-regulation*: metacognition, strategic planning, and evaluating personal progress against a standard.

- Assign final grades by counting the amount/depth of work completed at a satisfactory level; more hurdles or higher hurdles (or both)?
- Students are encouraged to choose their grade goal and *only do the work they need to do in order to achieve that goal.*

MY COURSE

MATHEMATICAL CONTENT TARGETS (38)

The mathematical content on which I wanted students to demonstrate competency.

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- **Example:** “R5 – I can determine whether a given subset of a ring is an ideal.”
- **Example:** “G2 – I can verify elementary properties of groups using basic definitions.”

DEMONSTRATING CONTENT COMPETENCY

Each content objective assessed twice:

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1. First time: 1–3 problems on regular weekly homework assignments
 - Collaboration encouraged
 - Problems tagged with learning target (usually one target/problem)
 - Must earn passing designations on all problems tagged with a given learning target in order to earn credit
 - One free revision allowed on learning targets given good faith effort

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 - One free revision allowed on learning targets given good faith effort
2. Second time: 1 problem on take-home exam
 - No collaboration allowed
 - One free revision allowed on learning targets given good faith effort

MATHEMATICAL PRACTICE TARGETS (5)

The habits I want my students to develop.

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- **Example:** “P3 – I worked on a homework problem outside of class with at least one other person on at least three different occasions.”

Demonstrated competency by noting it in their writeup.

MATHEMATICAL PRACTICE TARGETS (5)

The habits I want my students to develop.

- **Example:** “P3 – I worked on a homework problem outside of class with at least one other person on at least three different occasions.”

Demonstrated competency by noting it in their writeup.

- **Example:** “P4 – I was stuck on a problem but got unstuck by reading the book on at least three different assignments.”

Demonstrated competency by writing a footnote explaining in 2–3 sentences what they had learned by reading the book.

- Copious feedback given on initial submissions – where it went wrong, and a nudge in the direction of a correct solution
- Revisions due one week after initial feedback, re-uploaded to LMS
- Students given tokens to use to extend deadlines, get a second (or third) revision, or revise non-GFE work

FINAL GRADES (SIMPLIFIED)

Grade	Homework (43)	Exams (38)	Reflections
A	41	27	6
B	39	21	5
C	37	17	4
D	31	14	3

PLANNING FOR THE FUTURE

- Refine learning targets: clearer and more specific.
- Introduce higher-order tasks for A/B students
- Incorporate active/flipped learning work (GFE)

- Enforce the specifications early and often (and ruthlessly!); this is where the rigor lives.
- Teach the class once traditionally first and write learning targets as you go for next time (what do you *really* value?)
- Submit work electronically when possible to more easily manage the flow of student work in and out and back in
- Leave time for revision at the end of the semester (little/no new material or work the last week)

THANKS!

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