Types of Assignments — what kind? how many?

Cameron H.G. Wright
Dean of the College and Professor of Electrical and Computer Engineering
chgw@uwyo.edu

August 19, 2020

Abstract

I'll describe various types of assignments you might use in your course, and interactively discuss the advantages and disadvantages of each. I'll link Bloom's Taxonomy and student learning styles to the type of assignment, then discuss the "right" number and types of assignments for a course. Some potentially useful tips are provided.

Overview

- The Two Roles of an Instructor
- The Many Faces of an Assignment
- Why Do Students Hate Assignments?
- Bloom's Taxonomy, Learning Styles, and Assignments
- How Many Assignments Do You (the Instructor) Need?
- How Many Assignments Do Your Students Need?
- Assignment Advantages/Disadvantages
- Tips from the Trenches
- Assignments are Linked to Assessment
- Conclusions

The Two Roles of an Instructor

Never forget that an instructor must balance two conflicting roles. You are:

1. a **coach**, motivating and cheering on your students to embrace the subject matter, enjoy the course, and contribute to the class
2. a **gatekeeper**, ensuring that *only* those who master the subject matter to a predetermined extent are allowed to "pass"

The first role is enjoyable; we're on the students' side and we can share in their struggles and their success. How to be a good coach is left for other presentations.

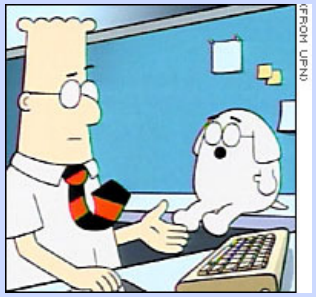
The second role is *harder*: it often puts us in direct conflict with our students. In order to effectively do our job as **gatekeeper**, we must somehow assess and quantify student achievement objectively. In most cases, that means we need to give and grade assignments of some sort.

The Many Faces of an Assignment

There are many types of assignments! In engineering, the more common ones are: homework problems, in-class quizzes, take-home quizzes, computer projects, design or analysis projects, in-class exams, other proctored period exams, take-home exams, written topic survey or report, oral presentation, lab exercises, lab books, and lab practicums.

Some of these can be further divided into individual assignments versus team assignments.

Which types of assignments should you choose for your course? Why, exactly the same kind of assignments that *you* were given when you took a similar course, right?



Hmmm. . . What do you think?

Why Do Students Hate Assignments?

Not every student will hate every assignment, but *some* students will hate *all* assignments, and *all* students will hate *some* assignments! Why is that?

Remember that just because *you* liked a certain kind of assignment when you were a student, that doesn't mean all (or even most) of the students in your class will feel the same way.

Actually, it's highly likely that most of them will *NOT* feel the same way you did!

Your Myers-Briggs type and/or learning style almost surely isn't the same as most of your students—or you wouldn't have pursued a PhD.

More details about the Myers-Briggs Type Indicators (MBTI) and learning styles are part of another presentation.

- Always remember that *most* of your students are *different* from you!
- So they view assignments differently than you did.

Why Do Students Hate Assignments?

Students hate assignments for many reasons, such as:

- feeling threatened by being measured and graded,
- not understanding the instructions,
- trying to balance other commitments,
- struggling with the material,
- being dissatisfied with the grading,
- not wanting to work hard enough. . .
- **Any others?**

Bloom's Taxonomy, Learning Styles, and Assignments

Levels of **Bloom's Taxonomy**: Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation. (more on this in another presentation)

How and when do you nudge students to higher levels of thinking?

For each question or part of an assignment, think about where it falls in Bloom's Taxonomy. Strive to balance a particular assignment across different levels of thinking as appropriate for the course.

Strive to balance all the assignments in your course relative to the level of thinking required.

For example, don't just give homework primarily at one level, such as Analysis, then give an exam that concentrates mainly on some other level, such as Synthesis (i.e., design)!

- Can you give some potential assignment questions, and identify where they belong on Bloom's Taxonomy?

Bloom's Taxonomy, Learning Styles, and Assignments

But don't forget this: Can you tie each question or part of an assignment back to your course objectives?

Learning Styles: there are many ways to classify or categorize learning styles. For example:

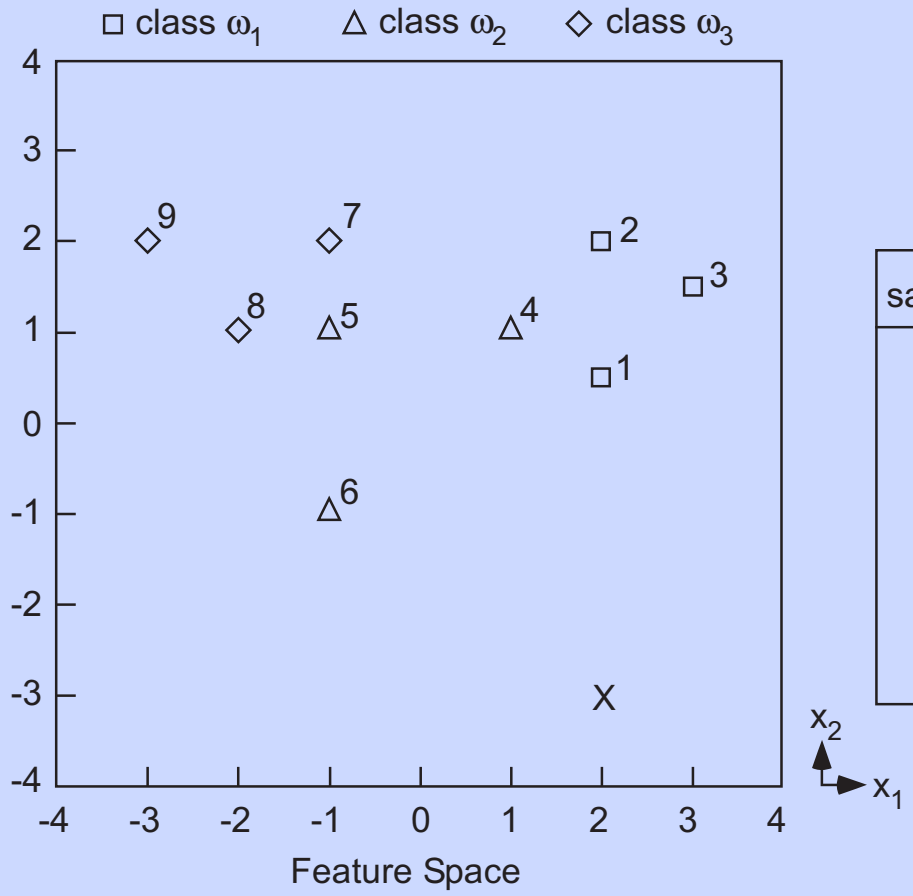
- visual versus auditory learners
- textual versus graphical learners
- sequential versus global learners
- Others?

Learning style is also affected to some degree by influences such as a student's culture, gender, and experiences.

Pop Quiz: Can you think of how you might devise an exam question that appeals to **both** textual **and** graphical learners?

An exam question from a graduate-level course in pattern recognition:

Apply the k-Nearest Neighbor Rule (k-NNR) to classify the test vector given below for $k = 1$, $k = 3$, and $k = 5$.

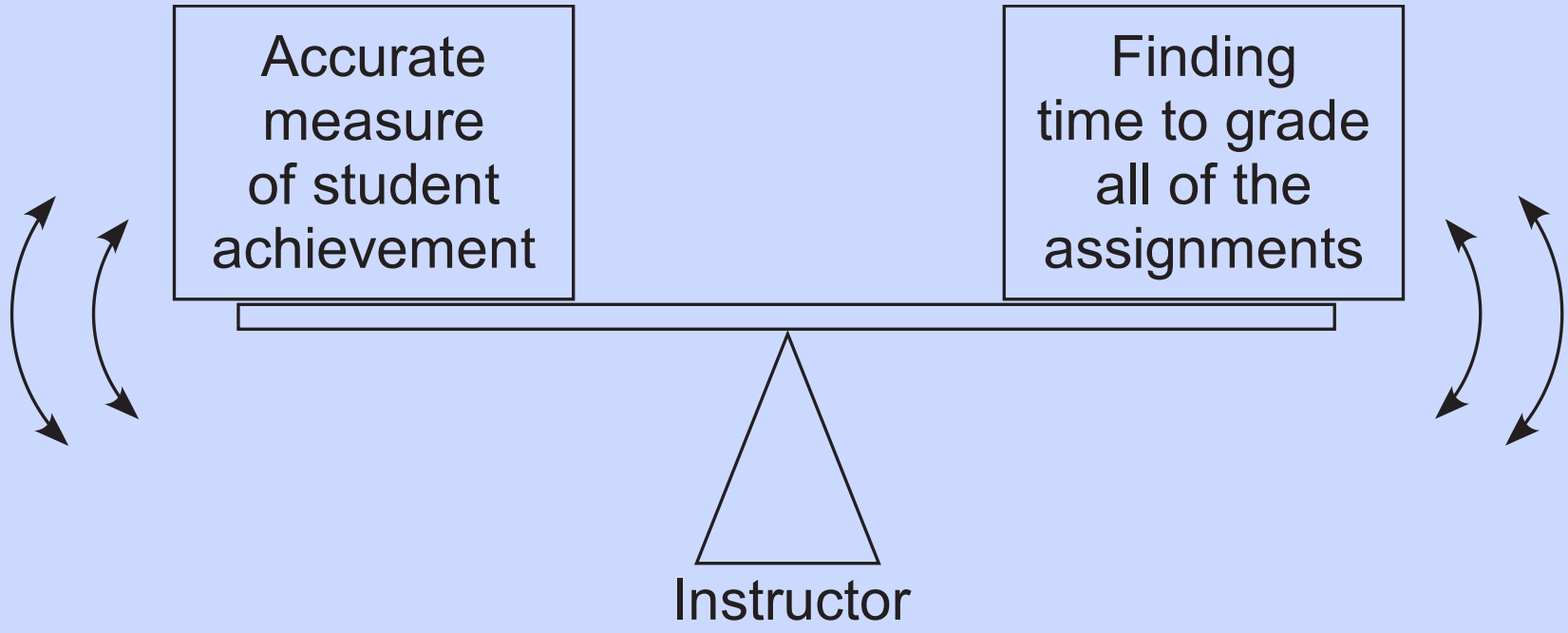


new test vector: $\begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} 2.0 \\ -3.0 \end{pmatrix}$

sample	x_1	x_2	class	distance	note
1	2.0	0.5	ω_1		
2	2.0	2.0	ω_1		
3	3.0	1.5	ω_1		
4	1.0	1.0	ω_2		
5	-1.0	1.0	ω_2		
6	-1.0	-1.0	ω_2		
7	-1.0	2.0	ω_3		
8	-2.0	1.0	ω_3		
9	-3.0	2.0	ω_3		

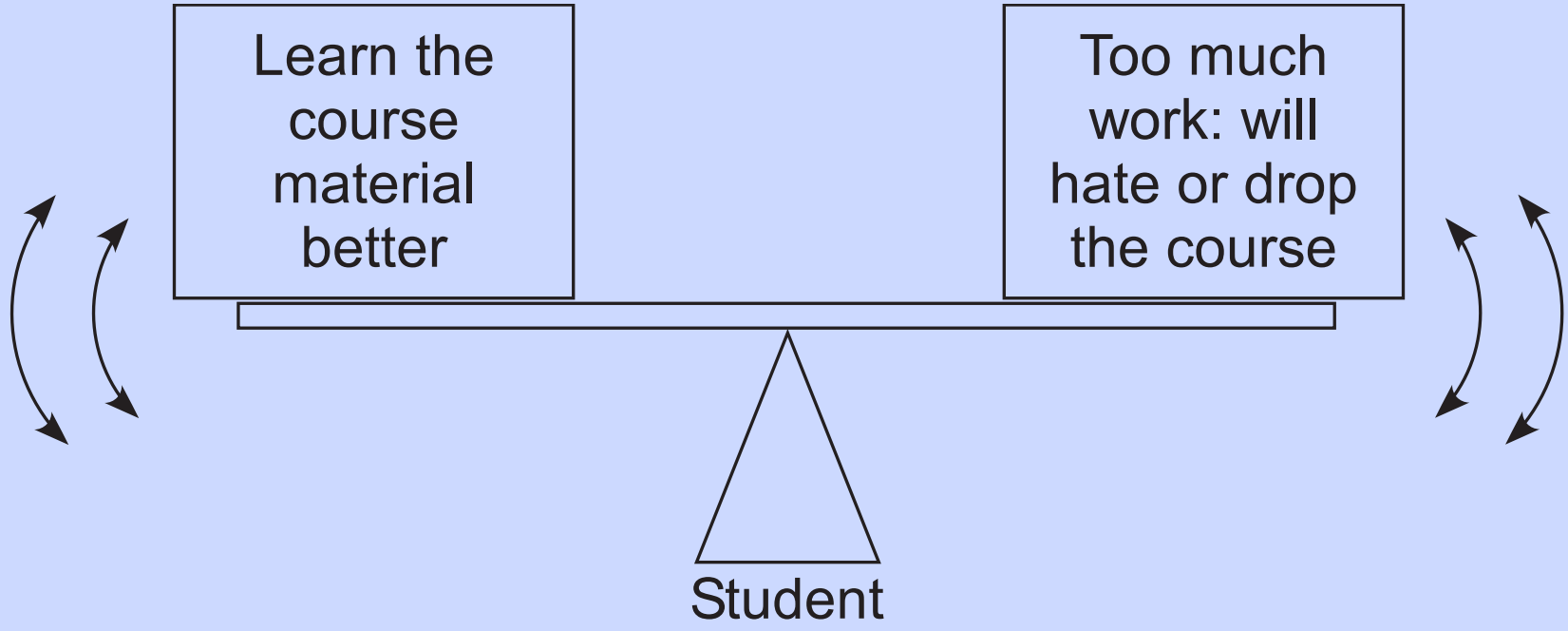
Classification by 1-NNR:
Classification by 3-NNR:
Classification by 5-NNR:

How Many Assignments Do You (the Instructor) Need?



Not just how many, but what type? For example, multiple choice exams are easy and quick to grade, but students tend to score lower compared traditional engineering exams. Plus, to write a *reasonably accurate* multiple choice exam requires *many* questions, all designed rather carefully. Online Learning Management Systems (LMS) are just now starting to become useful for the complexity of engineering course assignments.

How Many Assignments Do Your Students Need?



Students understand they need to put a certain amount of work into the course to learn the material. But you should explicitly convey to them that *you* take the course workload *very seriously*, and that you understand they have *other* courses and commitments.

Assignment Advantages/Disadvantages

What do *you* think?

Type	Advantages	Disadvantages
homework problems		
in-class quizzes		
take-home quizzes		
computer projects		
design projects		
in-class exams		
other period exams		
take-home exams		
written topic report		
oral presentation		
lab exercises		
lab books		
lab practicums		

Tips from the Trenches

- An exam, homework, or quiz question itself can be an opportunity for more learning. You can ask questions in such a way that you force students to think of things they might not otherwise have considered.
- An exam or quiz with a very low average score is demotivating to most students. It takes more effort to craft an exam or quiz you're confident will have an average in the 70 or 80 percent range, but it's worth it.
- Return graded material as quickly as possible. One or two lessons later is ideal; longer than that and it loses its effectiveness as a feedback mechanism.
- Try to convey to the students how much effort you put into creating fair and appropriate questions, and how much effort you put into fairly and thoughtfully grading their answers to such questions.
- Two-person project/lab teams can cut your grading load in half, and teach students how to work as part of a team. But more than two per team can often result in someone taking a "free ride."

Tips from the Trenches (continued)

- Letting students choose their own team members or not is up to you, but consider giving them an opportunity to "fire" their team partner after the first project. Announce that ahead of time.
- Have team members "grade" each other in some way and let the class know it ahead of time. Respect confidentiality.
- Homework or take-home quizzes should cover more difficult and/or more lengthy material compared to time-limited exams. Hardly anyone thinks at maximum efficiency under the mental pressure of a time-limited exam.
- An exam cover sheet can emphasize the overall exam instructions and also reinforce expectations of student integrity.

Assignments are Linked to Assessment

Most departments rely on the instructor to assess the courses they teach

But the ABET Program Evaluator will be looking to see *how* you arrived at your assessment, and assignments play a key role here

- Just making a subjective "judgment call" that your course is "doing fine" raises a red flag to an ABET Program Evaluator
- A well crafted set of assignments can provide you with a quantitative, objective metric for your course

Additional opinions on this can be found in the article *Getting More "Teaching" out of "Testing" and "Grading"* from the **Tomorrow's Professor** e-mail listserve moderated by Rick Reis of Stanford University

Highly recommended!!! Anyone can subscribe to the very helpful content provided by Tomorrow's Professor:

`https://mailman.stanford.edu/mailman/listinfo/tomorrows-professor`

Conclusions

The decisions you make regarding the number and types of assignments in your course will have *major ramifications* for:

- your ability to assign grades fairly,
- your students' learning level and persistence of learning,
- your grading workload during the semester,
- your students' attitude about the class (and about you),
- your ability to assess how the course is going, and
- other things we haven't even thought of. . . !

Don't forget to consider the different levels of thinking (e.g., Bloom's Taxonomy), the different learning styles, and your course objectives.

Bottom line: think very carefully about what assignments you give.