Let’s talk about teaching – EXAMS

A structured (open) discussion

May 21, 2019: Steve Hines

Overall Objectives

**Break down the silos!**

Through discussion & reflection, explore how our individual philosophies and practices align with our peers – and whether they seem appropriate.

Are there practices more of us should be following?
Part 1: Objectives

1. Explore the concept of “desirable difficulty” as it might apply to exams – and be reflected in exam statistics.

2. Share methods by which we adjust exam scores – and discuss whether we even should.

Part 2: Objectives

3. Collaboratively explore how & why we share EXAM STATISTICS with our students – and the pros & cons of our methods.

4. Explore our shared (or not) philosophies on the PURPOSE of exams – e.g. assessment tools versus learning tools.

Controversy!

5. Share our ideas on whether we should RETURN graded exams to our students – and why or why not.
Discussion Questions

1. What is an appropriate exam mean?
2. Is it appropriate to adjust student scores to hit a targeted mean? If so, when and how?
3. Should we share exam statistics – with our students; with each other?
4. Should graded exams always be returned to students – why or why not? **
5. What is the purpose of an exam?

Survey: Exam Means

DVM program
• n = 21
• MEAN = 85.1%
• SD = 4.2
• Range = 80 – 100 %
• Mean Min. Pass = 72%

Undergraduate program
• n = 11
• MEAN = 79.6%
• SD = 4.16
• Range = 72 – 85%
A desirable difficulty is a learning task that requires a considerable but desirable amount of effort, thereby improving long-term performance.

Research suggests that while difficult tasks might slow down learning initially, the long term benefits are greater than with easy tasks.

However, to be desirable, the tasks must also be accomplishable (i.e. not so difficult as to be overly frustrating or stress inducing).

The term DESIRABLE DIFFICULTY was first coined by Robert A. Bjork in 1994. [1]
The “sweet spot”

Flow
Anxiety

Level of Challenge

Level of Skill

https://blogs.scientificamerican.com/observations/how-wrong-should-you-be

https://www.biorxiv.org/content/10.1101/255182v1

The Eighty Five Percent Rule for Optimal Learning

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Abstract

• Researchers and educators have long wrestled with the question of how best to teach their clients be they human, animal or machine. Here we focus on the role of a single variable, the difficulty of training, and examine its effect on the rate of learning.

• In many situations we find that there is a sweet spot in which training is neither too easy nor too hard, and where learning progresses most quickly. We derive conditions for this sweet spot for a broad class of learning algorithms in the context of binary classification tasks, in which ambiguous stimuli must be sorted into one of two classes.

• For all of these gradient-descent based learning algorithms we find that the optimal error rate for training is around 15.87% or, conversely, that the optimal training accuracy is about 85%.

• We demonstrate the efficacy of this ‘Eighty Five Percent Rule’ for artificial neural networks used in AI and biologically plausible neural networks thought to describe human and animal learning.

Figure 4: Proposed relationship between the Eighty Five Percent Rule and Flow.

(A) Original model of flow as a state that is achieved when skill and challenge are well balanced.

(B) Normalized learning rate, \( \delta E / \delta \beta \), (B) and accuracy (C) as a function of skill and challenge suggests that flow corresponds to high learning and accuracy, boredom corresponds to low learning and high accuracy, while anxiety is associated with low learning and low accuracy.
Discussion Questions

1. What is an appropriate exam mean?

2. Is it appropriate to adjust student scores to hit a targeted mean? If so, when and how?

3. Should we share exam statistics – with our students; with each other?

4. Should graded exams always be returned to students – why or why not? **

5. What is the purpose of an exam?
Part 2: Objectives

3. Collaboratively explore how & why we share EXAM STATISTICS with our students – and the pros & cons of our methods.

4. Explore our shared (or not) philosophies on the PURPOSE of exams – e.g. assessment tools versus learning tools.

Controversy!

5. Share our ideas on whether we should RETURN graded exams to our students – and why or why not.

Collaboratively explore how & why we share EXAM STATISTICS with our students – and the pros & cons of our methods.

- How many share exam statistics with students?
- Why?
- Your methods? (e.g. statistics shared)
Fall, Year 2 – DVM curriculum

Concept: Students can -

• gain some sense of overall exam difficulty – as reflected in class performance
• measure their own performance relative to their peers
• NOT define themselves as “above or below” average

Scores are put into pools to discourage meaningless comparisons
Additional statistics are NOT provided

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