

Immunology: Beyond the Textbook

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Learning Objectives

1. Understand varied approaches to developing clinical and basic immunology curricula beyond the “textbook”
2. Implement common adult learning theory concepts
3. Elevate learning approaches to immunology

Curriculum goals and development

Educational content as well as delivery options

Incorporate playfulness and fun

Use variation in approaches:

Gamefication or “serious games”

Alter space/environment

Q Do you have a curriculum for basic immunology

TIPS FOR SUCCESS

**Begin at the end:
Identify desired outcome,
and work backwards!**

**Create learning objectives
and establish relevance: adult
learners need to know “why”**

**Consider content AND
approach**

What is your age?

26-35



36-45



46-55

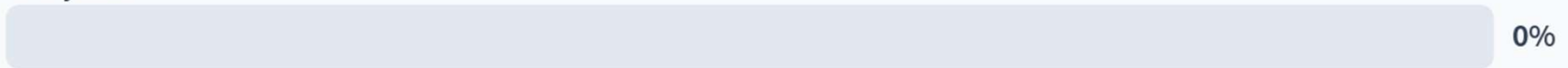


55+



How long have you been a Program Director/Associate Director?

0-3 years



4-6 years



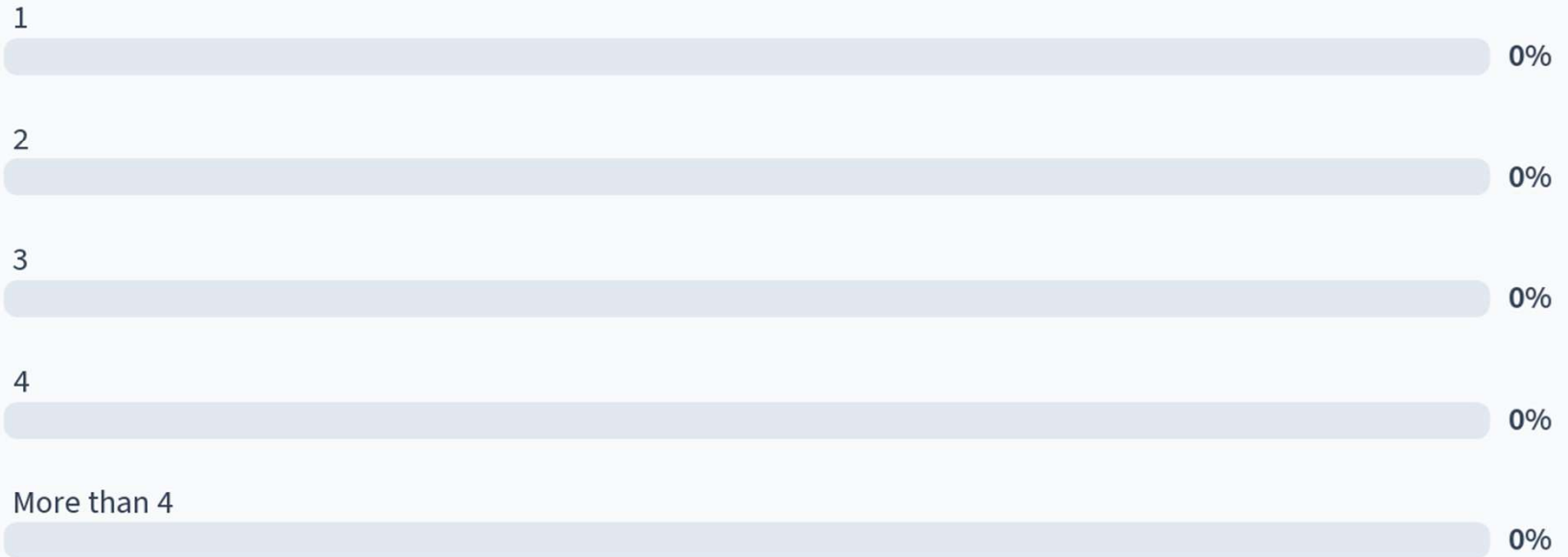
7-12 years



12+ years

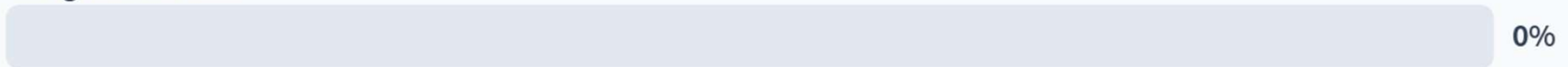


How many clinical fellows join your program each year?



What is your role in education?

Program Director



Associate Director



Clinical Teaching Faculty

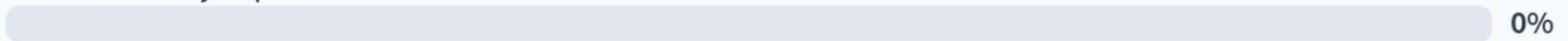


Other

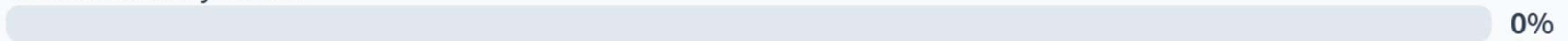


Are your immunology lectures/sessions:

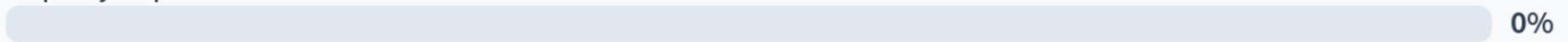
Predominantly in person



Predominantly virtual



Equally in person and virtual



None of the above



Something else (e.g. a separate course)



How many people at your institution are responsible for teaching immunology?

Its fellow led, faculty are not involved

0%

Just the PD and/or APD

0%

PDs and other core faculty

0%

PDs, core faculty and other immunology faculty

0%

None of the above

0%



Q: “Real world examples” or best practices for curriculum development in your programs

POWERFUL TEACHING



**UNLEASH
THE SCIENCE OF
LEARNING**

POOJA K. AGARWAL, Ph.D. AND PATRICE M. BAIN, Ed.S.

make it stick



The Science of Successful Learning

Peter C. Brown
Henry L. Roediger III
Mark A. McDaniel

Flipped classrooms

Traditional classroom



Flipped Classroom



How often is a flipped classroom used for teaching immunology in your program?

Not at all



Sometimes



Frequently



Almost all the time



Retrieval practice

Retrieval is a strategy not an assessment

Allows for deeper connections, and organization of knowledge



Approaches to Retrieval Practice

Think-pair-share

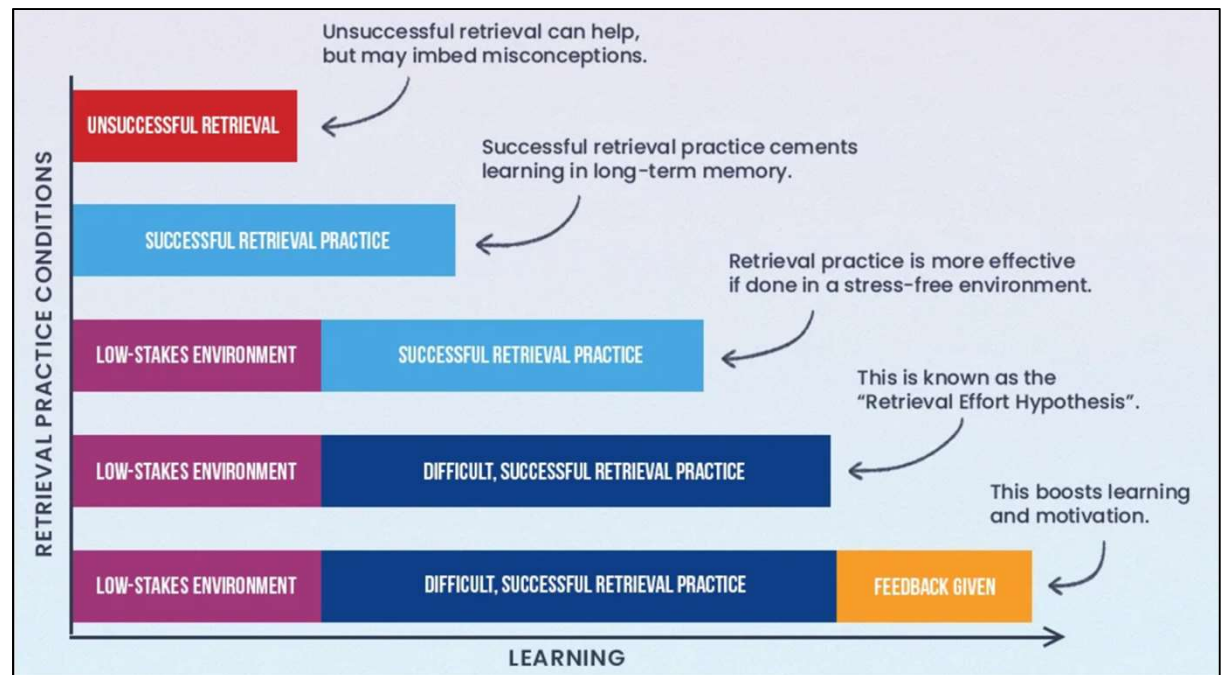
Hints

“Two things”

“Brain dumps”

Practical Challenges

Real-time retrieval





Make a simple switch



encode

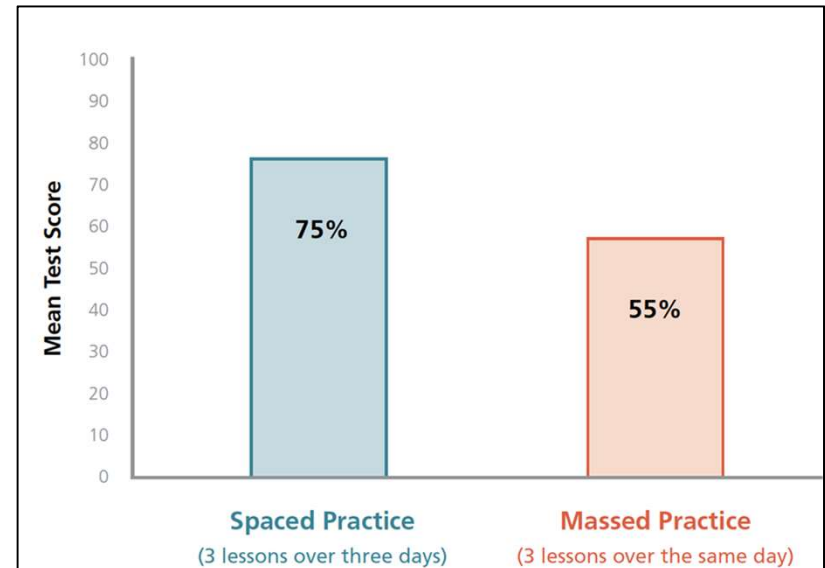
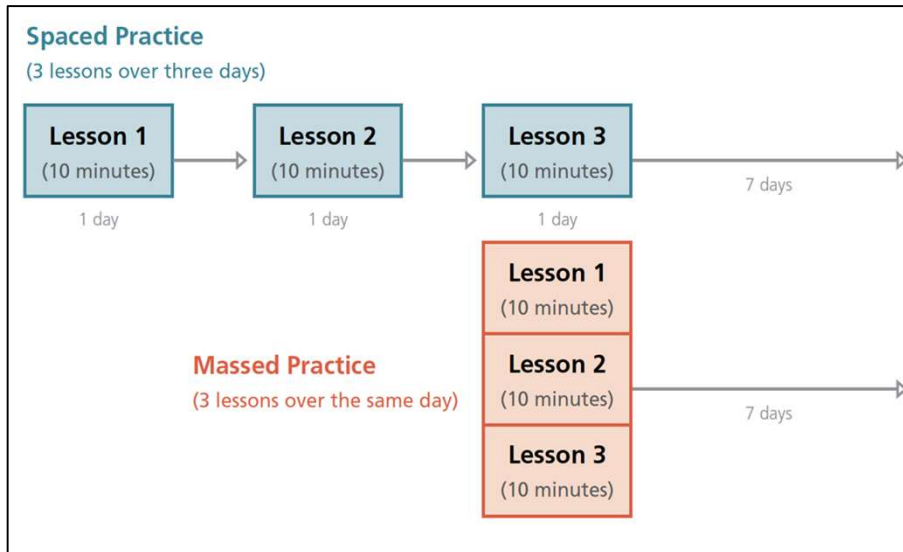
Here's what we did last week.

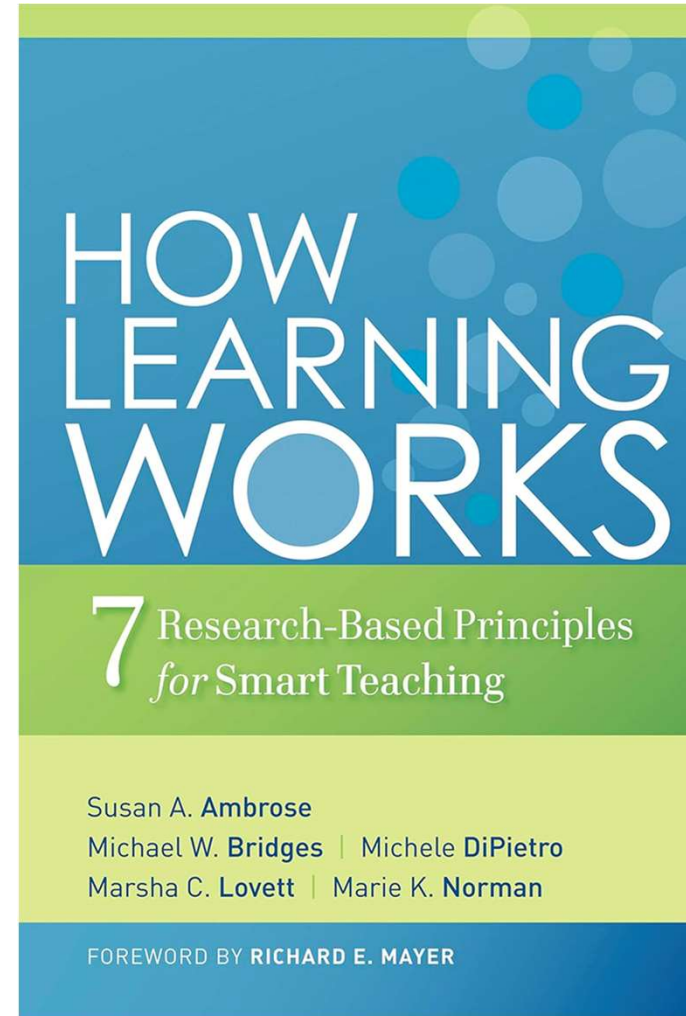
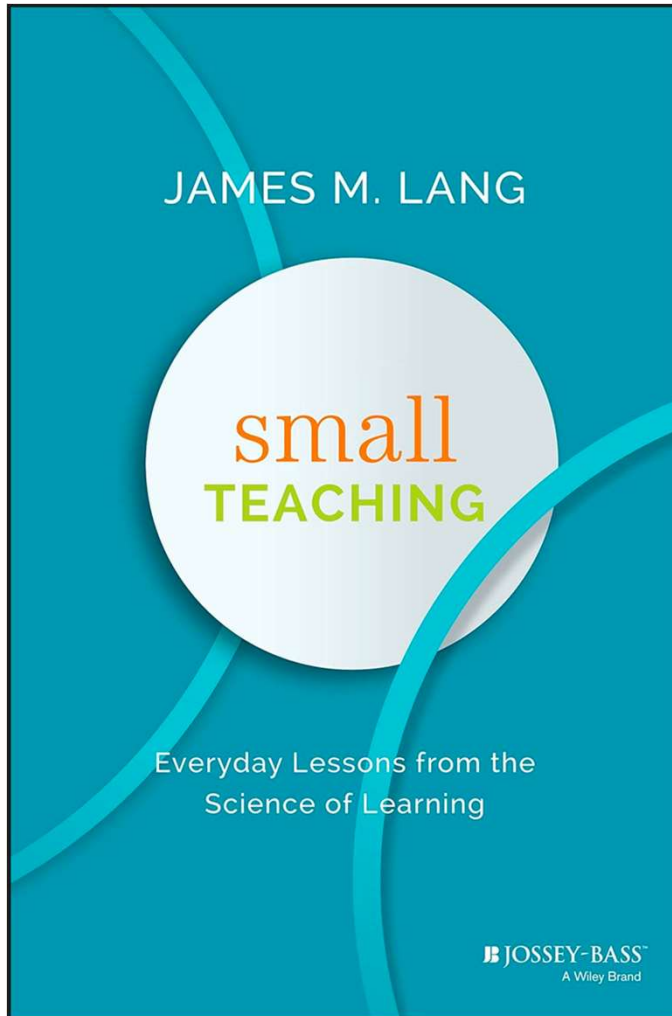


retrieve

What did we do last week?

Spaced Learning





Q: Are there other books or resources programs have used or provide to faculty related to optimal learning or teaching?

Interleaving

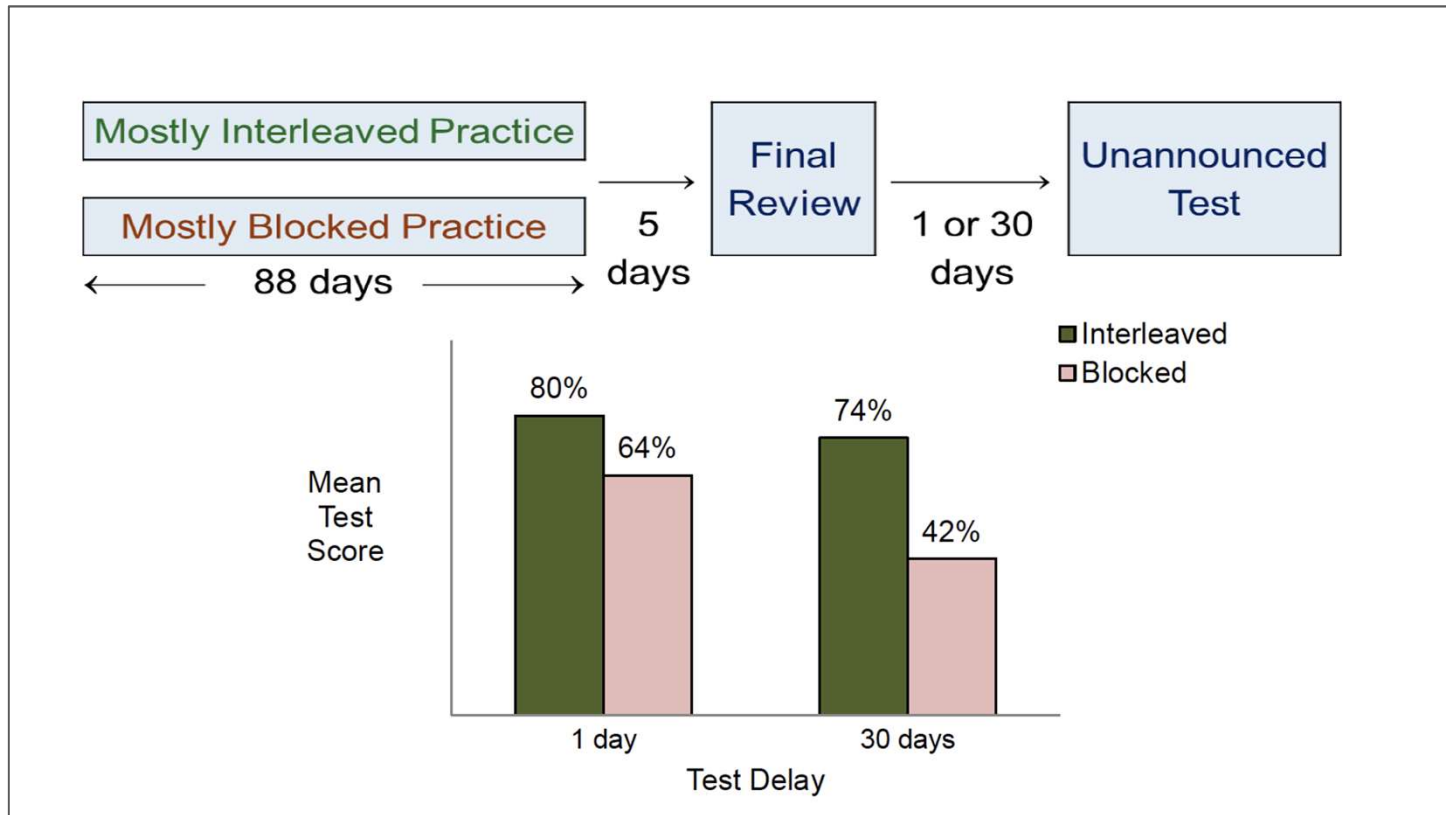
Variety (content or type of problem/presentation)

Interspersing or building on concepts

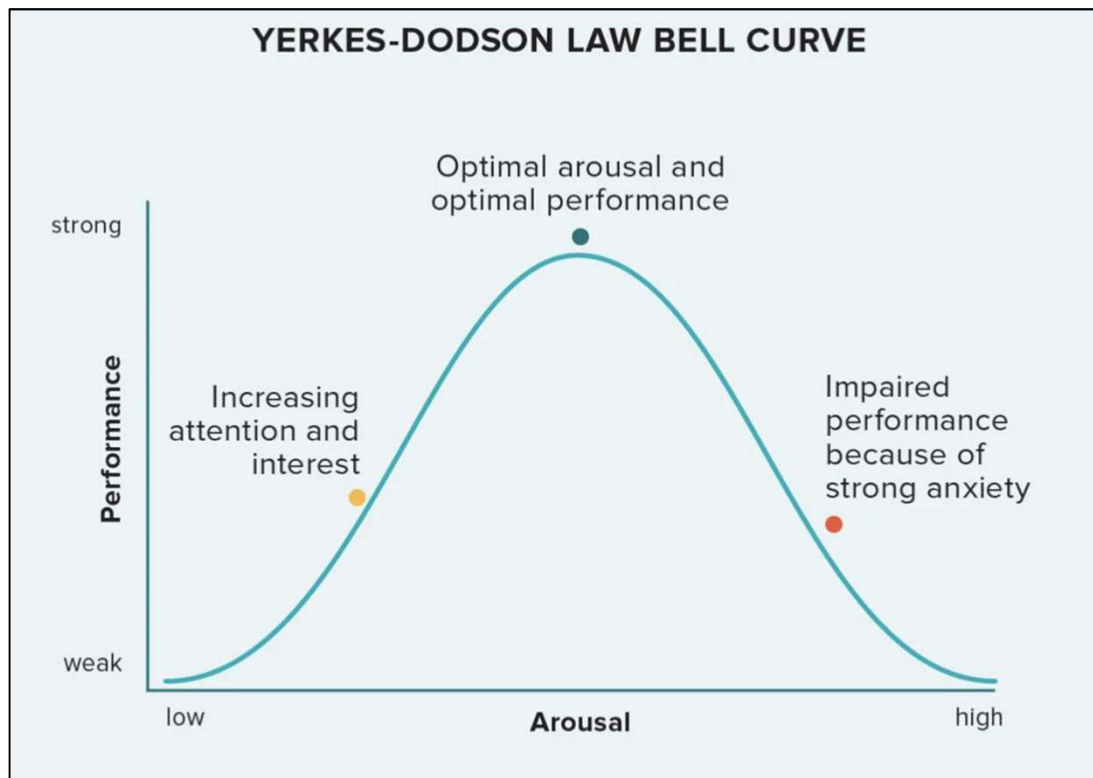


Q: “Real world examples” or best practices for learning in your programs

The Illusion of Mastery



Level of engagement and performance



Serious Games (that aren't hard)

Jeopardy (Board review)

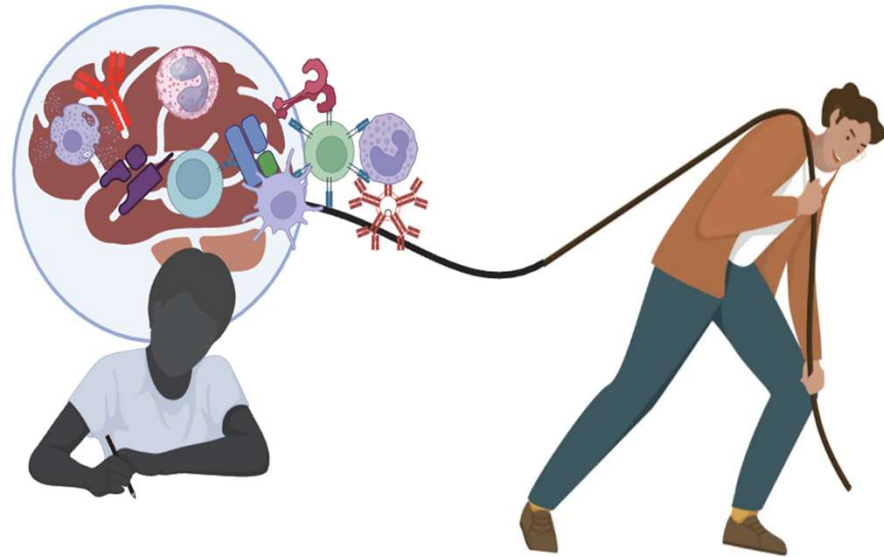
Kahoot

Polling

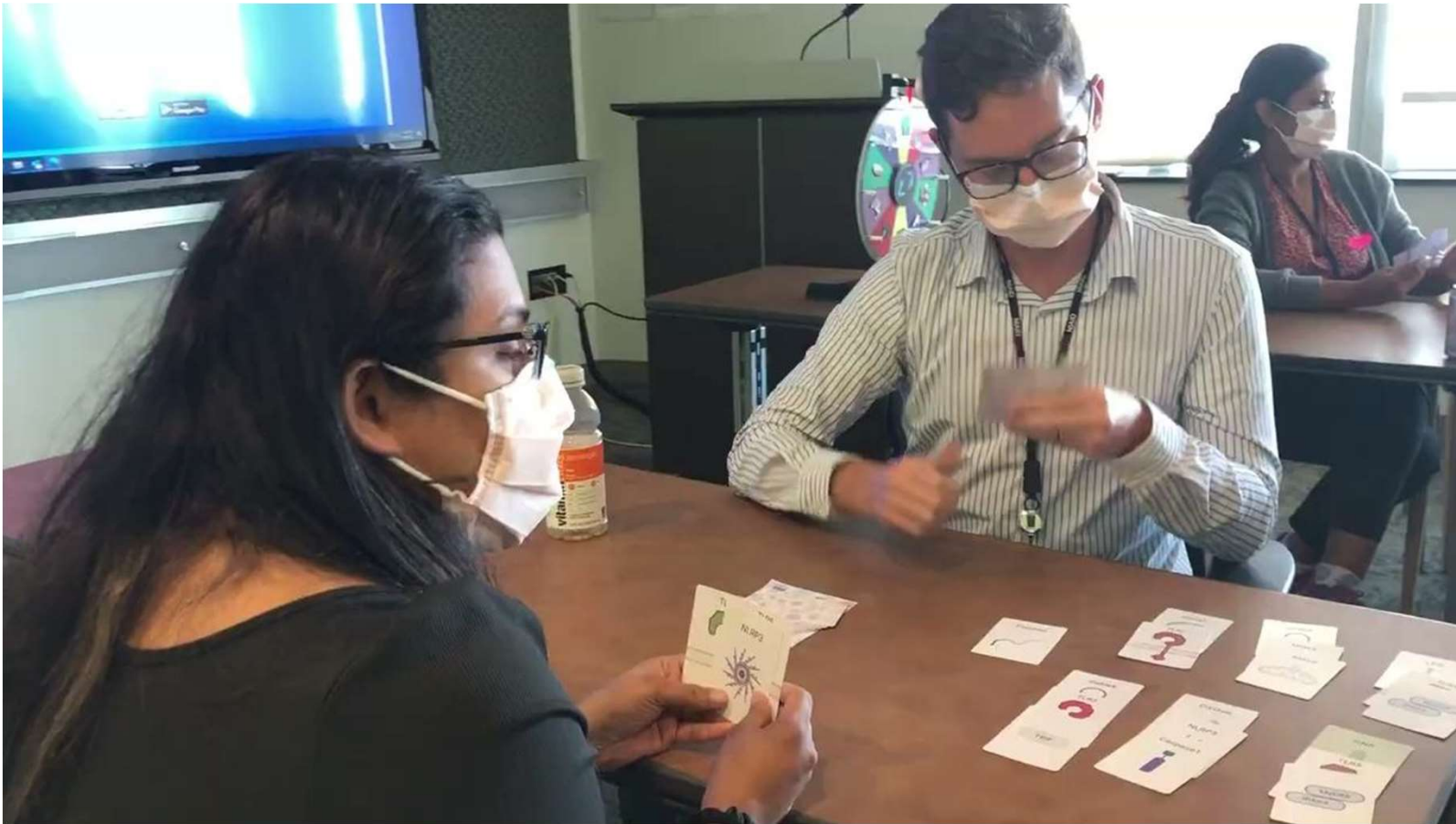
Incentives (bribery?)

Quick recall e.g. "Name that"

Battle of the Biologics



Simple immunology games



More complex immunology games



Generative Practices

Active participation in learning

Tools or methods can be adapted to suit the learners and topics

Methods can include:

- Drawing
- Building (Blocks etc)
- Explaining
- Mapping



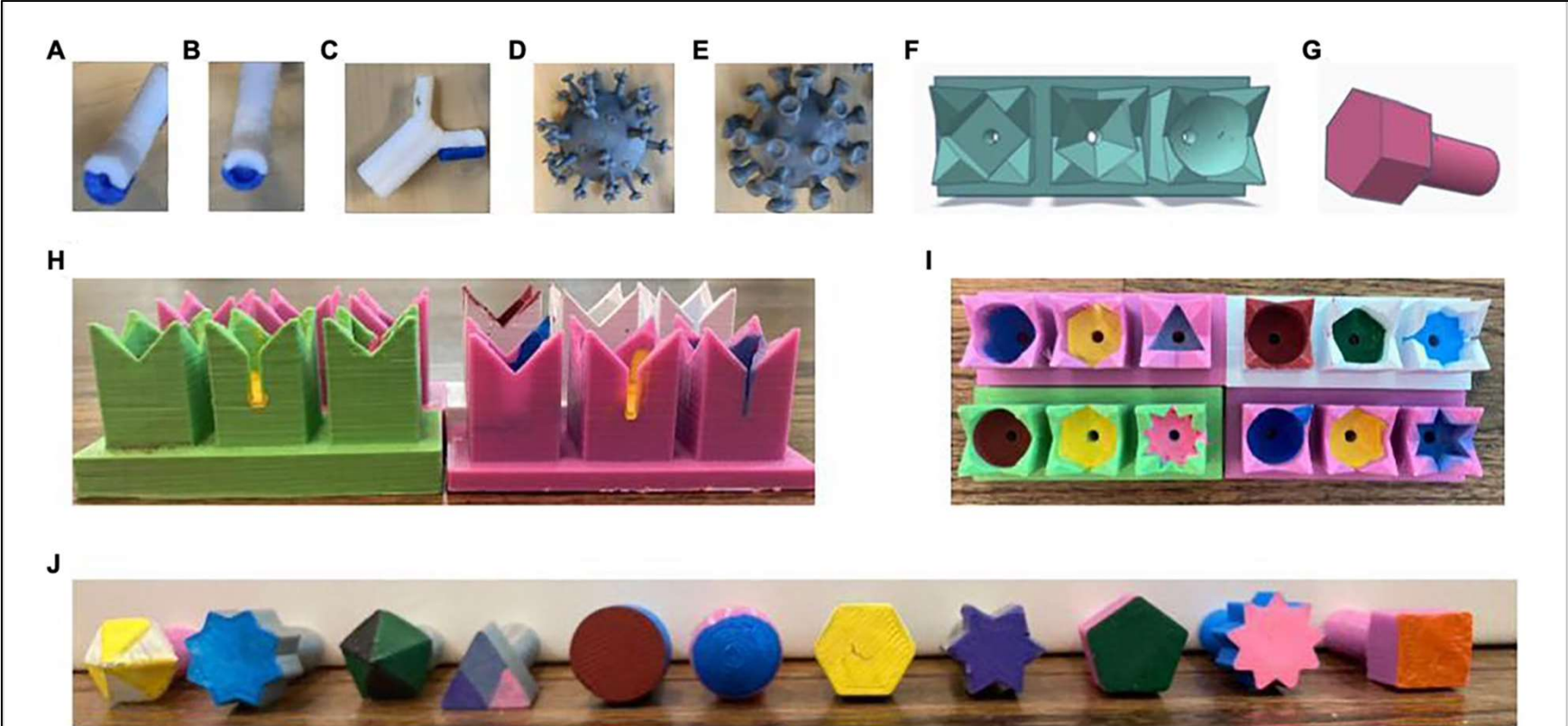
Generative practice with 2D printing activities



Simple but “serious” games



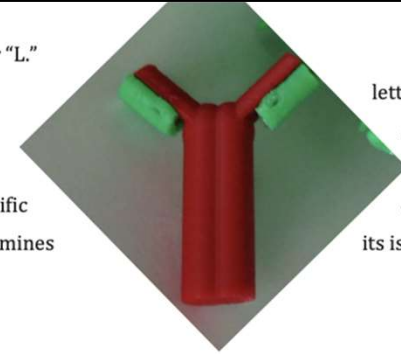
Types of 3D printing activities



Example of a 3D printing activity in a flipped classroom

Before you begin...

1. Label the light chains of this antibody with the letter "L."
2. Label the heavy chains of this antibody with the letter "H."
3. Draw rectangles around the variable regions on this antibody.
4. Circle the constant region(s) on this antibody.
5. Draw an arrow to the region that may bind to a specific epitope.
6. Draw a star on the region of this antibody that determines its isotype/class.



letter "H."
antibody.
epitope.
its isotype/class.

7. What is/are the antigen(s) in this picture?
8. Where are the potential epitopes?



After this activity, you should be able to:

1. Describe how antigens and epitopes are related.
2. Explain why some antibodies get made that do not bind to any epitopes.
3. Discuss which regions on the heavy and light chains come together to bind to a specific epitope.
4. Identify the region on the antibody that determines its class or isotype.

Q: “Real world examples” in your programs

Authentic learning spaces

Psychological safety: all of the activities described are best in a no or “low” stakes environment

Allow mistakes, and use feedback as an opportunity for growth

Encourage trainees to innovate and bring their creativity to the teaching too!

Building on foundations: (reflect, refer to what happened in clinic or on consult case)

TIPS FOR SUCCESS

Provide Autonomy and Options
“Should we play again, or move on...”

Define goals of the game or activity

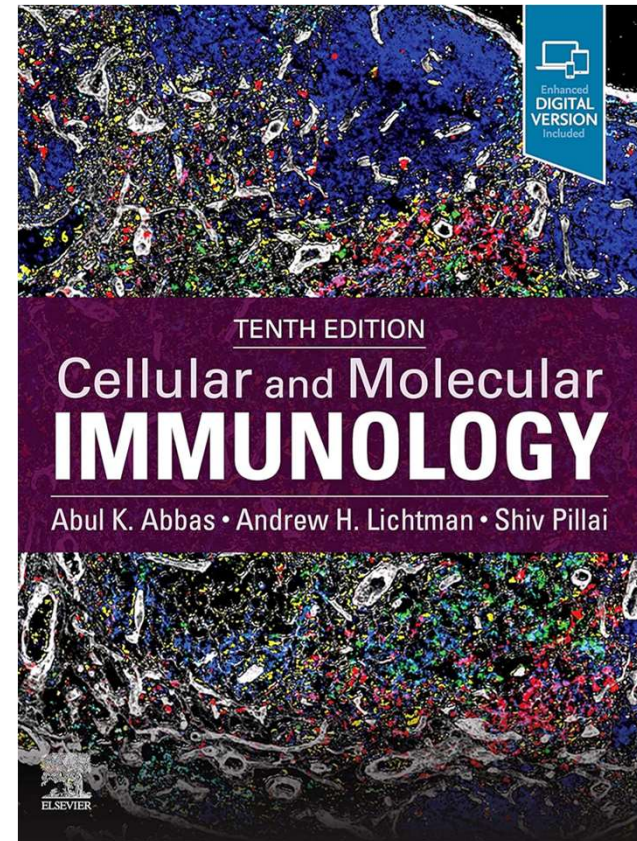
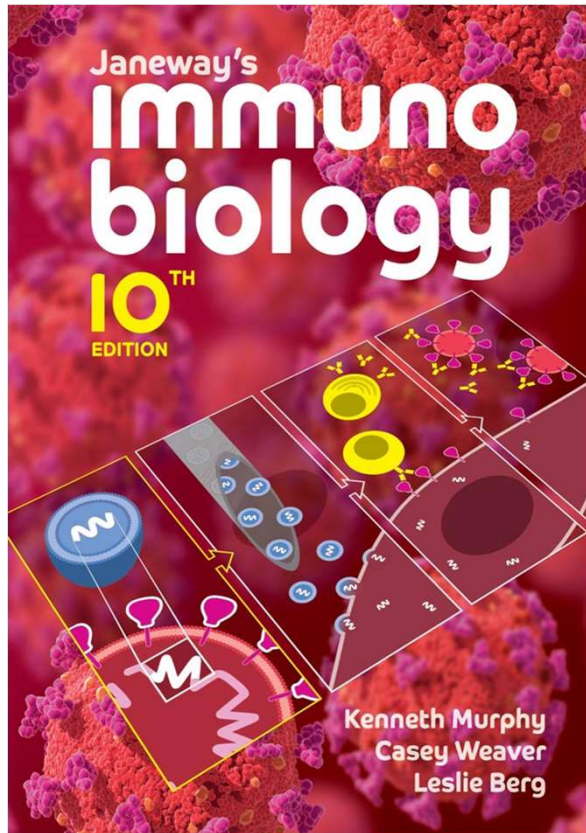
“We’re playing this because...”

Provide facilitation and encouragement

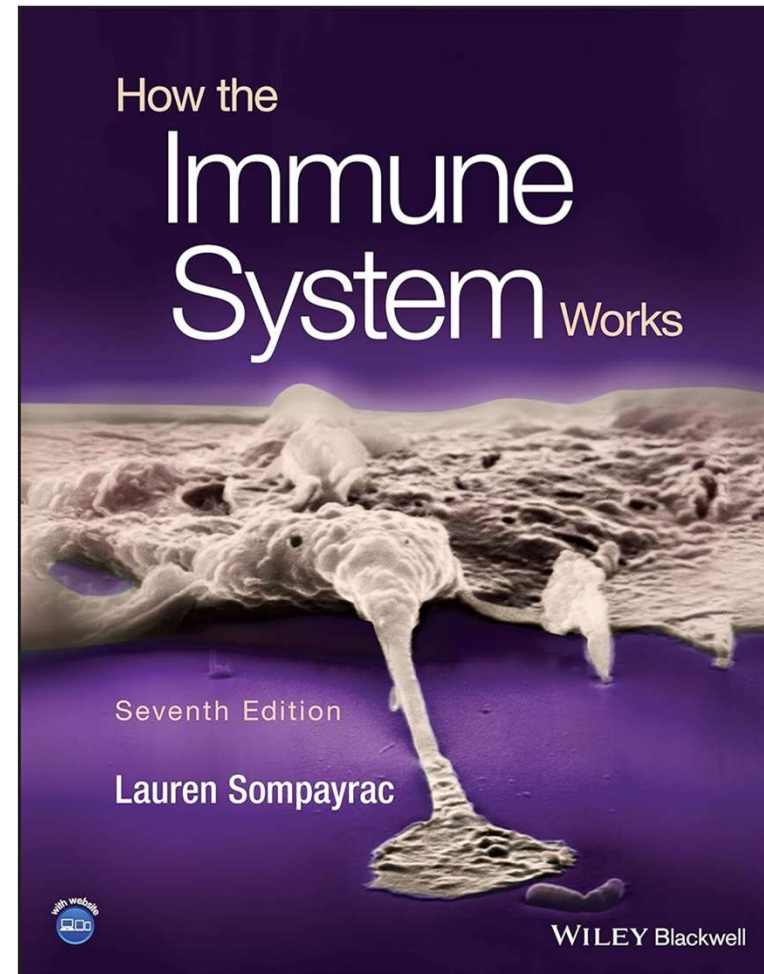
Use the game as a medium to provide teaching

Encourage cooperation, or engender competition in groups
Have fun with the trainees

How to teach Immunobiology?



A step before that.....?



Why create a basic immunology course?

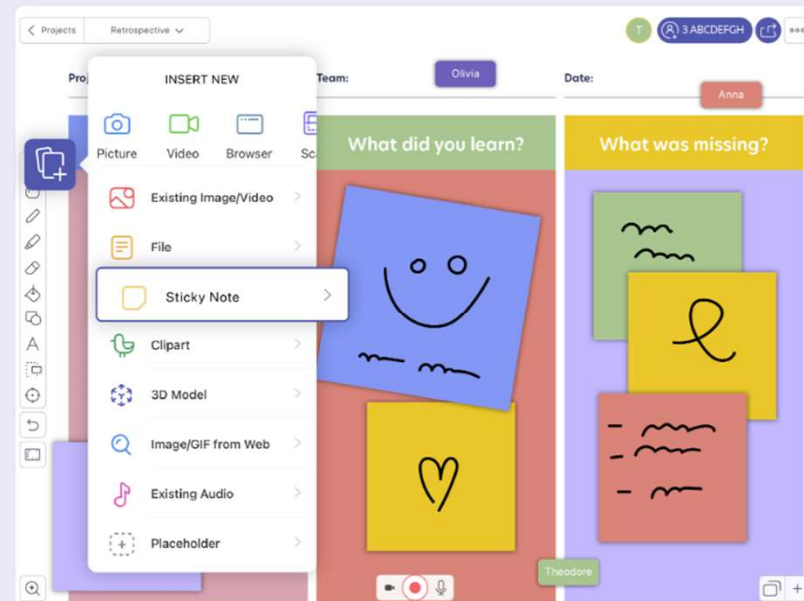
- A core understanding of basic immunology required for all A/I fellows
- Many fellows start training without much basic immunology knowledge
 - Limited immunology curriculum in most medical schools
- Fellowship level textbooks start with very complex information
- An intro to immunobiology could benefit many of our learners
 - A/I fellows are the target audience
 - Other groups may benefit:
 - Immunology APNs
 - Fellows in other specialties
- Will be available to all fellowships/trainees

Have a CODE to collaborate on a Whiteboard?

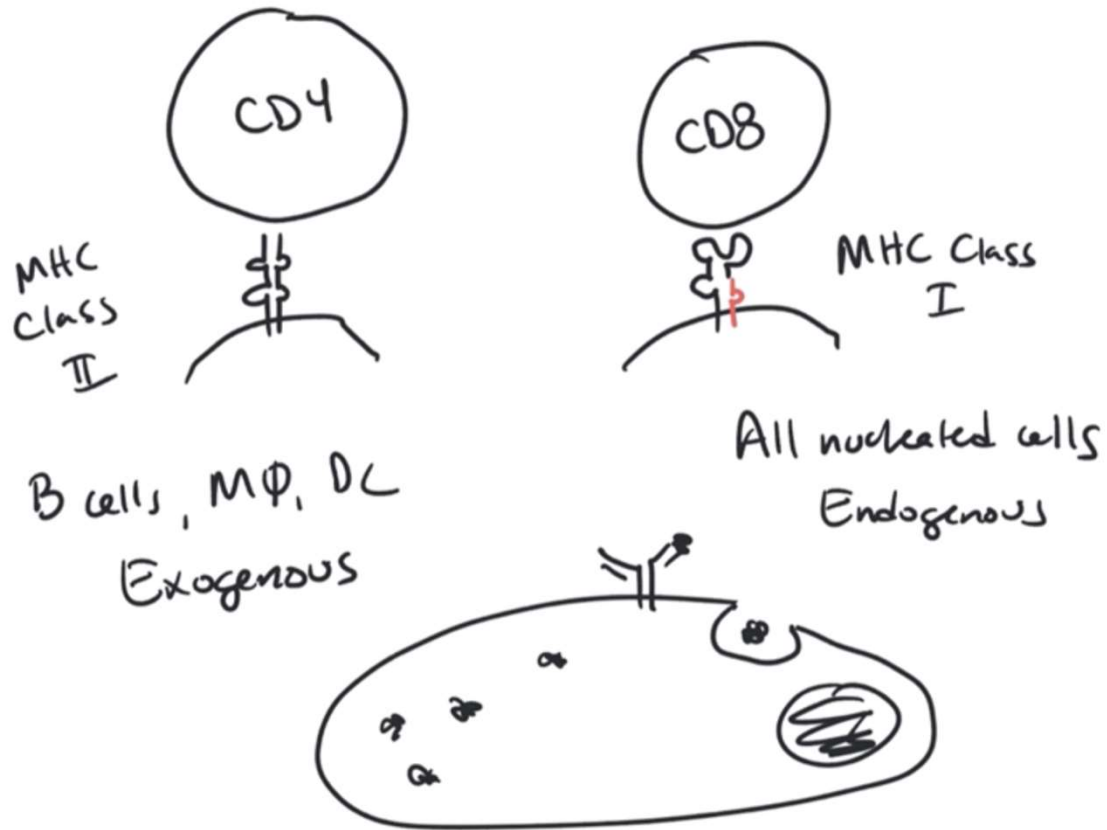
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Interactive Whiteboard Example



Proposed Topics For the Course

- Overview of the Immune System -
Innate vs Adaptive
- Cells of the Immune System
- Secondary immune organs
- Complement Cascade
- Complement regulation
- Innate Immunity (TLR)
- Neutrophil function and respiratory burst (CGD)
- B cell development
- T cell development (APECED)
- B cell and T cell receptor generation (RAG deficiency)
- Antigen processing
- T cell signaling
- NFkB (NEMO)
- B cell signaling
- Antibody function
- Class switching (CD40L deficiency)
- T helper cell subtypes (Th1)
- T helper cell subtypes (Th2)
- T helper cell subtypes (Th17)
- Mast cells
- Eosinophils
- Immunology lab tests - Flow cytometry (How to do it, FSC vs SSC, markers)
- Immunology lab tests - Targetted vs WES, VUS

What is your feedback on the particular topics chosen? Are there topics missing that you would add?

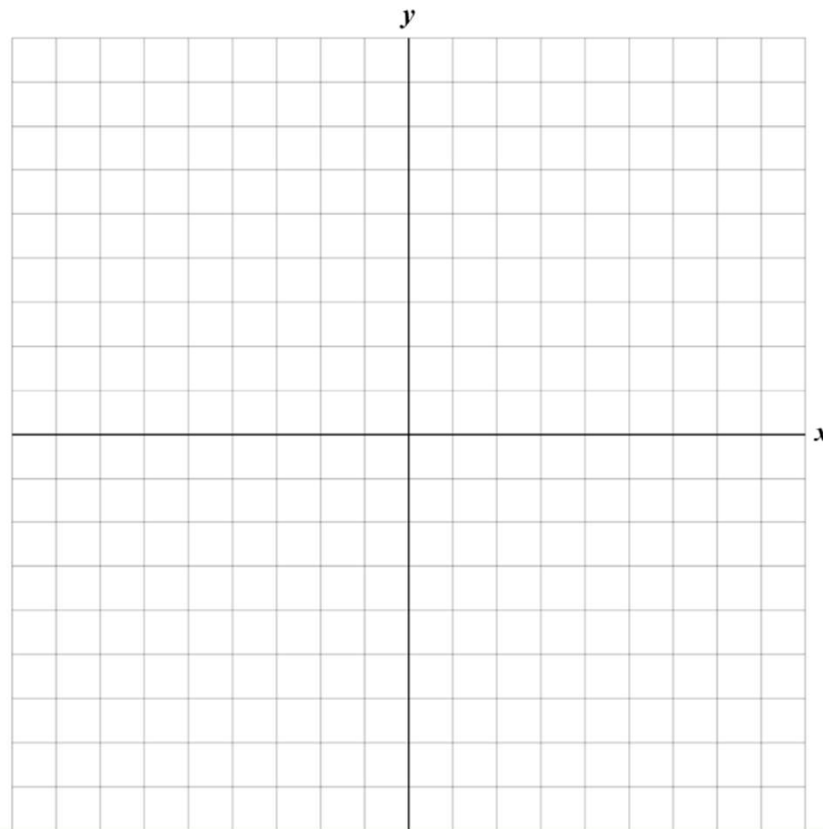
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Nobody has responded yet.

Hang tight! Responses are coming in.



Rate this project in terms of urgency and importance. X = urgency (right quadrants are most urgent) and Y = importance (top quadrants are most important).



Open Discussion!!