

# Experiences, Barriers, and Challenges for Engaging International Students in STEM

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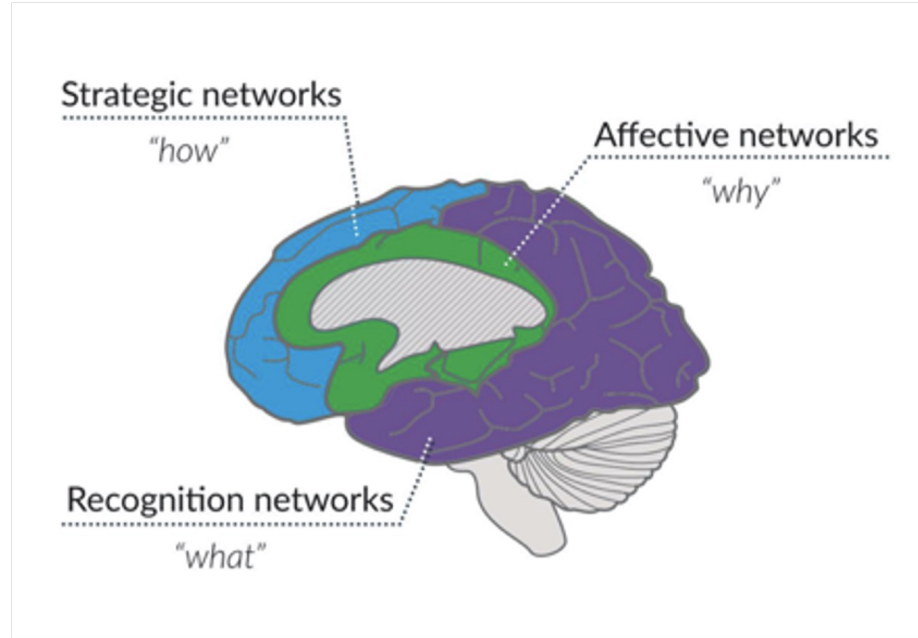
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# Session outcomes

By the end of this session, you will:

- Understand the needs and outcomes of implementing universal design for learning in higher education
  - Understand and explain the underlying reasons for its importance, as well as the challenges, barriers, and experiences that international students face in U.S. higher education.
  - Be able to define culturally responsive pedagogy
  - Be able to integrate evidence-based practices that improve inclusiveness in modern learning environment
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# Why Universal Design for Learning (UDL) in Higher Education?



# What is UDL?

UDL is incorporated into K-12, higher education, educational technology, and workforce development policies in the U.S. It is defined in the **2008 Higher Education Opportunity Act (HEOA)** as a scientifically valid framework for guiding educational practice that:

- ❖ provides flexibility in the ways: information is presented, students are engaged, and students respond or demonstrate knowledge and skills
  - ❖ reduces barriers in instruction, provides appropriate accommodations, supports, and challenges, and maintains high achievement expectations for all students, including students with disabilities and students who are limited English proficient.
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# International students

- ❖ Increasing international students population in the U.S.
- ❖ Positive influences
- ❖ Challenges that they encounter include
  - lack of diversity in coursework and research interest
  - the quality of courses
  - new culture adjustments and separation from family, friends, and country
  - new educational system and English proficiency requirements
  - lack of funding and economics

# Other challenges

- ❖ **Higher risk of mental health issues:** International students have a higher prevalence of depression than local students and the general public
  - ❖ **Research gap:** Not much literature that explores and identifies experiences, barriers, and challenges for engaging international students in postsecondary STEM
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# What questions we addressed in our study?

1. How do international students perceive their learning experiences and adjustment at a large American university during the COVID-19 pandemic?
  2. What are the effects of the pandemic on international students' learning experiences?
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# Student learning experience is improved as UDL addresses :

- International students' perceptions about their learning experience
  - Course design
  - Learning preference
  - Concern for academic success
  - A sense of belonging
  - Social adjustment and integration into the campus community
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Q: How did we arrive at these findings?

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# Culturally responsive pedagogy

It is defined as “using the cultural characteristics, experiences, and perspectives of ethnically diverse students as conduits for teaching them more effectively” (Gay, 2003, p. 106).



# Cultural competency

“Requires the preparation of the faculty and staff to work with diverse population[s], and [to] accept ownership of the responsibility for teaching in such a way that demonstrates a commitment to the principle of respect for all,” according to Block, Roberson, and Neuger (1995, 30).

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# The purpose of this project

1. **Explore:** the academic and socioemotional challenges our international STEM students face at a land grant institution
  2. **Identify:** how the COVID-19 pandemic was perceived to have affected their learning experiences
  3. **Recommend:** research-based best practices for faculty and staff to connect and support them
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# Participants

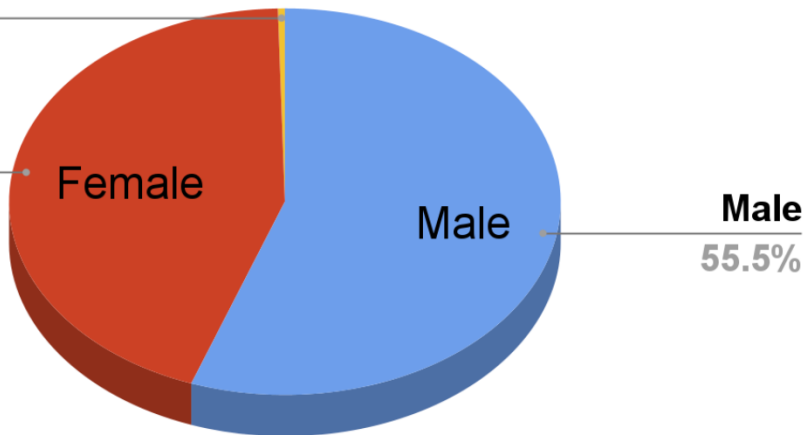
*Gender identity*

**Transgender**

0.4%

**Female**

44.1%



Total participant sample size

n=245

Country of origin (47 countries)

# Participants' academic status

## What is your academic status?

Non-degree seeking

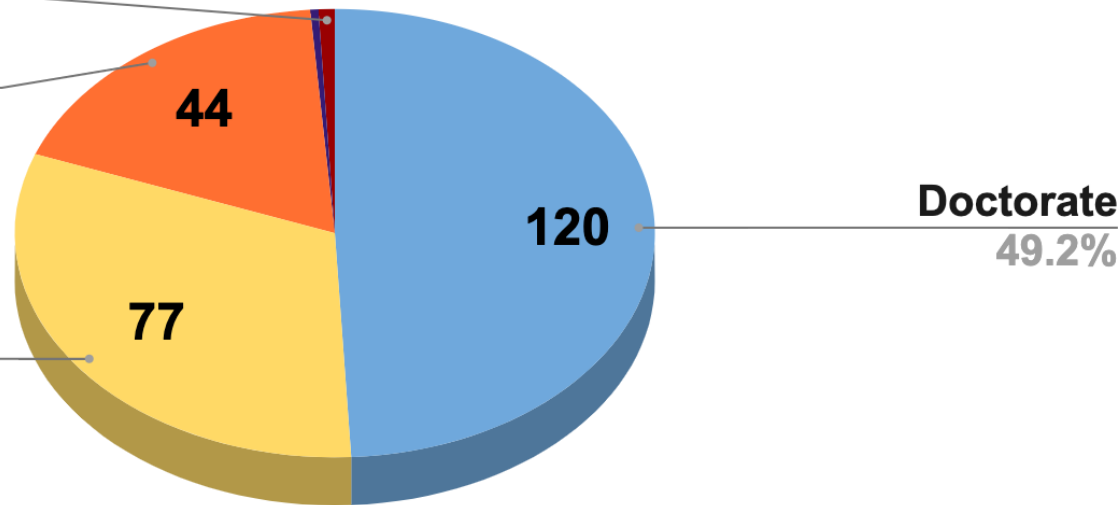
0.8%

Undergraduate

18.0%

Master's/Professional

31.6%



Note: with 244 students responses, 86% from STEM disciplines, 62%  $\geq 25$  years old.

## Reasons for studying in the US

<b>Better education</b>	87%
<b>Better job or career opportunity</b>	87%
<b>A flexible education system</b>	55%
English language skills	30%
American culture	24%
A major not available at home	20%
To leave home	15%

Note: The number of students responses: 244

# International students' perceptions about their learning experience at VT

Table. Concern about “**Academic Success**” before and after Joining VT

	Before Joining VT			After Joining VT			T score
	Obs.	Mean	Std. Err.	Obs.	Mean	Std. Err.	
Concern about “Academic Success”	245	3.77	0.08	245	3.16	0.09	7.94

Table. Concern about “**Personal Adjustment**” before and after Joining VT

	Before Joining VT			After Joining VT			T score
	Obs.	Mean	Std. Err.	Obs.	Mean	Std. Err.	
Concern about “Personal Adjustment”	244	3.16	0.08	244	2.60	0.08	6.85



## Student's perceptions before and after, CONT.

Table. Concern about **“Teaching Methods”** before and after Joining VT

	Before Joining VT			After Joining VT			T score
	Obs.	Mean	Std. Err.	Obs.	Mean	Std. Err.	
Concern about “Teaching Methods”	245	3.07	0.08	245	2.38	0.08	7.99

Table. Concern about **“US Political Climate”** before and after Joining VT

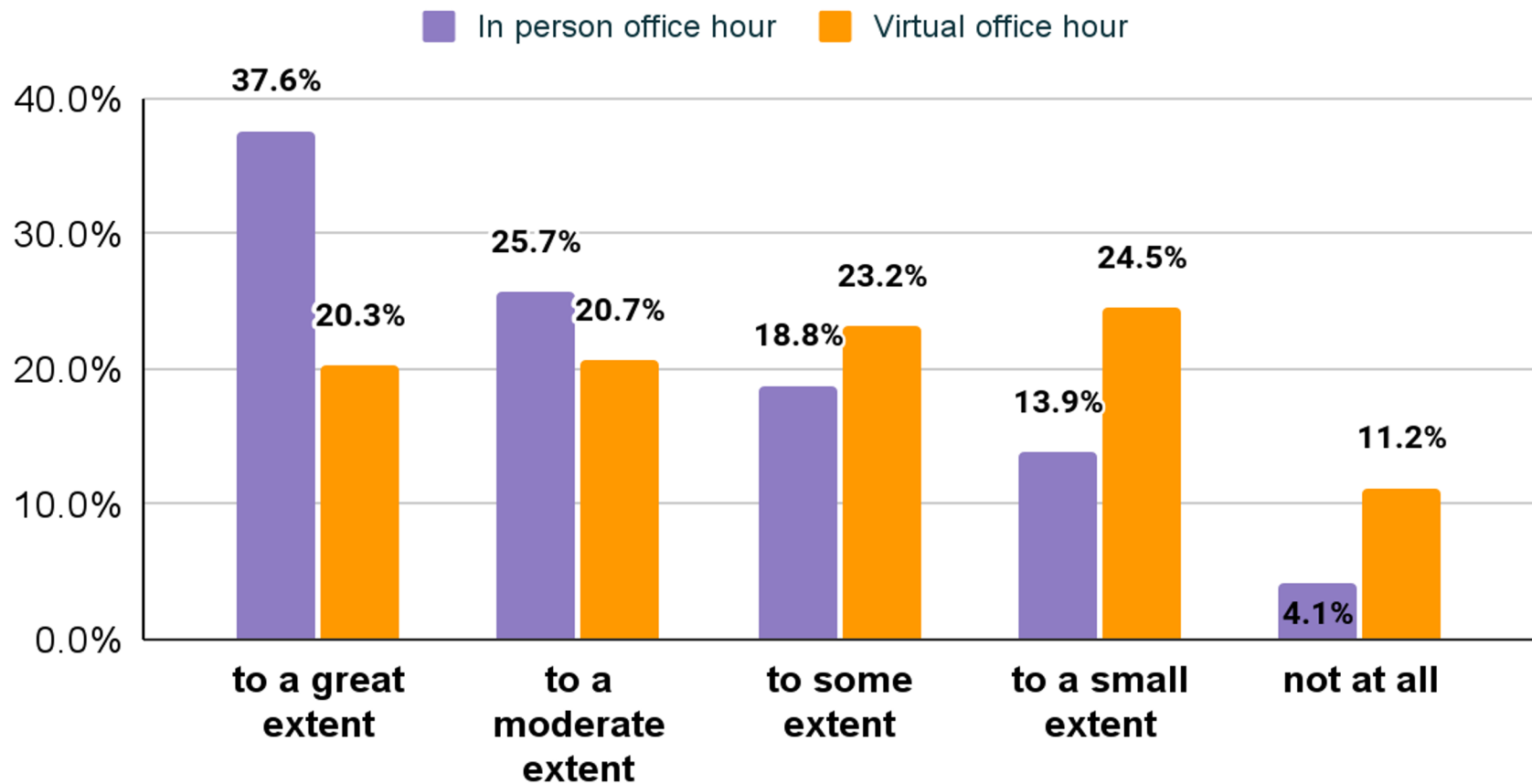
	Before Joining VT			After Joining VT			T score
	Obs.	Mean	Std. Err.	Obs.	Mean	Std. Err.	
Concern about “US Political Climate”	245	2.98	0.08	245	2.59	0.09	5.61

## International students' learning preference

Mode of learning	Number of participants responses
Blended learning	44%
In person/face-to-face mode of learning	44%
Online learning	10%
Others	2%

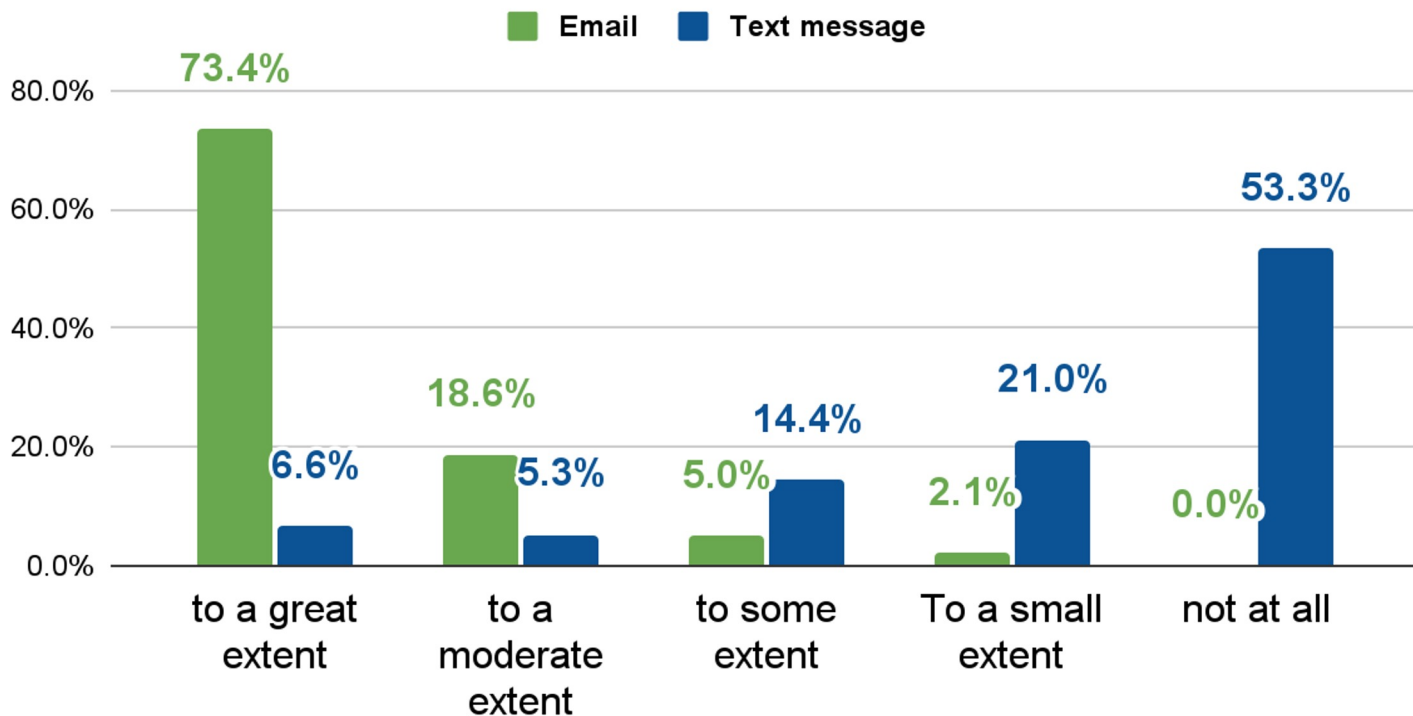
Note: What is your preference of the mode of learning after the pandemic? N=213

# Office hour preference: In person VS Virtual



# Communication preference with your professors

## Communication preference: Email VS Text



## Perception on course design:

- Positive learning experience overall;
- Use of technology tools (i.e. like Canvas);
- Importance of clear communications, learning objectives, grading practices, technology tools, assignments and assessments;
- Clear communication & different communication styles;
- Constructive feedback

# Quality of faculty-student interactions matters



# Sense of belonging

It appears that international students have a moderate sense of belonging in this study. Belonging is the feeling of security and support when there is a sense of acceptance, inclusion, and identity for a member of a certain group (Cornell University Diversity and Inclusion).



## International students' sense of belongings: Female VS Male

	Male			Female			T score
	Obs	Mean	Std. Err.	Obs.	Mean	Std. Err.	
Item 3. I feel isolated in my classrooms (reverse coded).	136	3.70	0.09	106	3.19	0.12	-3.44
Item 4. I feel isolated in the university community (reverse coded).	136	3.62	0.10	105	3.24	0.11	

Comparing male and female students using independent group t-test. However, there is a statistically significant difference between male and female students in items 3 and 4. That is, **female students have a lower level of sense of belonging** in the classrooms and the university community.



# Feeling isolated

Cross-cultural differences, differences in personal interests, ways of communication, norms about friendship, and daily routines may negatively influence social interaction with domestic students and may interfere with international students' sense of social belonging (Chen & Zhou, 2019).

## Forming friendship in the VT community (n=245)

Making friends in the VT community	Yes	No
Have you made meaningful friendships with other international students?	201, (82%)	44, (20%)
Do you have any professors or administrators who have mentored you?	184, (76%)	58, (24%)
Have you made meaningful friendships with American students?	131, (53.5%)	114, (46.5%)
Have you made meaningful friendships with people in the local community?	105, (43%)	140, (57%)

## Group Activity

To discuss best practices to address those **most academically challenging experience** during the pandemic?

- ❖ **Taking online courses**
- ❖ **Isolation** both socially and academically.

<https://shorturl.at/mCJU3>



## Scenario 1. Challenges in taking online courses

I'm an international student in STEM disciplines at VT. The most academically challenging experience during the pandemic for me was attending online classes for 6-7 hours a day. It was difficult, and I cannot maintain the required level of attention (concentration) throughout the day.

*I felt the most challenging thing was to find motivation to attend the online lectures. Time management challenge and the difficulty to create a new schedule for staying at home for classes, work, and personal stuff. Also, professors are not able to see "humanity" in me in online courses, while complaining about lack of interaction with me at the same time.*

**Discuss the best practices to help international students address challenges in taking online courses, regarding communication challenges, motivation, concentration etc**

## Scenario 2: Challenge in feeling isolated both socially and academically

*I'm an international student in STEM disciplines at VT, working in the lab alone. At the beginning, when graduate students were allowed to work on campus, it was so scary. I can work independently. However, after the pandemic, working alone in the lab made me feel lonely and unmotivated to do school work. And due to my language accent, talking during classes gave me lots of anxiety.*

**Discuss the best practices to increase the sense of belongings, regarding their challenges of feeling isolated both socially and academically**



**<https://shorturl.at/mCJU3>**

What have we learned from our international students in this project?

## How has the pandemic shaped your learning experience overall?

Themes	Number of responses	Samples of the responses
Being adaptable to new situations	10	Being able to adapt to new conditions; Quick adoption of changing times and lifestyle; It taught me to be resilient and stand up in the face of challenges.
Self-learning, self-regulation	15	I have to rely more on following the guidelines and regulate my studies more than before; It has taught me that I'm the one in charge of learning
Online learning systems, modality	14	13 responses illustrated being familiar with online learning and being prone to it; one dislike
Technology tools, software, Zoom	6	Become more tech savvy; I can use technology for my learning, get things done by myself at home, familiarize with online courses, aware and feel sympathy to others; For some classes zoom is better than driving 30-40 minutes to class. Some meetings are better over zoom too.

## International students' suggestions for VT to help them adjust and integrate into the campus community

- ❖ Clear instruction and better communication in organizing and advertising existing resources and activities; providing much clearer information about navigating around campus
- ❖ Promoting intercultural interaction events to all that make students blend in
- ❖ Students could be paired and mentored together (i.e. cultural mentorship)
- ❖ Creating opportunities for collaboration and work that integrates diverse groups



# Curricula suggestions

- ❖ Adding socializing time and activities into curriculum;
- ❖ Encouraging collaborative activities in curricula;
- ❖ Having cultural highlights lectures would be helpful, as It was so interesting to see how Americans are individualistic, other than having a community first kind of an ideal;
- ❖ Seminar;
- ❖ Providing some cultural courses which are optional for international students;
- ❖ In classes, mandatory to have have Americans and international students in the same group for projects

*Other suggestions: Keep making regular international event at Department/College level; the advisor should care more about our personal side and homesickness as international students*

What are the suggestions for adopting and implementing these findings?

# How UDL can help?

- Implications on practices
  - *Increasing learner voices and feedback in course design*
  - *professional development trainings/programs*
  - *Increasing students' sense of belongings*
    - *Promoting intercultural interaction events*
    - *Expanding mentorship and advice programs*
    - *Addressing students' mental health challenges*
- Implications on research

# Inclusive Teaching Practices

“An inclusive classroom means that the instructor and students move away from assumptions that some students are lacking... and move toward the idea that learning environments and course designs lacking structure are a problem” (Sathy, 2021).

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# Moving forward: Making small changes in course design

**Increase structure through inclusive practices** (Haak et al., 2011; Sathy & Hogan, 2019)

- Give clear instructions for assignments; give examples; give clear rubrics
- Have frequent low-stakes assignments/formative assessments
- If there are group discussions, increase structure by assigning specific tasks, showing discussion questions on the screen, and assigning a speaker for the group.

Note: A lot of recommendations have to do with increasing structure and flexibility.

Structure means giving students greater and clear guidance on

# Moving forward CONT.

## Other suggestions (Sathy & Hogan, 2019)

- Drop the lowest scoring exam or quiz
- Dispel the imposter syndrome and emphasize the growth mindset
- Facilitate student options in assignments and assessments
- Ask yourself, with this assignment, activity, assessment, whom am I excluding?
- Explicitly tell students that **you care about them**
- Resources: [Hogan and Sathy's website](#)

# A strategy to manage stress in real-time



While yoga & meditation support long-term emotional regulation, a real-time tool is most effective inside or outside of classrooms.

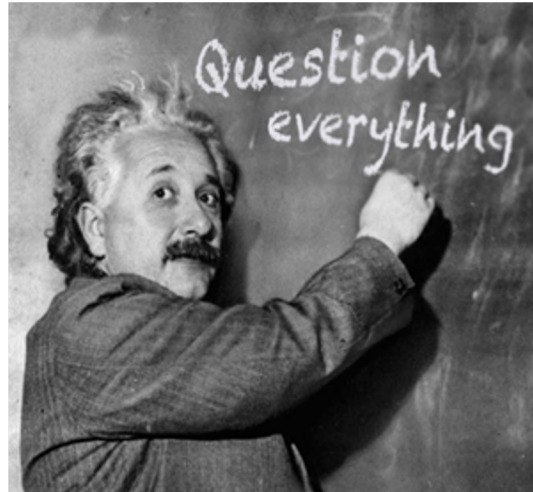
## **Enter: The Physiological Sign**

Emotional regulation in the moment: Two inhales through the nose, one extended exhale through the mouth.

Strategy: engage the fastest way to bring calm, engage the parasympathetic nervous system to create space.

# Q & A

Thank you for your time and participation!



***“Creativity is intelligence having fun.” — Albert Einstein***



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