

# **Flipping the classroom in a nutrition course:** Towards encouraging collaborative learning in Hong Kong post-secondary students

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# Main objective of the study

To evaluate the **flipped classroom** model in the Hong Kong post-secondary context.

Context studied:

- A 'nutritional science' module
- 1-semester long, compulsory for Year 1 Health Care undergraduates

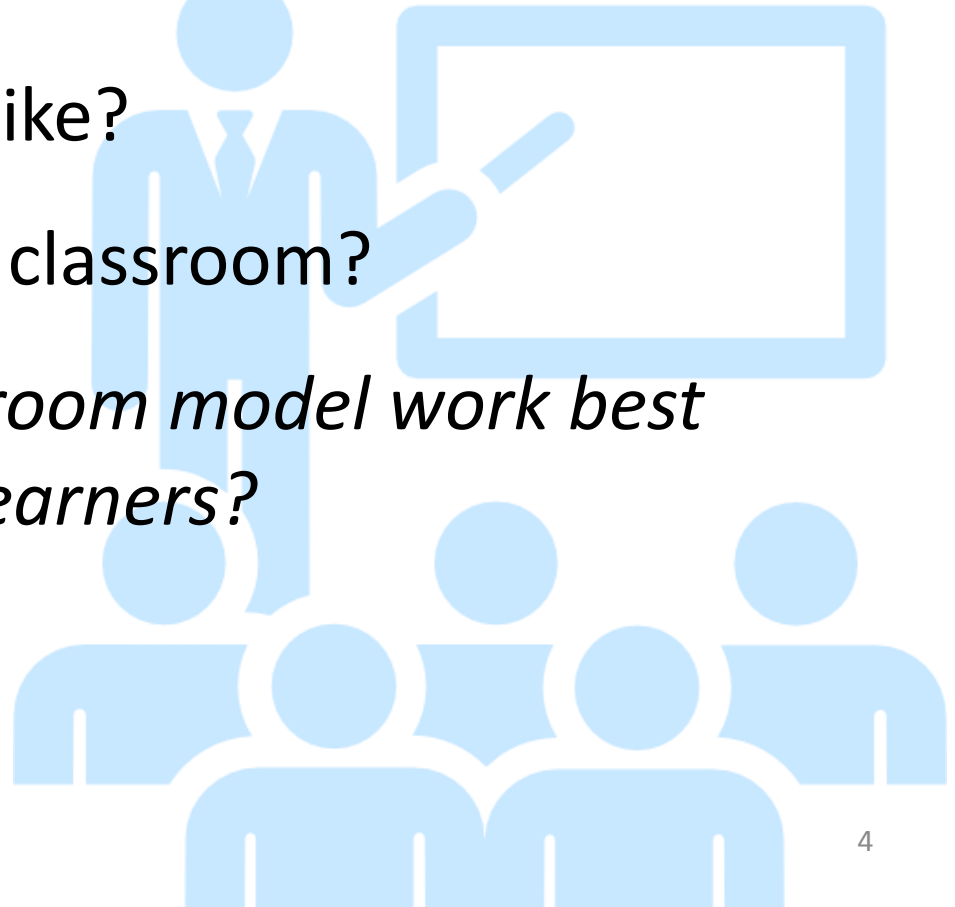
## **The flipped classroom** *(Bergmann and Sams, 2012)*

- ‘Home’ and ‘school’ reversed
- Blended learning  
through web lectures and class activities
- **Expected benefit:**  
Encouraging active learning?

# Q1

**Can the flipped classroom pedagogy be used with a given group of learners?**

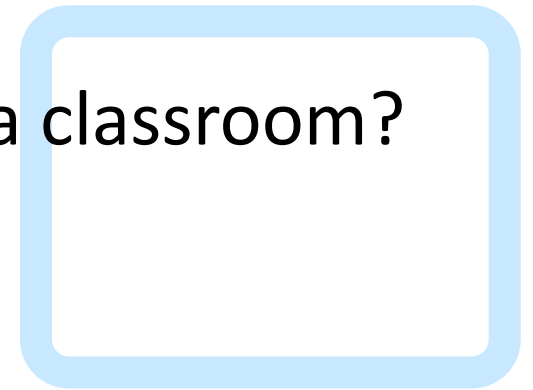
- What are the learners like?
  - What defines a flipped classroom?
- *Does the flipped classroom model work best with certain types of learners?*



# Q2

## Is Moodle useful—from the flipped classroom perspective?

- (How) can Moodle be used to flip a classroom?



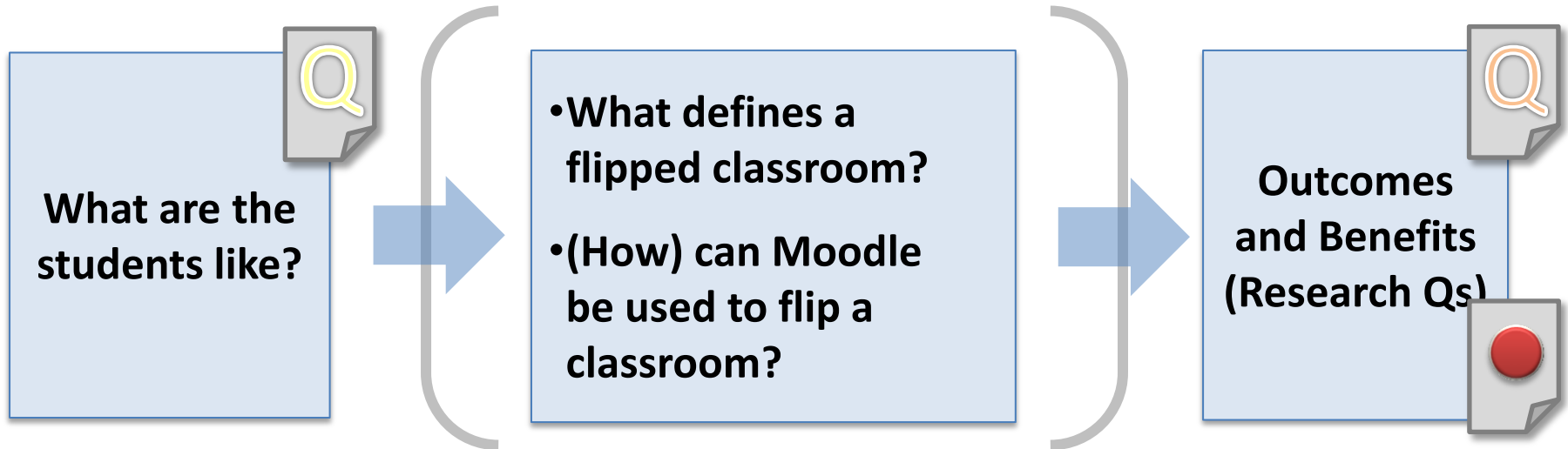
# Q3

## Impact of the flipping on learning experience

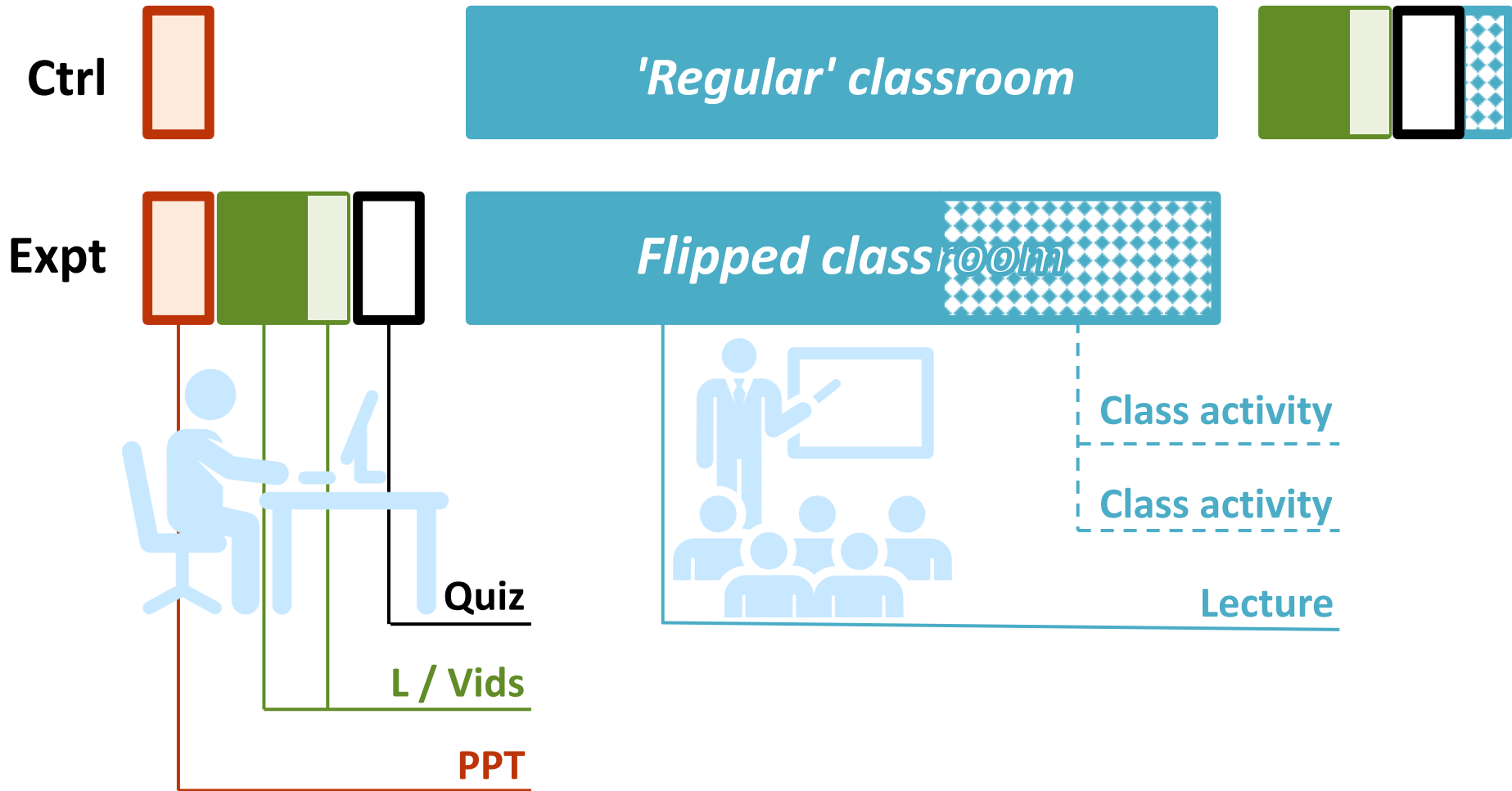
- *In general what **benefits** for students are expected of the flipped classroom?*
  - How will students **perceive** their flipped classroom?
  - Will students change their **learning habits** in favour of 'active learning'?
  - Will students in a nutritional science class **do better** as a result of flipped learning?

## Research questions

# *Putting it all together...*



# Class period structures





**Question bank contents**

Category: Default for SHC4124\_ST\_FS  
 The default category for questions shared in this category is 'SHC4124\_ST\_FST\_sidchan88\_1'.

Select a range  
 Default for SHC4124\_ST\_FST\_sidchan88\_1 (53)

Create a new question ...

Page: (Previous) 1 2 3 (Next)

Question

- T  Video 9.2 DNA, Genes and Chromosome
- Video 9.3 From Genes to Proteins (Q4-10)
- Video 1.1 Food Balance Sheet (Q1) A focus
- Video 1.1 Food Balance Sheet (Q2) For a
- Video 1.2 HK's Food Supply & Consumpt
- Video 1.2 HK's Food Supply & Consumpt
- Video 2.1 Energy intake and expenditure,
- Video 2.1 Energy intake and expenditure,
- Video 2.1 Energy intake and expenditure,
- Video 2.2 Body weight simulator (Q4) Wh
- Video 2.2 Body weight simulator (Q5) Wh
- Video 3.1 Dietary reference intakes (Q1) I
- Video 3.1 Dietary reference intakes (Q2) (
- Video 3.1 Dietary reference intakes (Q3) \
- Video 3.2 Choose My Plate Dietary Guide
- Video 3.2 Choose My Plate Dietary Guide
- Video 5 Energy Metabolism (Quick Over
- Video 5 Energy Metabolism (Quick Over
- Video 5 Energy Metabolism (Quick Over
- Video 5 Energy Metabolism (Quick Over

Page: (Previous) 1 2 3 (Next)  
 Show all 53
























**With selected:**

Add to quiz  Delete  Move to >>

Default for SHC4124\_ST\_FST\_sidchan88\_1 (53)

**Add random questions from category:**  
 Add 1 random questions

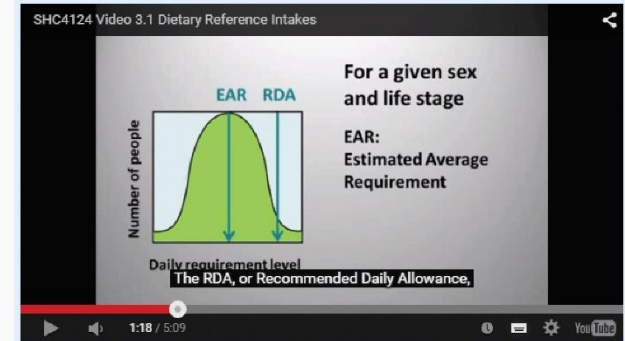
Also show questions from subcategories  
 Also show old questions

-  [Lecture 1 Notes Food Supply Consumption](#)
-  [Lecture 1 Videos \(plus 5 Questions\)](#)
-  [Lecture 2 Notes Food and Energy](#)
-  [Lecture 2 Videos \(plus 5 Questions\)](#)
-  [Lecture 3 Notes Food Selection](#)
-  [Lecture 3 Notes Food Selection \(Supplement\)](#)
-  [Lecture 3 Videos \(plus 5 Questions\)](#)
-  [Lecture 4 Notes Macronutrients revised](#)
-  [Lecture 4 Videos \(plus Questions\)](#)
-  [Lecture 5 Notes Energy Metabolism 2nd revised](#)
-  [Lecture 5 Video \(plus Questions\)](#)
-  [Topic 6 Notes Micronutrients - vitamins](#)
-  [Lecture 6 study tools \(vitamin structures summary tables\)](#)
-  [Lecture 6 supplement \(vitamin profiles of selected foods\)](#)
-  [Lecture 6 Video \(plus Questions\)](#)
-  [Topic 7 Notes Micronutrients - Minerals](#)
-  [Lecture 7 study tool \(summary table for mineral regulation\)](#)
-  [Lecture 7 Videos \(plus Questions\) Quiz](#)
-  [Topic 8 Notes Nutrition for special groups](#)
-  [Lecture 8 Video \(plus Questions\)](#)
-  [Topic 9 Notes Nutritional genomics Non-nutritive food components](#)
-  [Lecture 9 Exercise \(with answers\)](#)
-  [Lecture 9 Videos \(plus Questions\)](#)

This video introduces the key figures that form the **guidelines for our nutrient and energy intakes**. Specifically, the values define the **adequate levels** of intake for people in a **given sex and age group**.

Before you watch the video, think about these terms in the context of **nutrient adequacy**: *reference, (in)adequate, excessive, requirement, recommended, intake goal, scientific evidence, toxicity and energy contribution*.

Now watch the video and answer **Questions 1 to 3**. While you are watching, you can click on the **'Subtitles/CC'** icon near the YouTube logo to show the English subtitles. To turn them off, just click on the icon again.



**Question 1**  
Not yet answered  
Marked out of 1.00  
Flag question  
Edit question

For a given nutrient, either... or... is established as an intake goal of an individual in a specific population.

- Select one:
- a. RDA / AI
  - b. EAR / AI
  - c. EAR / UL
  - d. RDA / UL

**Question 2**  
Not yet answered  
Marked out of 1.00  
Flag question  
Edit question

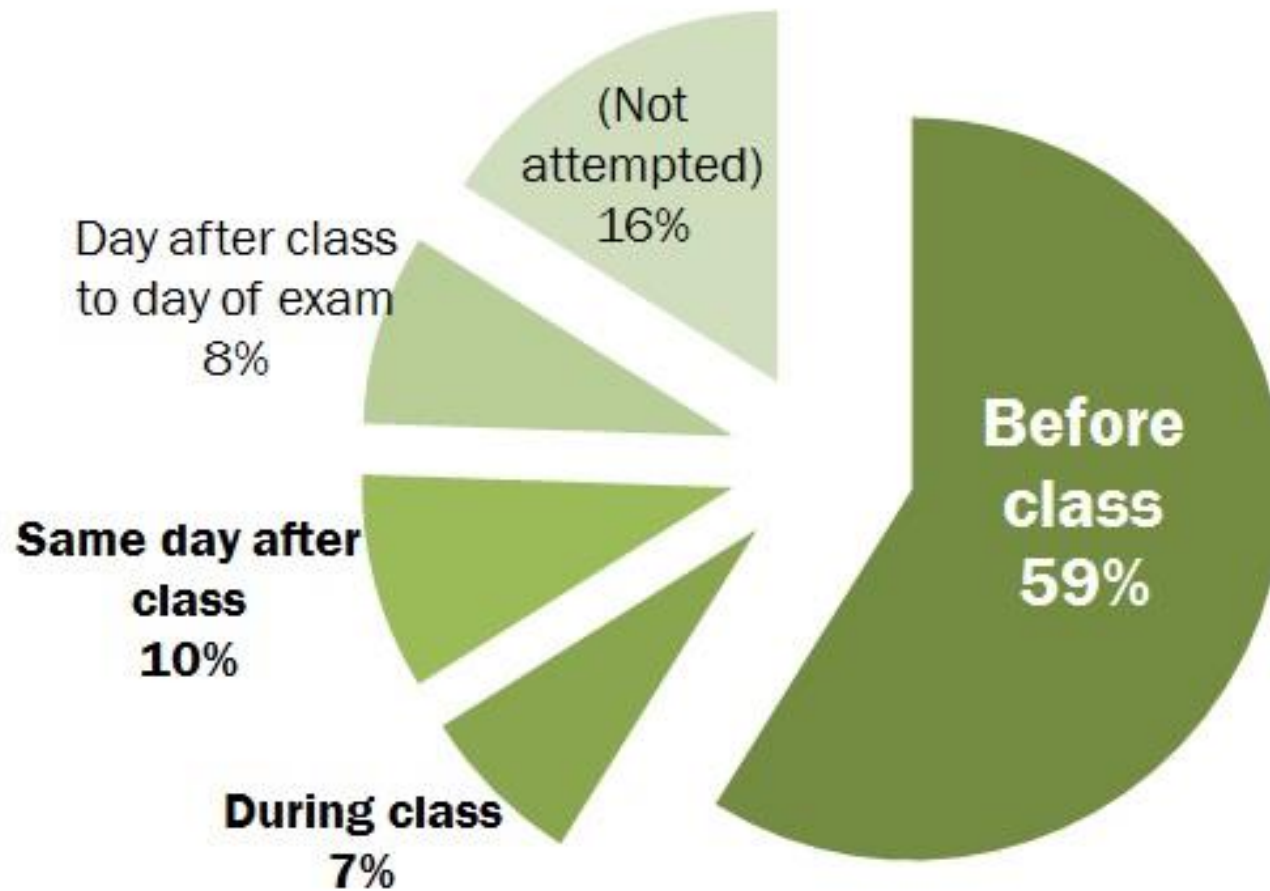
**(Choose all the possible answers)** To be sure we take in an adequate amount of a nutrient without running a risk of getting sick from getting too much, we should place our intake goal between

- Select one or more:
- a. EAR and AI
  - b. AI and UL
  - c. EAR and RDA
  - d. RDA and UL

**Question 3**  
Not yet answered  
Marked out of 1.00  
Flag question  
Edit question

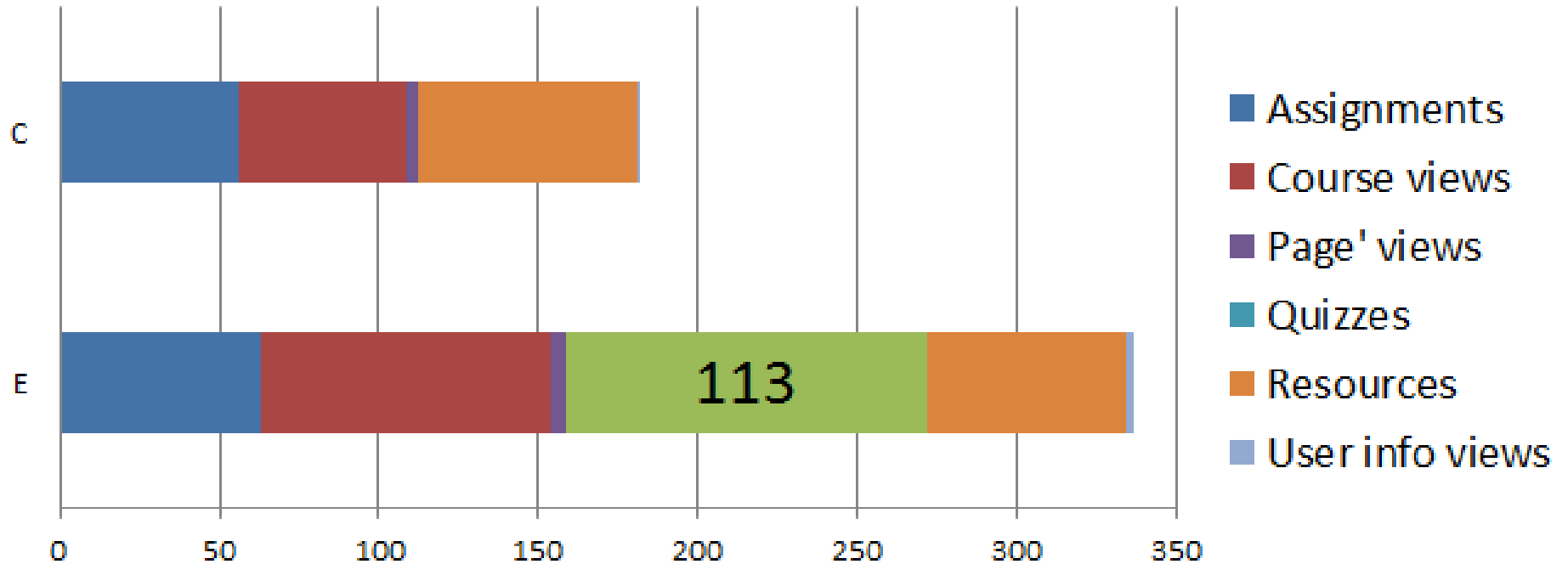
Which of these dietary reference values does **NOT** apply to any of the macronutrients?

- Select one:
- a. EAR
  - b. RDA
  - c. UL
  - d. AMDR
  - e. AI



**Time of first attempts at  
the Moodle quizzes  
(180 cases in total)**

## Moodle actions (No. per student)







## Activity 1

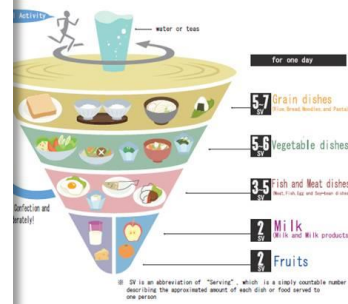
Your group is given a copy of Hong Kong's *Healthy Eating Food Pyramid* and two food guide from another countries.

1. Summarise the key messages in each of your food guides:
  - Does the food guide suggest the **types** and **proportions** of foods its target population should eat?
  - Does it have any **special messages**?
2. Then compare the food guides to find out if they...
  - present the above messages **clearly**
  - are **consumer-friendly**
  - are **culturally relevant** to their target population
3. How does the Hong Kong food guide compare to the other two? Which of the three do you like most?

All food guide graphics and detail retrieved from [www.fao.org/nutrition/nutrition-education/food-dietary-guidelines/en](http://www.fao.org/nutrition/nutrition-education/food-dietary-guidelines/en) unless otherwise stated

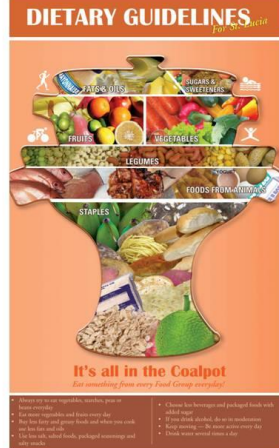
### Japan (2005)

Japanese Food Guide Spinning Top  
Do you have a well-balanced diet?



Decided by Ministry of Health, Labour and Welfare and Ministry of Agriculture, Forestry and Fisheries.

### Saint Lucia (2007)



## Activity 2

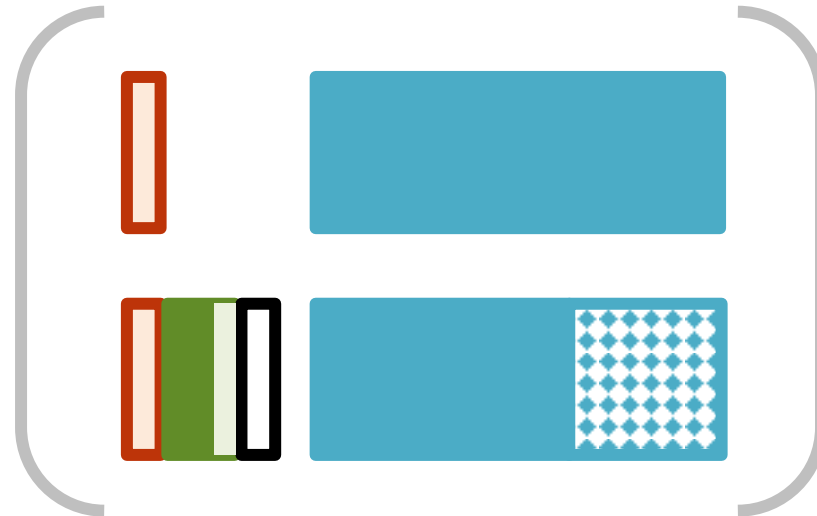
Your group is given a set of 18 nutrition-related guidelines. Choose the five you think would apply to Hong Kong.

1. Breakfast is the most important part of our daily diet. Lunch should be the main meal and the evening meal should be very light. (Cyprus)
2. Consume clean and safe water and food. (Namibia)
3. Eat at least three meals a day. (Namibia)
4. Eat calmly, never eat when driving or at work. (Hungary)
5. Eat just enough to maintain a healthy weight. (Venezuela)
6. Eat less margarine, cream, butter, chips and cold meats to take care of your heart and spend less money. (Guatemala)



# Data collection

**Ctrl**  
( $N = 18$ )



**Expt**  
( $N = 20$ )



# Conceptual constructs

## Orientation towards flipped learning

Ctrl



- Classroom experience
- IT in education
- Self-directed learning
- Application of knowledge
- Self-evaluation



Expt



## Learning styles

- **6 Learning styles** defined by Grasha & Reichmann (1974)

## Learner types / Learning styles

- **VA(R)K** not adequately addressing social aspects, a unique feature of 'flipped learning'
- **Grasha & Reichmann (1974) Student Learning Style Scales**  
Based on classroom behaviour  
Independent | Avoidant | Collaborative | Dependent | Competitive | Participant
- **Kolb's (1976) experiential learning model**  
Concrete Experience → Reflective Observation → Abstract Conceptualization  
→ Active Experimentation (→ Cycle repeats)
- **Honey & Mumford's (1982) Learning Style Questionnaire**  
Activist | Reflector | Theorist | Pragmatist
- **Felder & Silverman's (1988) Index of Learning Styles**  
Active/Reflective | Sensing/Intuitive | Visual/Verbal | Sequential/Global





# Grasha-Reichmann Student Learning Styles (Grasha, 1996)

		1	2	3	4	5
<b>Independent</b>	1. I prefer to <b>work by myself</b> on assignments in my courses.	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
<b>Avoidant</b>	38. I <b>study just hard enough</b> to get by.	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
<b>Collaborative</b>	9. I enjoy discussing my ideas about the course content <b>with other students</b> .	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
<b>Dependent</b>	10. I <b>rely on my teachers</b> to tell me what is important for me to learn.	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
<b>Competitive</b>	29. I like to solve problems or answer questions <b>before anyone else can</b> .	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
<b>Participant</b>	18. I get more out of <b>going to class</b> than staying at home.	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

## Pre-module analysis

### GRSLS Scales: Cronbach's $\alpha$

Ctrl		Independent	0.68
		Avoidant	0.81
Expt		Collaborative	0.761
		Dependent	0.264
		Competitive	0.799
		Participant	0.561

# Pre-module inter-group comparison

## Items with stat. sig. Ctrl-Expt difference ( $p < 0.05$ )

Ctrl



PrQ19

*Overall I think I am learning in a way a college student should be.  
整體來說，我正以大專生的學習方式去學習。*

Mean - Control: 3.000 / **Experimental: 3.652**

$p=0.017$ , Mann-Whitney  $U$  Test

Expt



**PrGRSLSQ11 (PrQ33) – The Competitive style**

*It is necessary to compete with other students to get a good grade.  
為取得好成績，與其他學生競爭是必要的。*

Mean - **Control: 3.667** / Experimental: 2.700

$p=0.023$ , Mann-Whitney  $U$  Test

**PrGRSLSQ25 (PrQ47) – The Independent style**

*I feel very confident in my ability to learn on my own.  
我對我的自學能力非常有信心。*

Mean - Control: 2.722 / **Experimental: 3.400**

$p=0.029$ , Mann-Whitney  $U$  Test

## Pre Vs Post comparison

Items with stat. sig. Pre-Post difference ( $p < 0.05$ )  
in Ctrl only

Ctrl



**Higher positive ranks in:**

Pr/PoGRSLSQ6 – the Participant style

為了學會這課程的內容，我有做我被要求做的所有事情。

I did whatever was asked of me to learn the content in this class.

$p = 0.033$ , Wilcoxon's signed ranks  $T$  Test

Pr/PoGRSLSQ25 – the Independent style

我對我的自學能力非常有信心。

I felt very confident in my ability to learn on my own.

$p = 0.021$ , Wilcoxon's signed ranks  $T$  Test

## Pre Vs Post comparison

Items with stat. sig. Pre-Post difference ( $p < 0.05$ )  
in Ctrl only

Ctrl



☹ **BUT ALSO** higher positive ranks in:

Pr/PoGRSLSQ26 – the Avoidant style

留心上課對我來說是非常困難的。

Paying attention during class sessions was very difficult for me to do.

$p = 0.046$ , Wilcoxon's signed ranks  $T$  Test

Pr/PoGRSLSQ32 – the Independent style

我放棄嘗試憑藉上課去學習任何東西。

I gave up trying to learn anything by going to class.

$p = 0.034$ , Wilcoxon's signed ranks  $T$  Test

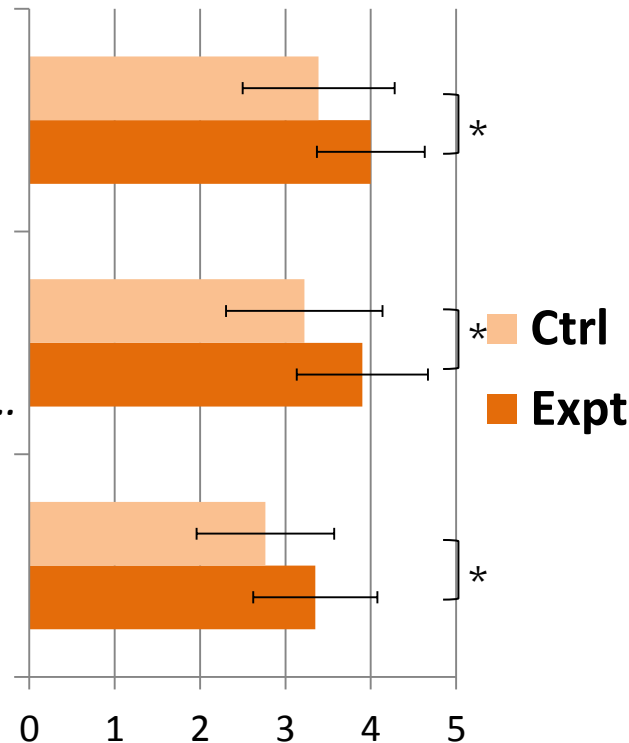
# Post-module inter-group comparison

## Items with stat. sig. Ctrl-Expt difference (p<0.05)

*[Po13or30] Online tools and resources were very useful to my learning in this course.*

*[Po11or28] The online platform (i.e. Moodle) helped me manage my...*

*[PoQ7] When I had difficulties I usually sought help from my teacher.*



**Ctrl**



**Expt**

\*p<0.05, Mann-Whitney U Test

## GRSLS items with stat. sig. Ctrl-Expt difference ( $p < 0.05$ )

### PoGRSLSQ3 – **The Collaborative style**

*Working with other students on class activities was something I enjoyed doing.*

於課堂活動中與其他學生合作令我很享受。

Mean - Control: 3.333 / **Experimental: 3.900**

$p = 0.033$ , Mann-Whitney  $U$  Test

### PoGRSLSQ33 – **The Collaborative style**

*This course made me feel like a part of a team where people helped each other learn.*

這課程讓我覺得自己身處一個互助學習的團隊當中。

Mean - Control: 2.500 / **Experimental: 3.650**

$p = 0.000$ , Mann-Whitney  $U$  Test

### PoGRSLSQ39 – **The Collaborative style**

*An important part of taking this course was I earning to get along with other people.*

讀這個課程其一重要的部分是學習與其他人相處。

Mean - Control: 3.333 / **Experimental: 3.800**

$p = 0.030$ , Mann-Whitney  $U$  Test

### PoGRSLSQ57 – **The Collaborative style**

*I enjoyed participating in small group activities during class.*

我享受參與課堂上的小組活動。

Mean - Control: 3.278 / **Experimental: 3.650**

$p = 0.044$ , Mann-Whitney  $U$  Test

## Post-module inter-group comparison



**Ctrl**



**Expt**

## GRSLS Scales: Cronbach's $\alpha$

**Independent**      **0.755**

**Avoidant**      **0.739**

**Collaborative**      **0.689**

**Dependent**      **0.422**

**Competitive**      **0.845**

**Participant**      **0.599**

## Post-module analysis



**Ctrl**



**Expt**



## Learners' evaluation of:

- The nutrition module in general
- The flipped classroom

*Also measured in the post-module questionnaires...*



**Ctrl**



**Expt**

## Expt group's evaluation of their flipped classroom:

- *'I hope more teachers will use the teaching approach used in this course.'* (3.65 / 5)
- **Positively correlated** with whether or not:
  - the students liked to participate in activities connected to the topic at hand ( $r=0.804$ ,  $p<0.01$ ),
  - they thought the video lectures were interesting ( $r=0.636$ ,  $p<0.01$ )

## Expt group's evaluation of their flipped classroom:

- *'This course enabled me to have more interactions with my instructor and classmates than other courses did.'* (3.85 / 5)
- **Positively correlated** with whether or not:
  - the students believed that classroom interactivity enhanced their learning ( $r=0.634$ ,  $p<0.01$ )

## Expt group's evaluation of their flipped classroom:

- *'The **video lectures were effective** in helping me learn nutritional science contents.'* (4.00 / 5)
- *'The **Moodle quizzes were effective** in helping me learn the content.'* (4.00 / 5)

## Expt group's evaluation of their flipped classroom:

- *'There were meaningful connections between the topics in the **videos** and the **class activities**.'* (4.15 / 5)
- *'Viewing the **videos before class** prepared me for the **class activities**.'* (4.10 / 5)

## Expt group's evaluation of their flipped classroom:

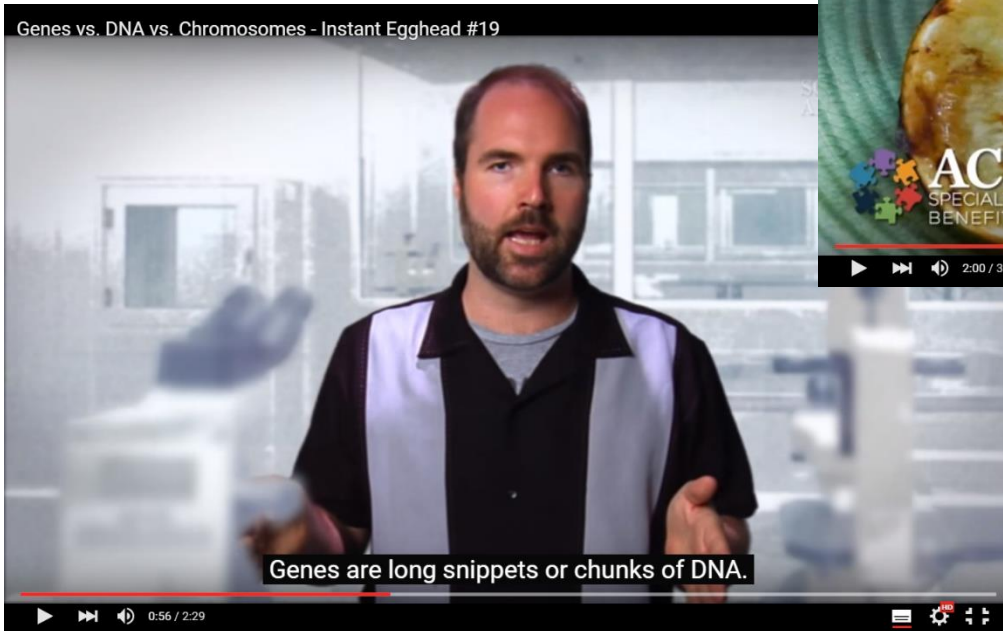
- *'The teacher required student participation in the class activities.'* (4.15 / 5)
- *The formats of class activities were suitable for the topics in question.* (3.95 / 5)







Genes vs. DNA vs. Chromosomes - Instant Egghead #19



Genes are long snippets or chunks of DNA.

0:56 / 2:29

Choose My Plate Dietary Guidelines



Protein

- Meat
- Poultry
- Seafood
- Beans
- Eggs
- Soy

ACI SPECIALTY BENEFITS

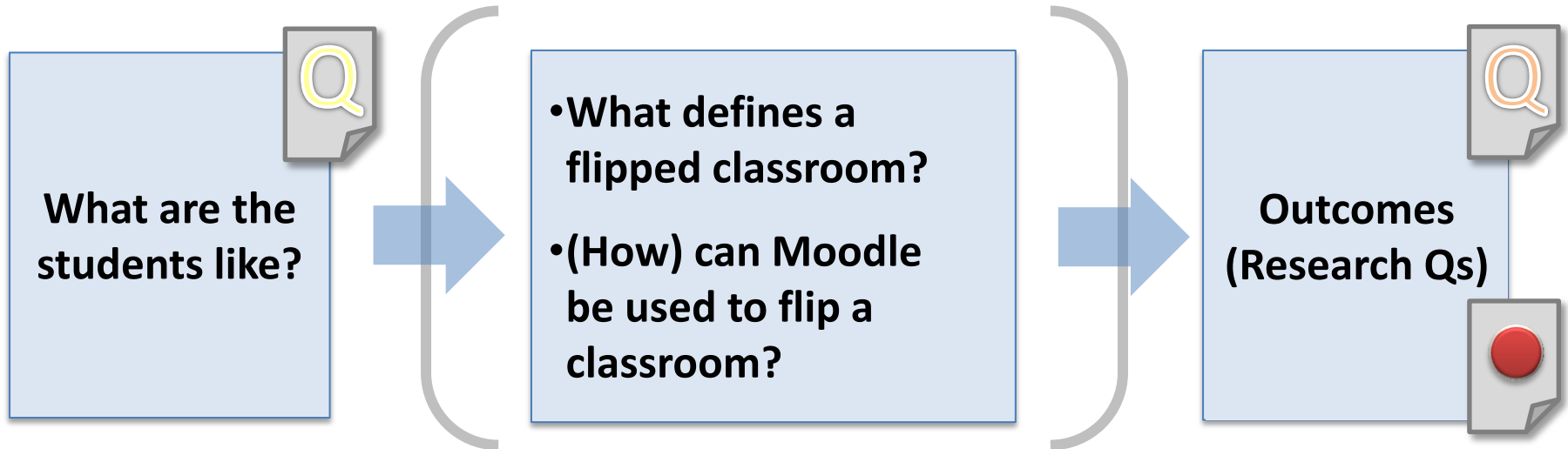
2:00 / 3:02

# Learning needs

- Remembering
- Understanding and being able to apply factual knowledge
- Learning in English (L2 for most learners)

有些專業名詞較難理解 • 很多學術詞彙不太明白 •  
生字太難 • vocabulary • 英文 • 用英文讀，生字難  
記生字 • The huge terms and memorizing them  
有好多內容是要死記 • 背 vitamins & minerals

# Conclusion



## Possible insights:

- **What kinds of students** are likely to benefit most from flipped learning?
- **What are the changes to expect** of the flipped classroom pedagogy?
- **How do a teacher go about** flipping his/her class?

# ***Questions to ask ourselves as teachers***

- Which classes to flip
- What to include in a lecture video
- What else to flip a classroom with
- What to do with the extra class time

# ***Potential pitfalls...***

*'We would like our teachers to do the teaching in class, instead of watching a video out of class, because you **can't interact and ask questions to a video...** If [the students] can learn from a video, they can certainly learn from a live teacher... The videos on Quest can be in addition to, but not in place of a live teacher.'*

Students at College of Natural Sciences,  
University of Texas at Austin

[www.change.org/p/university-of-texas-at-austin-college-of-natural-sciences-stop-the-flipped-classroom-system](http://www.change.org/p/university-of-texas-at-austin-college-of-natural-sciences-stop-the-flipped-classroom-system)

# ***Potential pitfalls...***

*'It is a **cultural problem** that this kind of interactive session does not have optimal participation – treat the Chinese.'*

Dr. Neel Sharma (2013)  
Li Ka Shing Faculty of Medicine, HKU

[www.cetl.hku.hk/seminar130419](http://www.cetl.hku.hk/seminar130419)

# Major references

- Bergmann, J., & Sams, A. (2012). *Flip your classroom: Reach every student in every class every day*. Eugene, OR: International Society for Technology in Education.
- Grasha, A. F. (2002). *Teaching with style: A practical guide to enhancing learning by understanding teaching and learning styles*. Pittsburgh, PA: Alliance Publishers.