UNIVERSITY *of* WASHINGTON

Catalyze Your Success

Read actively and Improve your scores

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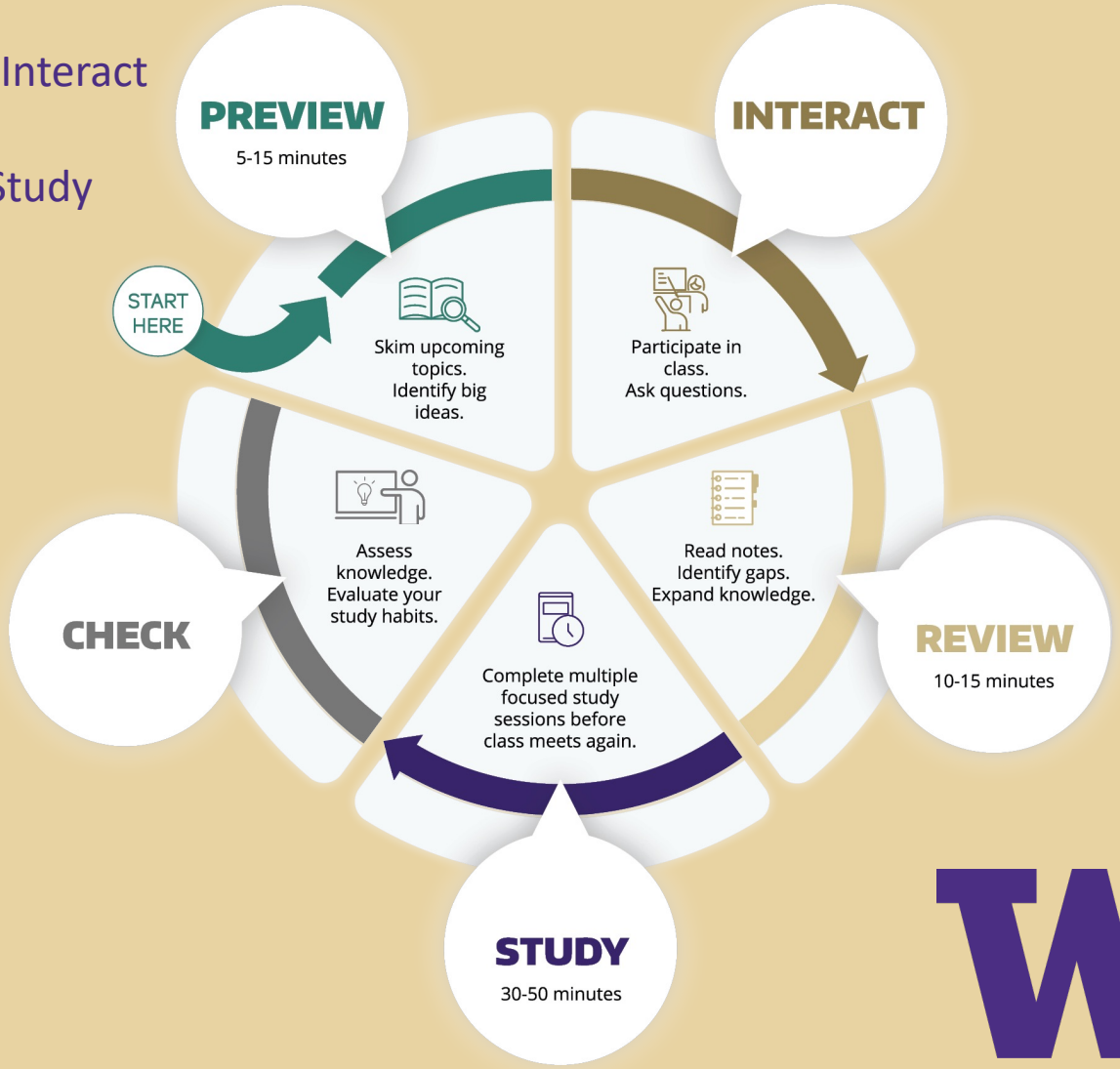
The Learning Cycle

- Workshop 1: Preview and Interact
- Workshop 2: Review and Study
- Workshop 3: Check

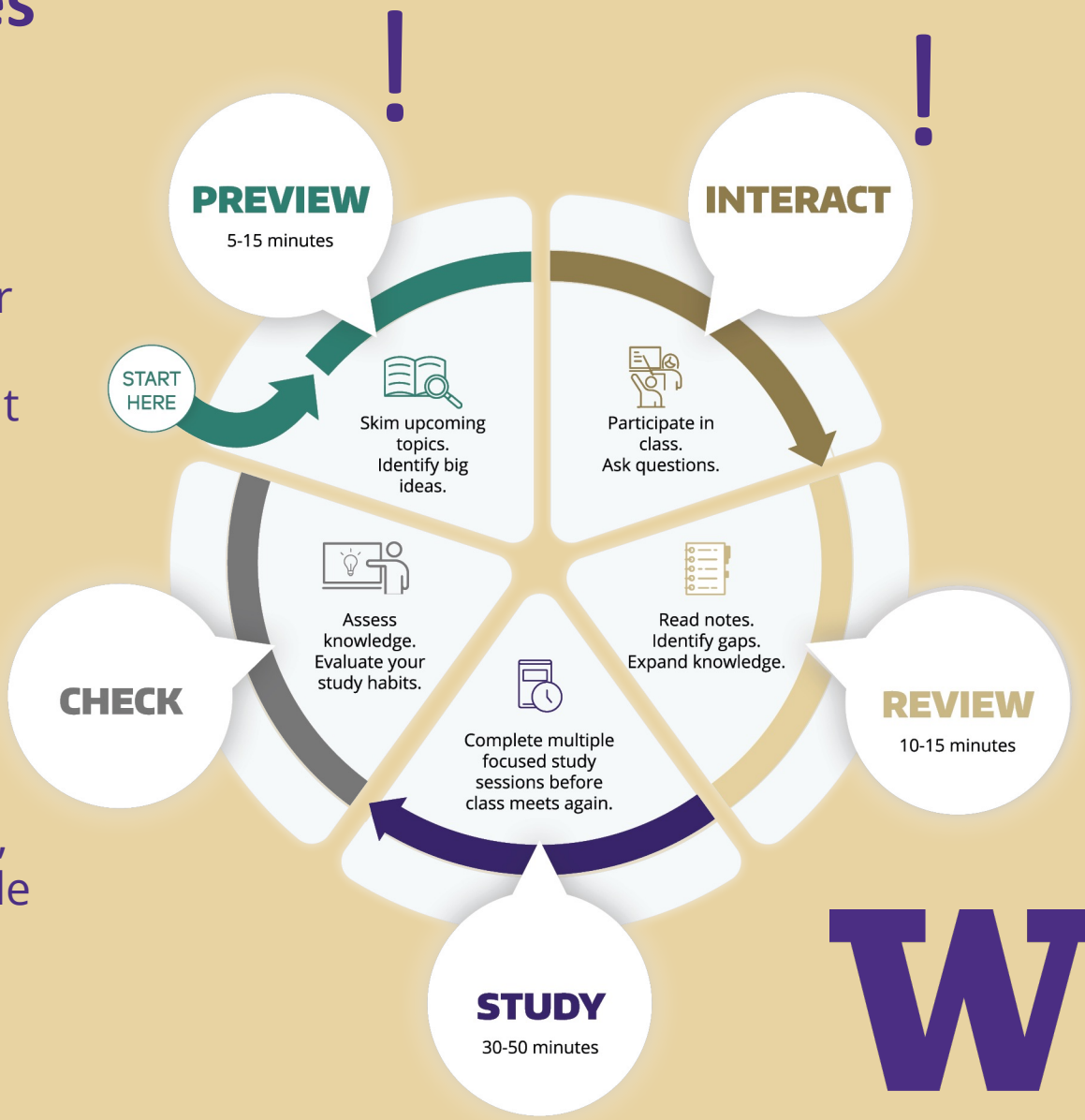


Learning strategies

Today's strategies

- Preview:
  - Skim lecture notes or assigned reading
  - Create questions that will be answered in class or through the reading

- Interact:
  - Paraphrase each paragraph
  - Highlight, take notes, make flashcards while reading or attending lecture



Active Reading Definition

1. PREVIEW THE ASSIGNED PASSAGE
2. DEVELOP A LIST OF QUESTIONS
3. READ AND PARAPHRASE THE PASSAGE, ONE PARAGRAPH AT A TIME
4. REFLECT

Learning strategy #1: Preview

1. Preview the material

Active Reading Example

The procedure is actually quite simple. First, you arrange items into different groups. Of course, one pile may be sufficient, depending on how much there is to do. If you have to go somewhere else due to lack of facilities that is the next step; otherwise, you are pretty well set. It is important not to overdo things. That is, it is better to do too few things at once than too many. In the short run, this may not seem important, but complications can easily arise. A mistake can be expensive as well. At first, the whole procedure will seem complicated. Soon, however, it will become just another facet of life. It is difficult to foresee any end to the necessity for this task in the immediate future, but, then, one can never tell. After the procedure is complete, one arranges the materials into different groups again. Then they can be put into their appropriate places. Eventually, they will be used once more, and the whole cycle will then have to be repeated. However, that is a part of life.

From: Bransford, 1979, pg. 134-135.

Active Reading Example

Laundry

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Learning strategy #2: Create questions

1. Preview the material

2. Create questions to answer while reading or ask in class

Learning strategy #3: Paraphrase and read slowly

1. Preview the material

2. Create questions to answer while reading or ask in class

3. Paraphrase each paragraph and read a little everyday

Learning strategy #4: Be active in your learning

1. Preview the material

2. Create questions to answer while reading or ask in class

3. Paraphrase each paragraph and read a little everyday

4. Reflect on each paragraph and connect it to the previous. **Always work out the examples and highlight, make flashcards, take notes, etc.**

How to Actively Read

TOPIC 1A The perfect gas

➤ Why do you need to know this material?

Equations related to perfect gases provide the basis for the development of many relations in thermodynamics. The perfect gas law is also a good first approximation for accounting for the properties of real gases.

➤ What is the key idea?

The perfect gas law, which is based on a series of empirical observations, is a limiting law that is obeyed increasingly well as the pressure of a gas tends to zero.

➤ What do you need to know already?

You need to know how to handle quantities and units in calculations, as reviewed in *The chemist's toolkit* 1. You also need to be aware of the concepts of pressure, volume, amount of substance, and temperature, all reviewed in *The chemist's toolkit* 2.

The properties of gases were among the first to be established quantitatively (largely during the seventeenth and eighteenth centuries) when the technological requirements of travel in balloons stimulated their investigation. These properties set the stage for the development of the kinetic model of gases, as discussed in Topic 1B.

Table 1A.1 Pressure units*

Name	Symbol	Value
pascal	Pa	**1 Pa = 1 N m^{-2}, 1 kg m^{-1} s^{-2}**
bar	bar	**1 bar = 10^5 Pa**
atmosphere	atm	**1 atm = 101.325 kPa**
torr	Torr	**1 Torr = (101 325/760) Pa** = 133.32… Pa
millimetres of mercury	mmHg	1 mmHg = 133.322… Pa
pounds per square inch	psi	1 psi = 6.894 757… kPa

* Values in bold are exact.

of pressure, the *pascal* (Pa, 1 Pa = 1 N m^{-2}), is introduced in *The chemist's toolkit* 1. Several other units are still widely used (Table 1A.1). A pressure of 1 bar is the standard pressure for reporting data; it is denoted $p^{\ominus}$.

If two gases are in separate containers that share a common movable wall (Fig. 1A.1), the gas that has the higher pressure will tend to compress (reduce the volume of) the gas that has lower pressure. The pressure of the high-pressure gas will fall as it expands and that of the low-pressure gas will rise as it is compressed. There will come a stage when the two pressures are equal and the wall has no further tendency to move. This condition of equality of pressure on either side of a movable wall is a state of mechanical equilibrium between the two gases. The pressure of a gas is therefore an indication of whether a container that contains the gas will be in mechanical equilibrium with another gas with which it shares a movable wall.

P. Atkins, J. de Paula, J. Keeler, Atkins` Physical Chemistry, 11th edition, Oxford university press, 2018

How to Actively Read

the molecules present in the gas and the resulting current of ions is interpreted in terms of the pressure. In a *capacitance manometer*, the deflection of a diaphragm relative to a fixed electrode is monitored through its effect on the capacitance of the arrangement. Certain semiconductors also respond to pressure and are used as transducers in solid-state pressure gauges.

(b) Temperature

The concept of temperature is introduced in *The chemist's toolkit* 2. In the early days of thermometry (and still in laboratory practice today), temperatures were related to the length of a column of liquid, and the difference in lengths shown when the thermometer was first in contact with melting ice and then with boiling water was divided into 100 steps called 'degrees', the lower point being labelled 0. This procedure led

Note how the units (in this case, °C) are cancelled like numbers. This is the procedure called 'quantity calculus' in which a physical quantity (such as the temperature) is the product of a numerical value (25.00) and a unit (1 °C); see *The chemist's toolkit* 1. Multiplication of both sides by K then gives $T = 298.15\,\mathrm{K}$.

A note on good practice The zero temperature on the thermodynamic temperature scale is written $T = 0$, not $T = 0\,\mathrm{K}$. This scale is absolute, and the lowest temperature is 0 regardless of the size of the divisions on the scale (just as zero pressure is denoted

On the thermodynamic temperature scale, temperatures are denoted T and are normally reported in *kelvins* (K; not °K). Thermodynamic and Celsius temperatures are related by the exact expression

$$T/\mathrm{K} = \theta/^{\circ}\mathrm{C} + 273.15 \qquad \text{Celsius scale [definition]} \qquad (1A.1)$$

This relation is the current definition of the Celsius scale in terms of the more fundamental Kelvin scale. It implies that a difference in temperature of 1 °C is equivalent to a difference of 1 K.

Brief illustration 1A.1

To express 25.00 °C as a temperature in kelvins, eqn 1A.1 is used to write

$$T/\mathrm{K} = (25.00\,^{\circ}\mathrm{C})/^{\circ}\mathrm{C} + 273.15 = 25.00 + 273.15 = 298.15$$

$p = 0$, regardless of the size of the units, such as bar or pascal). However, it is appropriate to write 0 °C because the Celsius scale is not absolute.

1A.2 Equations of state

Although in principle the state of a pure substance is specified by giving the values of n, V, p, and T, it has been established experimentally that it is sufficient to specify only three of these variables since doing so fixes the value of the fourth variable.

P. Atkins, J. de Paula, J. Keeler, Atkins` Physical Chemistry, 11th edition, Oxford university press, 2018

Is that all?

Upcoming workshops

- Understand Concepts and Improve your Scores
- Solidify Knowledge and Improve your Scores

Last thing: if you don’t implement a new strategy in 48 hours, you’ll probably not use the strategy

Dimensional analysis problem

Iron helps the body to produce red blood cells. If the amount of iron from our diet is not enough, iron supplements, ferrous sulfate tablets for example, may be prescribed. Mary was taking iron supplement for 60 days. Pharmacist used 22g of $FeSO_4 \cdot 7H_2O$ to fill out the prescription. How many pills per day did the pharmacist prepare for Mary, if 1 pill contains 200 mg of $FeSO_4$? Molar mass of $FeSO_4$ is 152 g/mol, molar mass of $FeSO_4 \cdot 7H_2O$ is 278 g/mol, melting point of $FeSO_4 \cdot 7H_2O$ is 147 F.

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Dimensional analysis problem

Given

pills for 60 days

22g of $FeSO_4 \cdot 7H_2O$

1 pill contains 200 mg of $FeSO_4$

MM $FeSO_4$ is 152 g/mol

$FeSO_4 \cdot 7H_2O$ is 278 g/mol

Find

How many pills per day?

Dimensional analysis problem

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MM $FeSO_4$ (compound B) is 152 g/mol

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1) mass (A)/day = 22g/60 days = 366.7 mg/day

Find

How many pills (A) per day?

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1) mass (A)/day = 22g/60 days = 366.7 mg/day

2) **For 1 pill:** mol (B)/pill = mol (A)/pill
200mg/152(g/mol) = 0.001316 mol/pill

Find

How many pills (A) per day?

Dimensional analysis problem

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2) **For 1 pill:** mol (B)/pill = mol (A)/pill
200mg/152(g/mol) = 0.001316 mol/pill

3) mass (A)/pill = mol/pill * MM (A)
mass (A)/pill = 0.001316 mol/day * 278 g/mol
mass (A)/pill = 0.366 g/pill = 366 mg/pill

Answer: compare 3) and 1) => **1 pill/day**

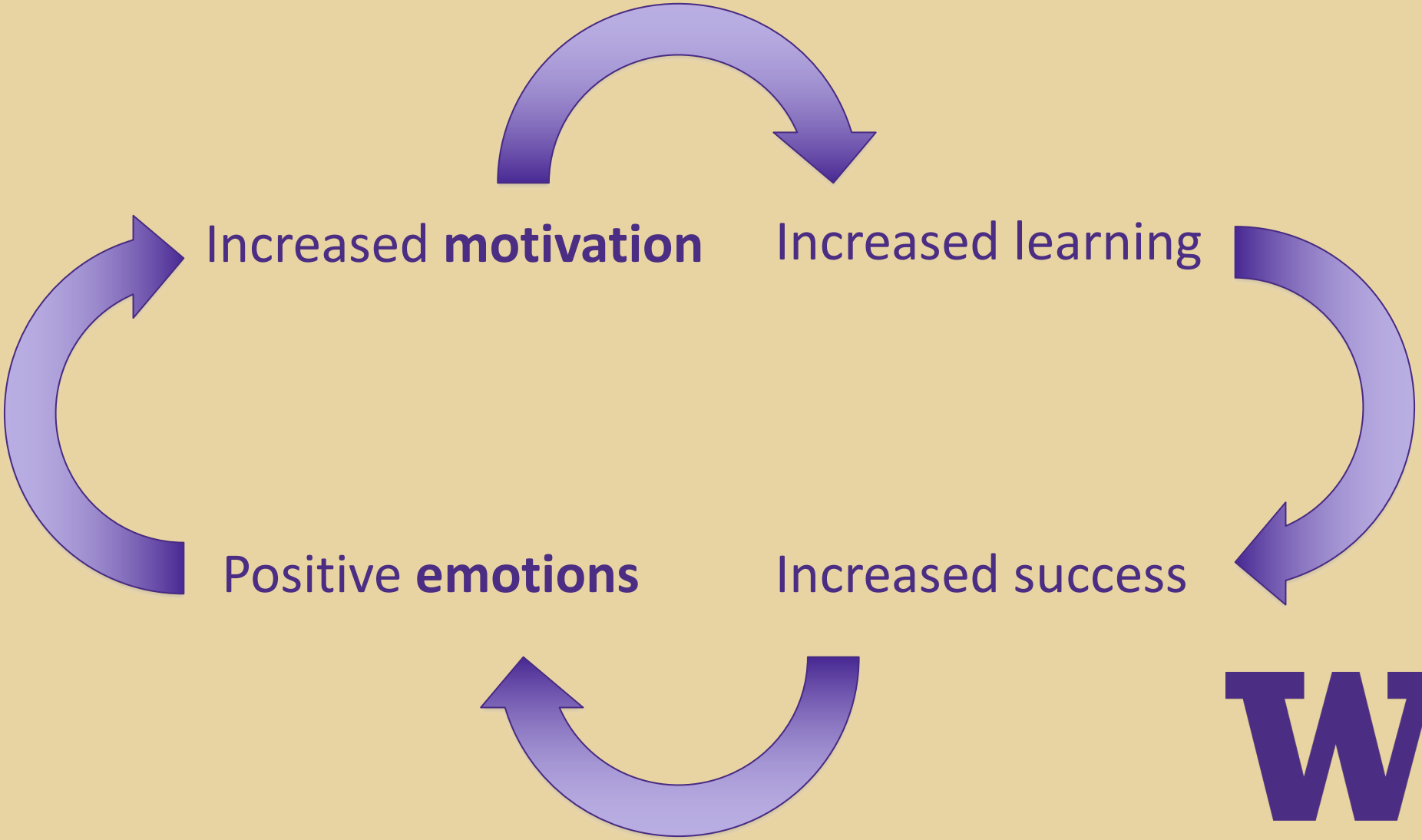
Test anxiety

- studies show that stress can lead to short-term memory loss and impede long-term memory retrieval (Frodl & O`Keane, 2013; Kim, Lee, Han, Packard 2001; Phelps 2004)

- how to reduce anxiety and build confidence?

- let`s see what the connection between emotions and motivation is

Connection between emotions and motivation



What affects motivation?

- **Value.** How important do I find this goal?
- **Nature of the environment.** Do I feel supported?
- **Belief in the ability to succeed.** Do I feel I can design and follow a course of action to meet this goal?

How to improve motivation?

> use learning strategies to build academic success

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> cultivate a mindset that your intelligence can grow

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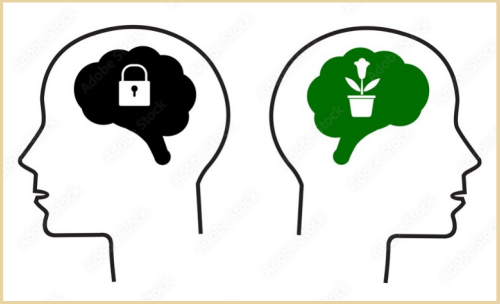
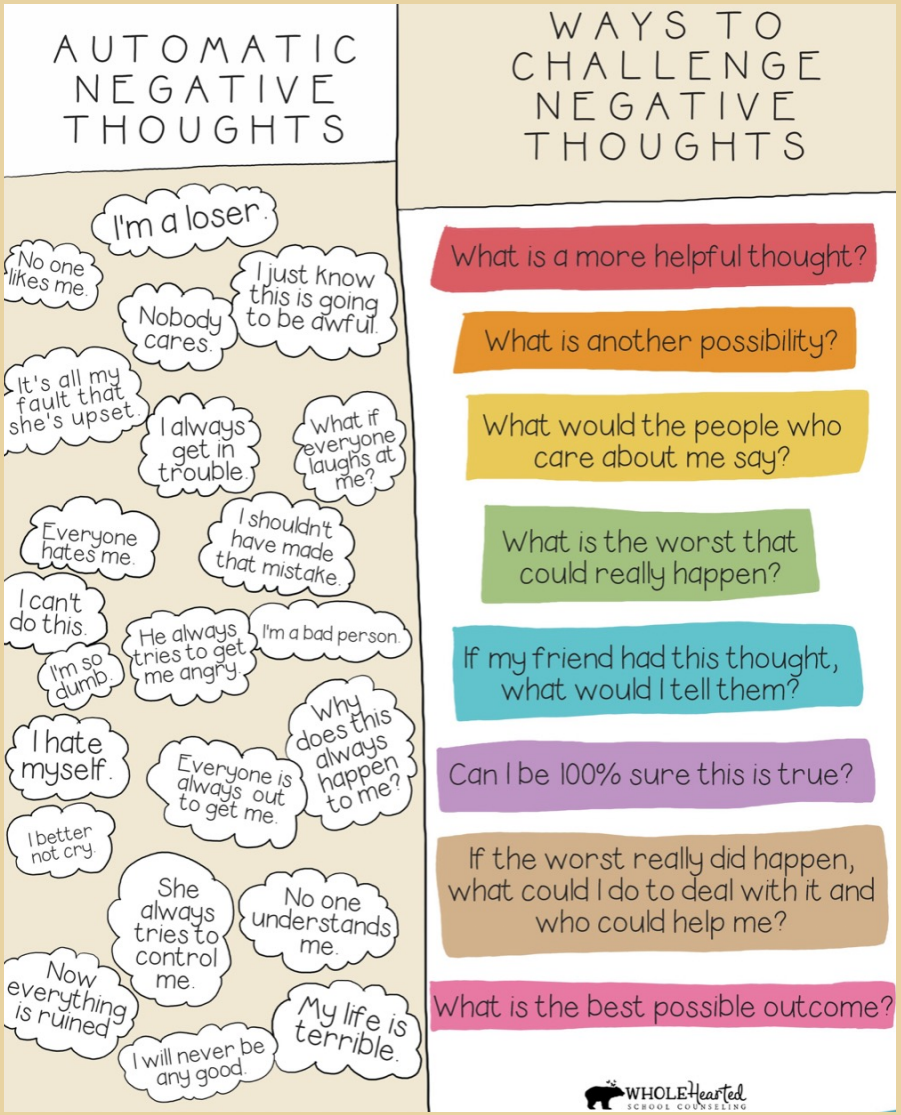


“Fixed” Mindset	“Growth” Mindset
I'm not good at this.	What am I missing?
I give up.	I'll use a different strategy.
It's just good enough.	Is this my best work?
This is too hard.	This may take some time.
Who am I to be smart, talented ... ?	Who am I not to be?
My plan failed. It's over.	There's always a Plan B.
Why can't I do it like [someone else you admire]?	What do they know that I don't know? I will learn from them.

How to improve motivation?

> use learning strategies to build academic success
> cultivate a mindset that your intelligence can grow
> engage in positive, healthy self-talk

How to improve motivation?



https://www.teacherspayteachers.com/Product/Challenge-Automatic-Negative-Thoughts-Cognitive-Behavioral-Therapy-Free-Poster-5219624

How to improve motivation?

- use learning strategies to build academic success
- cultivate a mindset that your intelligence can grow
- engage in positive, healthy self-talk
- hard to improve external circumstances – easier to work on things that you can control. Attribute positive and negative results to your behavior

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- know your learning style preferences (visual, auditory, read/write, kinesthetic)

How to improve motivation?

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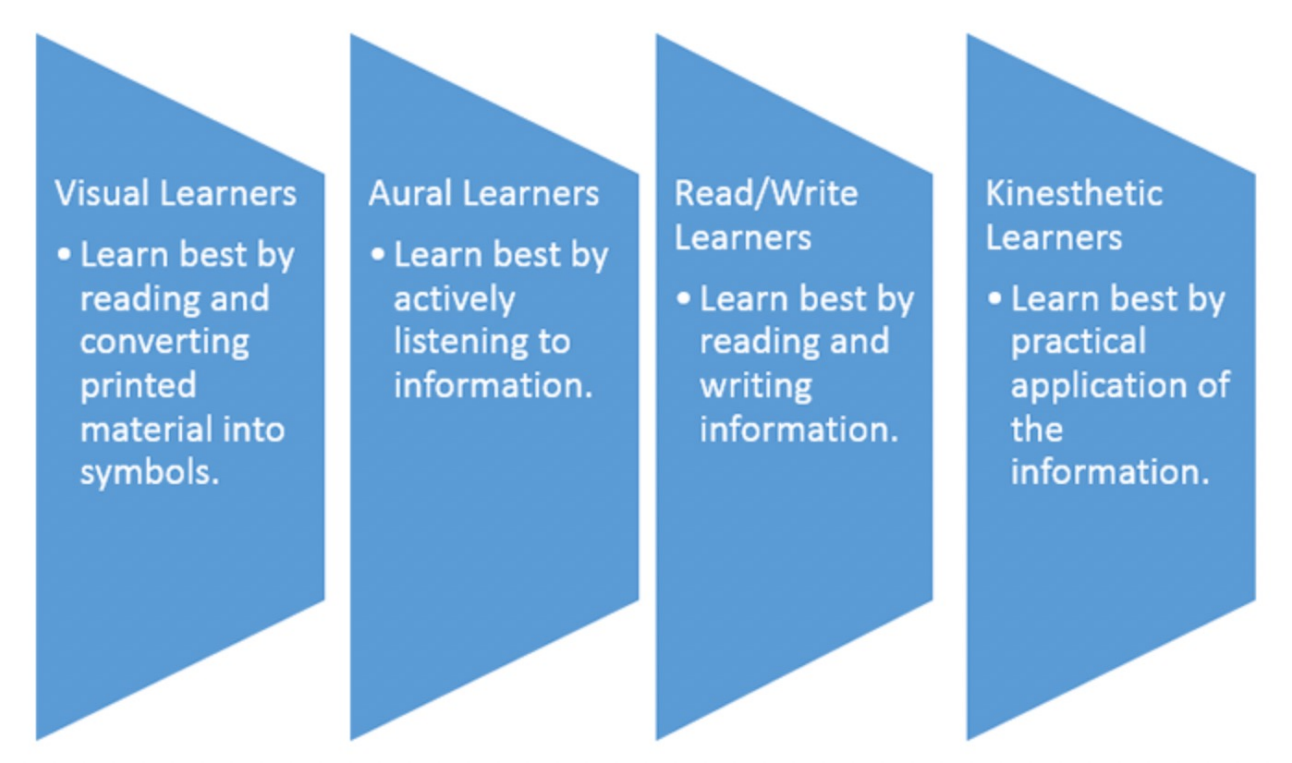

https://nursing.lsuhsc.edu/AcademicSuccessProgram/LearningStyles.aspx

Study strategies for different learning style preferences

Visual Learner (prefers pictures, charts, diagrams, graphs, etc.)		
In Class	While Studying	During Exams
• Underline important points • Highlight with different colors • Use symbols, charts, graphs	• Underline notes and text • Highlight notes and text (in color) • Summarize with images and concept maps	• Recall pictures • Draw concept map of essay • “Dump” formulas/diagrams

How to improve motivation?

- use learning strategies to build academic success
- cultivate a mindset that your intelligence can grow
- engage in positive, healthy self-talk
- hard to improve external circumstances – easier to work on things that you can control. Attribute positive and negative results to your behavior
- know your learning style preferences (visual, auditory, read/write, kinesthetic)
- get adequate rest, nutrition, and exercise

Study strategies for different learning style preferences

Visual Learner (prefers pictures, charts, diagrams, graphs, etc.)		
In Class	While Studying	During Exams
• Underline important points • Highlight with different colors • Use symbols, charts, graphs	• Underline notes and text • Highlight notes and text (in color) • Summarize with images and concept maps	• Recall pictures • Draw concept map of essay • “Dump” formulas/diagrams

Study strategies for different learning style preferences

Aural or Auditory Learner (prefers hearing information)		
In Class	While Studying	During Exams
• Attend lectures, discussions, and tutorials • Tape lecture for later	• Discuss material in study group • Summarize notes, then read out loud • Read onto tape, then listen back	• Listen to inner voice to recall information • Talk out question under breath

Study strategies for different learning style preferences

Reading/Writing Learner (prefers reading or writing about information)		
In Class	While Studying	During Exams
• Create lists and headings • Take complete lecture notes	• Identify key words and associate them with details • Reread notes and text and summarize them in writing • Reread and summarize old tests • Answer (in writing) the review questions	• Use key words to trigger more complete answers • At the beginning of the exam, write out important lists • Essay – write thesis, then outline

Study strategies for different learning style preferences

Kinesthetic Learner (prefers moving, touching, visualizing movement, or hands-on activities to learn information)		
In Class	While Studying	During Exams
• Use all senses • Participate in labs and field trips	• Trial and error is important – can learn from mistakes • Create personal examples • Use pictures to illustrate notes • Stand, move, walk • Study in an exam-like environment	• Remember examples • Stretch or move to jog memory