

Self-directed learning instruction as a tool for equity: A framework for improving student outcomes in online STEM courses

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Agenda



- The Postsecondary Teaching with Technology Collaborative
- A Framework of Self-Directed Learning (SDL) Processes
- How we address equity in design and development process
- Lesson learned from the field
- Discussion

The Postsecondary Teaching with Technology Collaborative

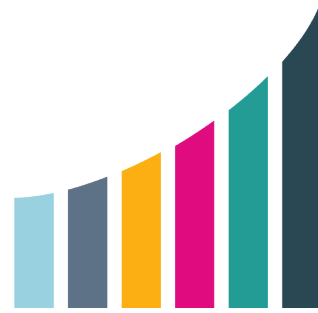


What is the Collaborative?



A research and capacity-building center that aims to study and improve how faculty **teach** and use **technology** to help students apply and strengthen **self-directed learning skills** to increase their success in **online courses**.

Who is the Collaborative?



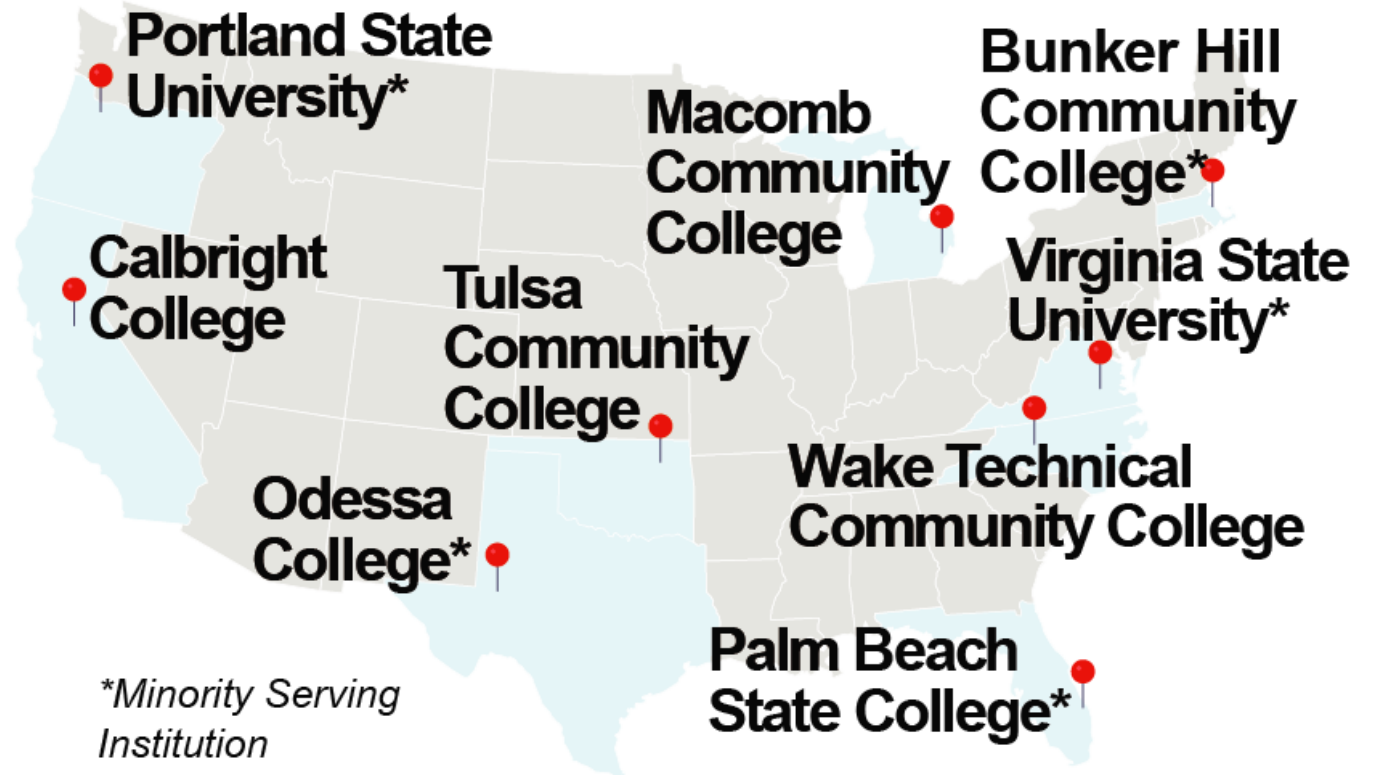
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**Achieving
the Dream**



Students report numerous barriers to success in online STEM



Belonging uncertainty

Lack of connection to peers and/or instructors

Stereotype threat



Uncomfortable asking for help

Unclear personal relevance of course content

Feelings of isolation exacerbated in online formats

Challenges reported by instructors



Student reluctance
to seek help

Weak relationships
with students



Limited class time for student skill
application, reflection, revision

Desire for more support with
online pedagogy

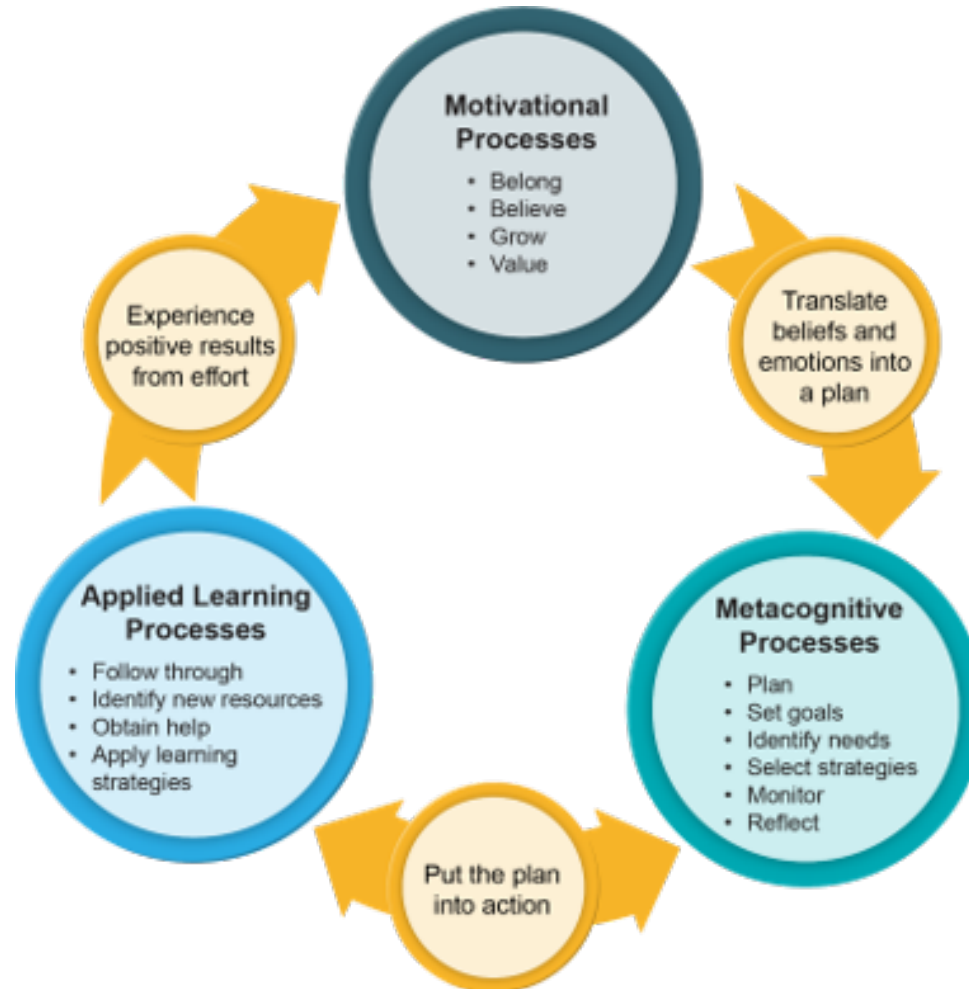
What does the Collaborative hope to achieve?

- ✓ Increase awareness of the importance of self-directed learning skills and of culture and context in supporting these skills
- ✓ Improve online instruction and/or use of technology for instructional purposes
- ✓ Advance educational equity by building colleges' and universities' capacity to improve instructional quality in ways that support their diverse student bodies
- ✓ Strengthen feedback loops among researchers, practitioners, and education technology developers


A Framework of Self-Direct Learning Processes



Three interconnected processes



Challenge & proposed approaches for equity orientation



Limited prior research on culture & context

Partner with broad access institutions

Include student voice in research and capacity

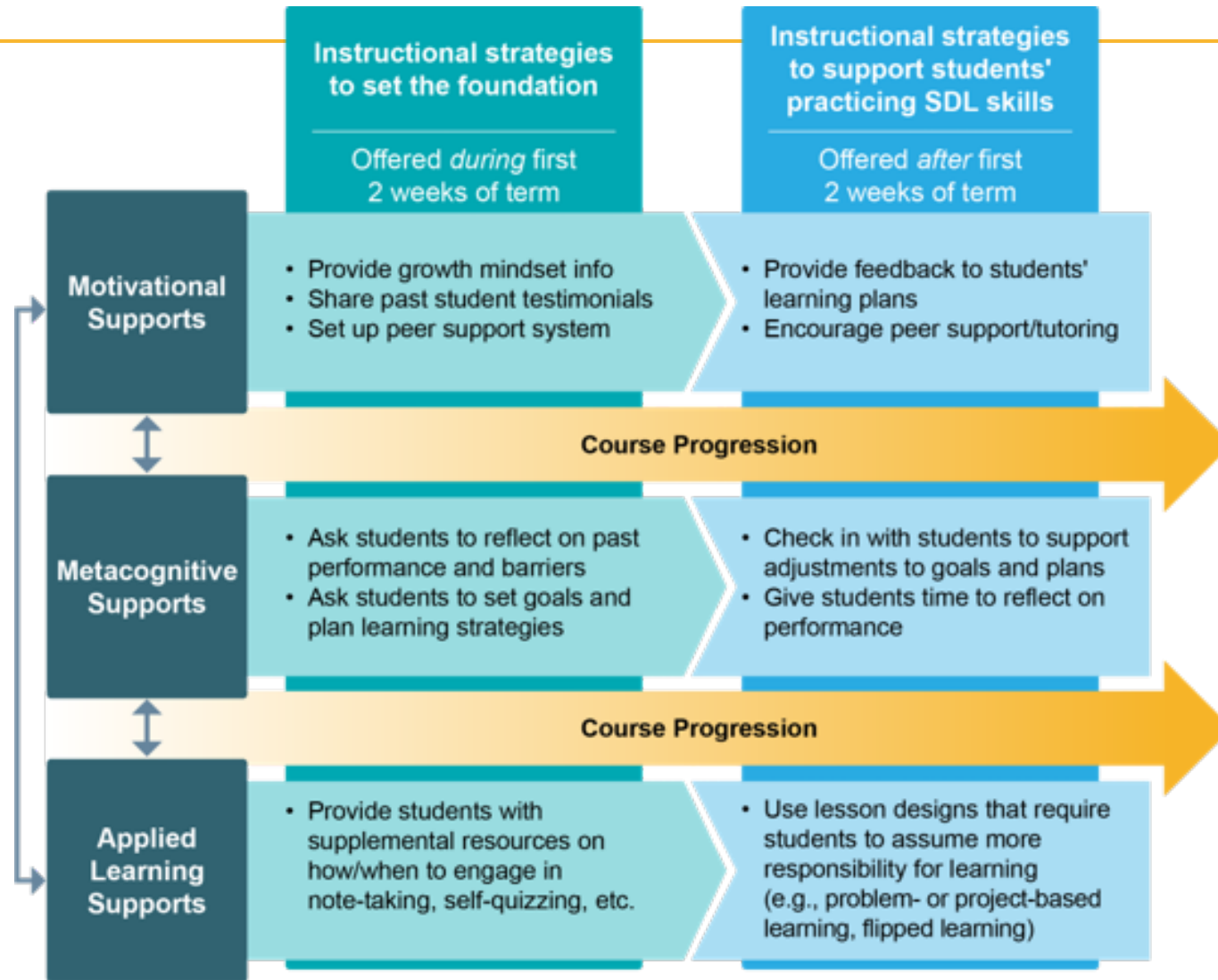
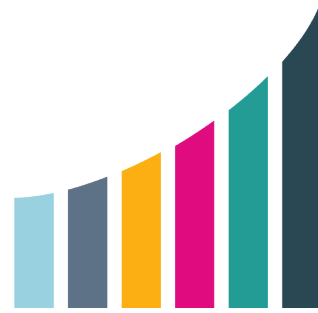
Integrate findings across relevant fields

How we address equity in design and development process



- Focus on strategies that are importance for students of color and marginalized background who have historically not been well supported in STEM fields
- Develop and test strategies to advance equity by creating conditions for faculty to foster mindsets that research shows are important
- Integrate more culturally responsive principles and strategies

Instructional Support



Reflection



- How do you think context and culture shape student learning and SDL skill development (motivation, metacognition, applied learning strategies) in online STEM courses?



Lessons learned from the field



A “typical” student

Non-traditional

- Average age: 27¹
- 64% working full- or part-time²
- 28% have children or care for family members³
- 28% struggle to balance work, life, and family obligations⁴
- 45% in 2-year institutions report being food insecure in the previous month⁵

Study time is tight

- Students need assignments that can be completed while they commute
- Being prepared, students can learn to critical think
- Students need opportunities to regularly “Recharge” their knowledge of key concepts throughout the course

1. U.S. Department of Education

2. McGraw-Hill Equity Survey

3. Source: U.S. Department of Education

4. McGraw-Hill Equity Survey

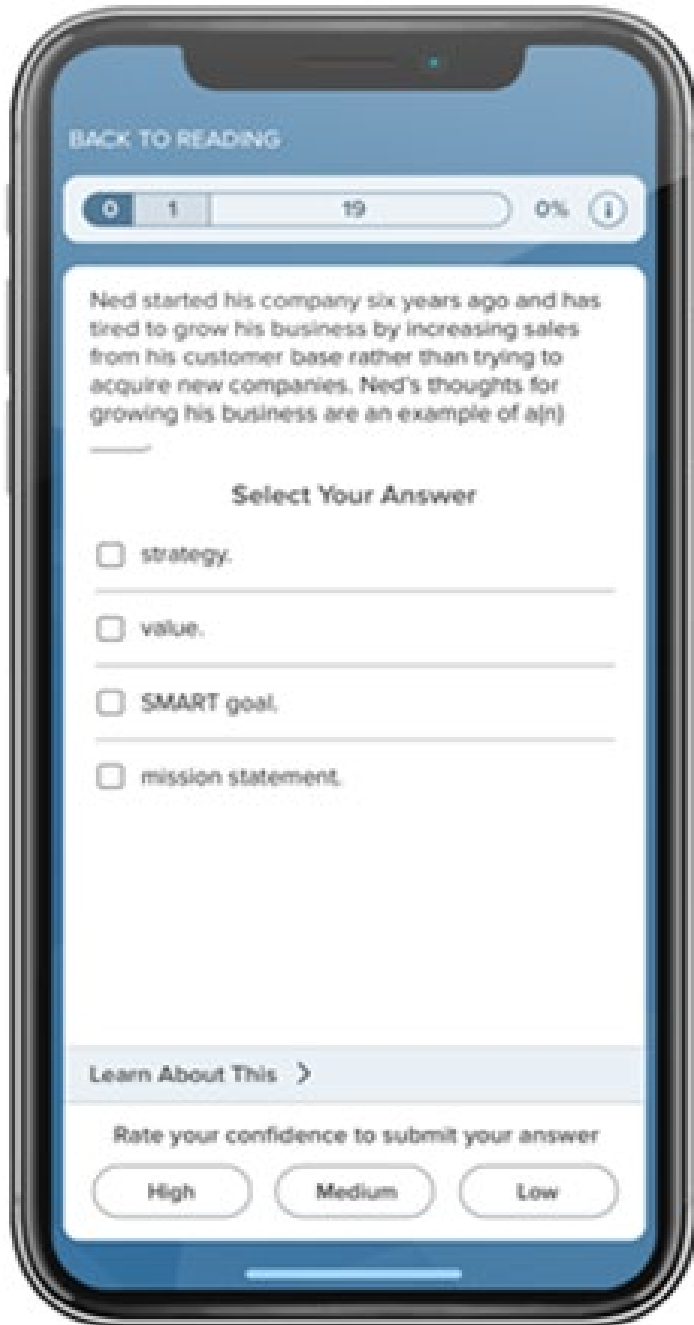
5. #RealCollege Survey report



“On the Go” Assignment Advantages

- Small, pedagogically chunks help students “scaffold” their learning
- Students can Micro/Binge learn to reinforce a sense of accomplishment
- Productive downtime leads to academic success

Inclusive App's Helped Students Achieve Their Academic Requirements



WiFi is not required to complete assignments



Don't have to pay for childcare while at the college



Can download and access assignments to study anywhere, anytime, even when offline

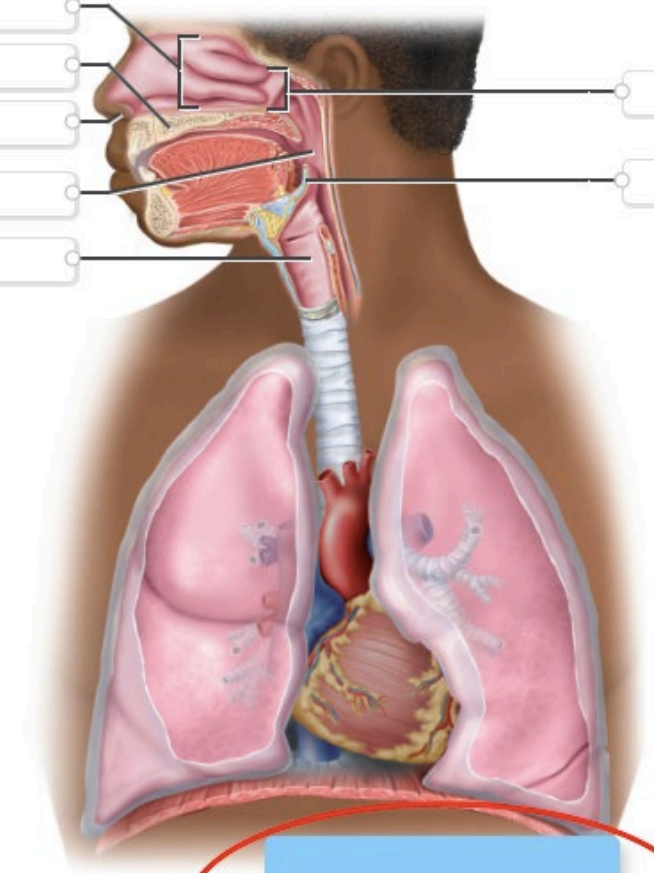
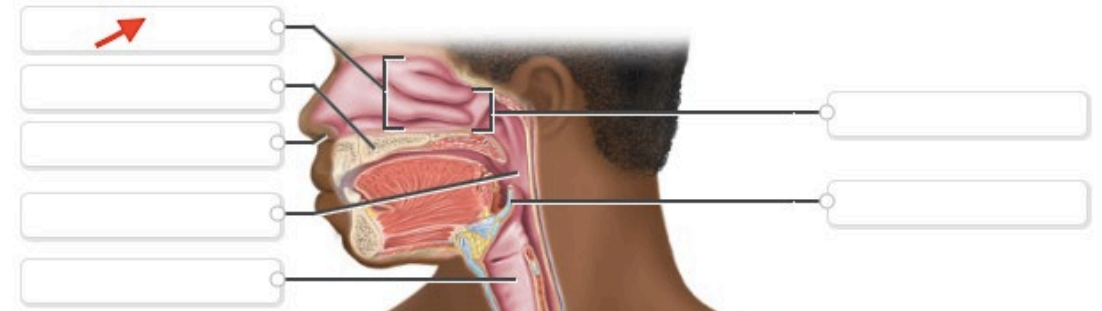


Students can sync their completed when they access available, free hotspots, avoiding penalties for missed or incomplete work

Labeling the Anatomy of the Respiratory System, Upper Respiratory System

Correctly label the components of the respiratory system.

- Nostril
- Nasal cavity
- Pharynx
- Larynx
- Posterior nasal aperture
- Epiglottis
- Hard palate



Floor of the nasal cavity

Reset Zoom

“Hints” help the student make a connection between concrete and abstract

“In the
Learning
Moment”
Feedback

Check My Work



You may use *check my work* **2 times per question.**

CANCEL

OK

Classifying Structures of the Upper Respiratory Tract

Assign the following features or functions to the appropriate anatomical region.

Pharyngeal tonsil

Inferior meatus

Epiglottis

Conchae

Thyroid cartilage

Opening of auditory tube

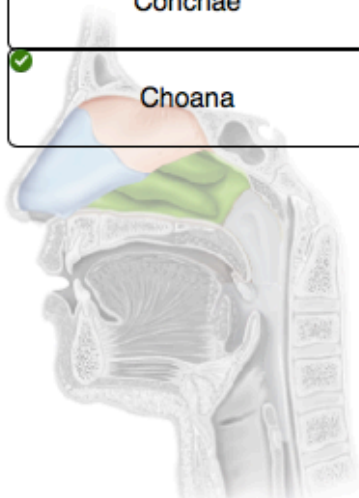
Uvula

Vocal folds

Choana

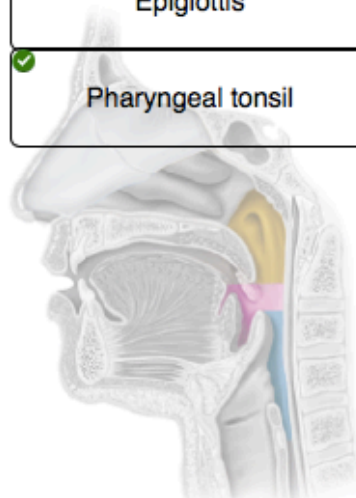
Nasal Cavity

- Conchae
- Choana



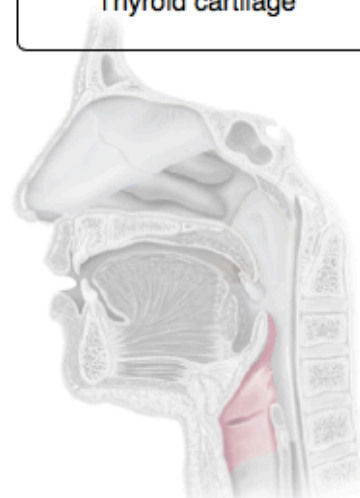
Pharynx

- Epiglottis
- Pharyngeal tonsil



Larynx

- Thyroid cartilage



Students receive “real-time” feedback, promoting confidence and course completion

Remediation
to the
Textbook

22. value:
2.94 points

Classifying Structures of the Upper Respiratory Tract

Assign the following features or functions to the appropriate anatomical region.

Pharyngeal tonsil	Inferior meatus	Epiglottis	Conchae
Thyroid cartilage	Opening of auditory tube	Uvula	Vocal folds
Choana			

Nasal Cavity	Pharynx	Larynx
Conchae	Epiglottis	Thyroid cartilage
Choana	Pharyngeal tonsil	

Reset

References eBook & Resources

[Anatomy of the Respiratory System](#)

[Report a content issue](#) [Check my work](#)

Navigation bar with icons for back, forward, search, and other functions.

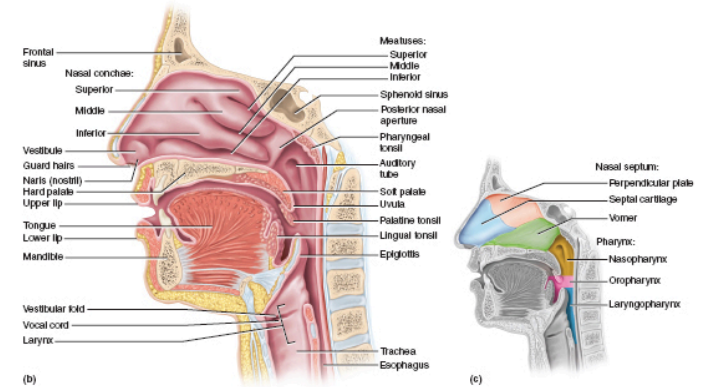



FIGURE 22.3 Anatomy of the Upper Respiratory Tract. (a) Median section of the head. (b) Internal anatomy. (c) The nasal septum and regions of the pharynx.

? Draw a line across part (b) of this figure to indicate the boundary between the upper and lower respiratory tract.

[Click here to view the PDF](#)

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The nasal cavity begins with a small dilated chamber called the **vestibule** just inside the nostril, bordered by the ala nasi. This space is lined with stratified squamous epithelium like the facial skin, and has stiff **guard hairs**, or **vibrissae** (vy-BRISS-ee), that block insects and debris from entering the nose. Posterior to the vestibule, the nasal cavity expands into a much larger chamber, but it does not have much open space. Most of it is occupied by three folds of tissue—the **superior**, **middle**, and **inferior nasal conchae**³ (CON-kee), or **turbinates**—that project from the lateral walls toward the septum (**fig. 22.3**). Beneath each concha is a narrow air passage called a **meatus** (me-AY-tus). The narrowness of these passages and the turbulence caused by the conchae ensure that most air contacts the mucous membrane on its way through. As it



Empowering Students Via Actionable Performance Dashboards



Review the Challenging Concepts

Overall Class Performance as of Mar 14, 2022

How are learners progressing?



■ Not Started 13%
■ In Progress 0%
■ Completed 87%

How long did learners take to complete?



⚠ On average, learners took more time than estimated.

How aware are learners of their knowledge?



How many concepts were challenging?



⚠ Many concepts require remediation.

Individual Learners

How did this learner do?



Search

Concept Performance

Download

Assignment Concepts	Preview Sample Question	Number of Learners with Low Accuracy
Working with the (D) Jellybean	Preview Sample Question	7
Working with the (N) Jellybean		7
Working with the (E) Jellybean		7
Working with the (S) Jellybean		5
Working with the (R) Jellybean		4

< Sample Question

Concept Title: Describe the function of calcitriol.

Multiple Select Question

Select all that apply

Identify the documents are accessed when you access the (D) Jellybean.

- Incoming Fax
- Outgoing Fax
- X-rays
- Referrals
- ePrescriptions

Check Answer

Supporting Planning and Study Skills in Anatomy & Physiology I



- Pre-course tech tutorial videos
 - Lessens tech barriers and bolsters student confidence
- Adaptive learning assignments: time estimation, key concepts, confidence assessment for each response
 - Supports time management and review
 - Data dashboards guide future instruction for faculty

The screenshot displays the McGraw Hill adaptive learning interface. At the top, it shows '1 of 41 Concepts completed' and 'Estimated time: 1 hour, 14 minutes'. A 'Multiple Choice Question' asks: 'Which type of secretion has an extracellular?' with options 'Endocrine' and 'Exocrine'. Below the question, there is a 'Rate your confidence to submit your answer.' section with 'High', 'Medium', and 'Low' buttons. A 'Need help? Review these concept resources.' link is also visible.

The data dashboard below shows 'Reading Assignment Chapter 7. Bone Tissue (7.1-7.5)'. It includes 'Overall Class Performance as of May 6, 2022' with four metrics: 'How are learners progressing?' (Not Started 16%, In Progress 0%, Completed 84%), 'How long did learners take to complete?' (Estimate 41m to 1h 01m, Actual 1h 33m), 'How aware are learners of their knowledge?' (Metacognition: Weak to Strong), and 'How many concepts were challenging?' (31 of 34). A 'Time Spent' section features a bar chart for 'Overall Time Taken' (Number of Learners vs. Completion time) and a donut chart for 'Time spent in Learning Activity' (Questions 71%, Resources 29%).

Metric	Value
Not Started	16%
In Progress	0%
Completed	84%

Completion time	Number of Learners
< estimated	2
as estimated	6
> estimated	13

Activity	Percentage
Questions	71%
Resources	29%

Discussion



Discussion questions

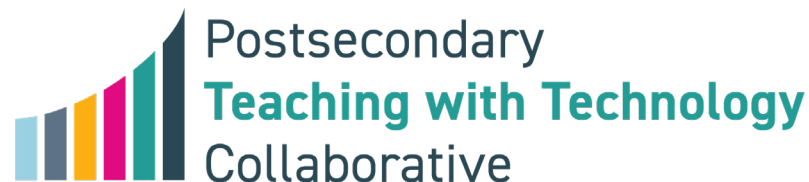
- What is your definition of SDL?
- Have you incorporated SDL skills and mindsets in your online courses? In what ways?
- What resources are available to support SDL skills and mindsets at your institution (e.g., student success courses, coaches, advising, tutoring)?
- What types of supports do you need to implement SDL strategies in your courses?

Thank you

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