**Conceptual Planning Framework**

**Big Idea:**

Homeostasis is maintained through physiological processes.

**Key Concepts:**

Structure and Function

**Content:**

Biological molecules

* water, acids, bases, buffers
* dehydration and synthesis reactions
* organic molecules: carbohydrates, lipids, proteins, nucleic acids, ATP

**Essential Questions:**

* As scientists, how do we use physical models to visualize, understand and predict scientific phenomena that are difficult to observe directly?
* How are structure and function related at various levels of biochemical organization (atoms, molecules, macromolecules)?
* How are the properties of water and carbon critical for maintaining life?

**Curricular Competencies:**

**Questioning and predicting**

* Demonstrate a sustained intellectual curiosity about a scientific topic or problem of personal, local, or global interest
* Make observations aimed at identifying their own questions, including increasingly abstract ones, about the natural world

**Processing and Analyzing**

* Construct, analyze, and interpret graphs, models, and/or diagrams
* Use knowledge of scientific concepts to draw conclusions that are consistent with evidence

**Communicating**

* Formulate physical or mental theoretical models to describe a phenomenon
* Communicate scientific ideas and information, and perhaps a suggested course of action, for a specific purpose and

audience, constructing evidence-based arguments and using appropriate scientific language, conventions, and

representations

**First Peoples Principles of Learning**

* Learning involves patience and time.
* Learning is embedded in memory, history and story.
* Learning ultimately supports the well-being of the self, the family, the community, the land, the spirits, and the ancestors.

**Ideas to promote Inquiry through E-learning:**

Incorporate inquiry questions and visible thinking routines from Harvard Project Zero

<http://www.pz.harvard.edu>

Explore stories and resources shared by colleagues experienced with blended learning models such as:

Tips for Designing an Online Learning Experience Using the 5Es Instructional Model

<https://catlintucker.com/2020/03/designing-an-online-lesson/>

8 Ideas Designed to Engage Students in Active Learning Online

<https://catlintucker.com/2020/07/8-ideas-designed-to-engage-students-online/>

7 Big Ideas as you shift towards online learning

<https://www.spencerauthor.com/online-teaching/>

**Summative Performance Assessment:**

Macromolecule Choice Board Option (Refer to Learning Plan below)

Questions to Consider:

* *What are the essential questions students need to answer?*
* *How are the essential questions connected to the performance/summative task?*
* *How can the summative task reflect authentic work connected to the areas of study/discipline?*
* *What problem will the students solve?*
* *Will the inquiry allow students to self-direct and have agency in their learning?*
* *How can you augment or redefine the use of technology to enhance student learning ?*
* *What will the students be able to transfer to their next inquiry?*

**Learning Plan:**

**Planning for Blended Learning**

*Before planning your units, it is important to consider the following features of the NVSD Blended Learning Timetable.*

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| **Session Styles** | | |
| **Face to Face** | **Remote** | **Independent** |
| * Synchronous * Small group * 50 minutes/session * 2 interactions/week (40%) * 1 interaction/week (20%) * Interactions may occur before or   after remote sessions | * Synchronous * full group * 60 minutes/session * 1 interaction/week (40/20%) * 2 sessions/cycle (40/20%) * Interactions may occur before or   after face to face sessions | * Asynchronous / At home * Students need to be able to start   on this independently / prior to  face to face or remote sessions   * 3 sessions/week (40%) * 4 sessions/week (20%) * 50 minutes/session |

**Timeframe:**  One 2-week cycle (approximately 1 month based upon an 8 block rotation)

**Unit Synopsis:**

* Specific strategies, activities and a suggested sequence of topics have been embedded into this sample unit plan.
* Opportunities for formative and summative assessment have been identified throughout.
* “Hands-on” Face to Face interactions include station studies and experimentation.
* Suggestions for chunking Remote Sessions include the use of Mentimeter and Break Out Rooms.
* Choice Boards and the Flipped Model have been suggested for use to direct Independent Sessions.

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| **WEEK ONE: Anatomy and Physiology 12 Biological Molecules** | | |
| **Face to Face** | **Remote** | **Independent** |
| “Hands on”    Water Stations   * Surface tension, adhesion, polarity   and solvent   * One station to provide direct   teacher instruction/ interaction   * (40%) complete two stations /   interaction   * (20%) complete four stations /   interaction   * Formative Assessment | Focus:  Water    Check in   * Request students post the first   word that comes to mind when  they think of “water”   * Use mentimeter to build a   communal word cloud  <https://www.mentimeter.com/>  or embed words into a droplet  shaped word art  <https://wordart.com/create>   * Discuss/comment     Set Learning Intentions and Timeline for the session    Powerpoint   * Electronegativity, Polarity, Dipoles     TED-Ed (3:52)  <https://ed.ted.com/lessons/how-polarity-makes-water-behave-strangely-christina-kleinberg>    Mentimeter   * Use to chunk session - Embed Q   and A relating to powerpoint and  video    Exit Slip   * Colour Symbol Image to be posted   on Padlet <https://pz.harvard.edu/sites/default/files/Color%20Symbol%20Image_1.pdf>   * Formative Assessment | FLIP example sequence    Session 1: Water   * Reading Passage Excerpt eg. David   Suzuki’s The Sacred Balance   * Provide note taking   frame/structure   * Use Padlet to gather Word,   Phrase, Sentence Thinking  Routine responses  <http://www.pz.harvard.edu/sites/default/files/Word-Phrase-Sentence.pdf>   * Assignment: Walk the Week   Thinking Routine as Formative  Assessment  <http://www.pz.harvard.edu/sites/default/files/Walk%20the%20Week.pdf>    Session 2: Acids and Bases   * Defining Properties * pH scale <https://phet.colorado.edu/> * Neutralization Reaction * Possible Extensions <https://www.flinnsci.com/api/library/Download/5f6db6d0af3d43a8bac20ecb907541c8>     Session 3: Buffers |

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| **WEEK TWO: Anatomy and Physiology 12 Biological Molecules** | | |
| **Face to Face** | **Remote** | **Independent** |
| "Hands on”    Plastic Molecular Model Kits   * Build macromolecules   and model dehydration synthesis  and hydrolysis   * Plastic pieces to be cleaned by   students before returning kits    OR    Flashcards   * Teacher provides students with   drawings of models and  summaries of macromolecule  function   * Students work to link structural   drawings to names and functions  to create a personal set of  flashcards   * Teacher provides support helping   students identify key functional  groups, bonding patterns,  etc. (clues for identification)         OR    Food analysis Lab   * Glucose, Polysaccharides, Proteins,   and Lipids    Design Considerations   * Procedure to be provided during   week one of cycle for prereading   * All students to test the same   provided foods   * Each student to perform one   specific test only   * Used shared document for data   summaries    Experimental Analysis   * Option to link analysis to   Macromolecule Choice Board | Focus: Carbon    Check in   * Share out Walk the Week   feedback from week one   * Discuss/comment     Set Learning Intentions and Timeline for the session    Powerpoint   * Carbon Chemistry * Demonstration how to create   annotations of a short reading  passage    Break Out Rooms   * Collaborative annotations   <https://catlintucker.com/2020/07/8-ideas-designed-to-engage-students-online/>   * Provide students with   templates/instructions to work  upon. (e.g. shared word  document)   * Be sure to provide all reading   passages to students in advance of  remote session   * Grp 1. Carbohydrate reading   passage   * Grp 2. Protein reading passage * Grp 3. Lipid reading passage * Grp 4. Nucleic acid reading   passage    Large Group Sharing   * Opportunities for Clarification     Exit Slip   * Forms survey with 5 “tester”   questions   * Formative Assessment | Macromolecule Choice Board     * When creating the board, provide   a variety of offline and online  options as well as options  addressing multiple intelligences   * Consider tasks and length of   independent sessions   * To select independent activities for   the week, students play  Tic Tac Toe drawing a line in any  direction through the centre  square.    Possible organizational framework for Choice Board   * Use the centre square as the   “product” piece for a summative  assessment. Provide choice in  format for evidence of learning.   * Use the peripheral squares for   research, note taking, video  viewing research activities etc.   * Sample board from which to   gather ideas:  <http://ogobio.weebly.com/uploads/3/2/3/9/3239894/macromolecules-_tic_tae_toe_board.pdf>    Session 1: Students complete the activities/tasks  outlined in one of their chosen block.    Session 2:  Students complete the activities/tasks outlined in their second chosen block.    Session 3:  Students complete activities in centre square and submit “product” piece as evidence of learning.   * Summative Assessment |

Teaching Online Tips :

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| **Design Considerations** | | |
| **Face to Face** | **Remote** | **Independent** |
| * Consider using the same cohort   groups as small groups within the  remote sessions to build  community (Connection)   * Design desk/table orientations   that promote peer support and  dialogue eg. circle/ horseshoe | * Embed opportunities to promote   social interactions and build  community (Connection)   * Incorporate small groups   opportunities for discussion and  problem solving (Collaboration)   * Chunk time/activities by using   different technology tools/tasks  such as Padlet <https://padlet.com/>  or Mentimeter  <https://www.mentimeter.com/>to  maintain engagement | * Post weekly schedule before   Monday at 8:30am   * Provide articles to read, videos to   view and any questions to be  discussed prior to remote  meetings   * Incorporate on-line discussion   boards to answer questions and  address misconceptions  (Clarification)   * Incorporate inquiry questions and   visible thinking routines (Critical  and Conceptual Thinking at Project  Zero  [http://www.pz.harvard.edu](http://www.pz.harvard.edu/) |

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| **Possible Formats** | | |
| **Face to Face** | **Remote** | **Independent** |
| Station Studies    Hands on Labs    Short formative or summative assessments    Q&A Tutorial    Small cohort group collaborations | Break Out Rooms  <https://www.youtube.com/watch?v=48J7ADQqPco#action=share>    <https://www.youtube.com/watch?v=qo6yqh7erEY>    Platform for Student Presentations    Timed, open book assessments in which students have been provided with the questions in advance    Small cohort group collaborations | Flipped classroom  <https://www.schoology.com/blog/flipped-classroom>    <https://flippedlearning.org/>    Hyperdocs  <https://www.cultofpedagogy.com/hyperdocs/>    <https://hyperdocs.co/>    Choice Boards  <https://catlintucker.com/2016/04/design-your-own-digital-choice-board/>    <http://ajjuliani.com/the-ultimate-guide-to-choice-boards-and-learning-menus/> |

Online Instructional Models:

**E-learning Frameworks to explore**

Blended Learning Model (Connection, Collaboration, Clarification, Critical and Conceptual Thinking)

<https://www.jenniferchangwathall.com/post/how-blended-learning-has-evolved>

4 Shifts Model (Formally known as Trudacot) <http://dangerouslyirrelevant.org/wp-content/uploads/2018/10/4-Shifts-Protocol-Solution-Tree-Reproducible-2.pdf>

SAMR Model <https://sites.google.com/a/ccpsnet.net/edtechhub/tech-services/samr>