Conceptual Planning Framework

**Big Idea:** The mole is a quantity used to make atoms andmolecules measurable.

**Key Concepts:** Accuracy and precision

**Content:**

S.I. Units

* Base, Derived, Prefixes

Dimensional analysis

* Unit conversions

Significant figures

* Exact vs inexact values
* Certain vs uncertain digits

Error Analysis

* Systematic vs random
* Percentage error

**Essential Questions:**

* How do scientists judge the quality of a measured value?
* As scientists, how can we accurately collect, record and analyze reliable data?

**Curricular Competencies:**

**Planning and Conducting**

* Collaboratively and individually plan, select, and use appropriate investigation methods, including field work and lab

experiments, to collect reliable data

* Use appropriate SI units and appropriate equipment, including digital technologies, to systematically and accurately collect

and record data

* Apply the concepts of accuracy and precision to experimental procedures and data:
* significant figures
* uncertainty
* scientific notation

**Processing and Analyzing**

* Seek and analyze patterns, trends, and connections in data, including describing relationships between variables,

performing calculations, and identifying inconsistencies

**Evaluating**

* Evaluate their methods and experimental conditions, including identifying sources of error or uncertainty, confounding

variables, and possible alternative explanations and conclusions

* Describe specific ways to improve their investigation methods and the quality of their data

**First Peoples Principles of Learning**

* Learning involves patience and time.
* Learning is embedded in memory, history and story.

**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:**

Experimental Analysis (Refer to Learning Plan below)

**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.
* The Break-out Room strategy has been used to format Remote Sessions.
* The Flipped Model has been suggested for use to direct Independent Sessions.

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| **WEEK ONE: Chemistry 11 Mathematical Foundations** | | |
| **Face to Face** | **Remote** | **Independent** |
| “Hands on”     Measurement Stations   * Temperature, Volume, Mass and   Length   * One station to provide direct   teacher instruction/ interaction   * (40%) complete two stations /   interaction   * (20%) complete four stations /   interaction   * Formative Assessment     Provide students with required pre-readings for next week’s face to face session   * Experimental Procedure * Summative Assessment Rubric | Focus: Accuracy vs Precision    Check in   * Use whiteboard function to share   an image of a circle of chairs.  Choose a variety of chair  styles/colours.   * Have each student write their   name beneath their preferred  chair as they enter the room.   * Discuss/comment     Set Learning Intentions and Timeline for the session    Break-out Rooms   * Provide students with   templates/instructions to work  upon. (e.g. shared word  document)   * Grp 1. Gather images that   represent the concept of  accuracy. Discuss key aspects and  be prepared to share.   * Grp 2. Gather images that   represent the concept of precision.  Discuss key aspects and be  prepared to share.   * Grp 3. Gather 3 definitions of   accuracy and as a group synthesis  them into one.   * Grp 4. Gather 3 definitions of   precision and as a group synthesis  them into one.    Large Group Sharing   * Opportunities for Clarification     Exit Slip   * Forms survey with 5 “tester”   questions   * Formative Assessment | FLIP example sequence    Pre-session: 3-2-1 Bridge   * Visible Thinking Routine <http://www.pz.harvard.edu/resources/3-2-1-bridge> * Initial Responses     Session 1: S.I. Units   * Small mistakes cost NASA Millions     Session 2: Unit Manipulations   * Conversions, Derived Units     Session 3: Significant Figures   * Zero - Children’s storybook by   Kathryn Otoshi   * Identification, Counting |

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| **WEEK TWO: Chemistry 11 Mathematical Foundations** | | |
| **Face to Face** | **Remote** | **Independent** |
| "Hands on”    Data focussed experiment   * Procedure to be provided   for prereading during week one of  cycle   * (40%)   Day 1: Conduct/Record  Day 2: Analyze/Evaluate   * (20%)   Face to Face: Conduct/Record  Home: Analyze/Evaluate   * Used shared document for data   summaries (averages)   * Experimental Analysis:   Summative Assessment    Examples:   * The Thickness of Al Foil * The Density of Water   (temperature dependent)   * The Density of an irregularly   shaped solid Element | Focus: Error Analysis    Check in   * Request students post image or   word relating to “measurement”   * Discuss/comment     Set Learning Intentions and Timeline for the session    Powerpoint   * Defining features of Systematic,   Random, and Human Error    Break-out Rooms   * Each group is   provided a description of an  experimental procedure.   * Analyze, identify, and sort the   errors. Students should be able to  provide reasoning.    Large Group Sharing   * Online Fishbowl Format   <https://catlintucker.com/2020/07/8-ideas-designed-to-engage-students-online/>    Exit Slip   * What links can be drawn between   accuracy, precision, systematic and  random errors?   * Formative Assessment | FLIP example sequence    Session 1: Multiplication and Division   * Significant figure rules     Session 2: Addition and Subtraction   * Decimal Digits     Session 3: Multi-step Operations   * Order of Operations * Rounding 5 Rule     Closure: 3-2-1 Bridge Thinking Routine   * Final Responses * Formative Assessment |

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?*

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>