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

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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>