HyperionDev

Teaching and Learning Journal

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Introduction

Remember that as with your learners, how much you learn is dependent on what *you* do. Exercises like these are intended to help embed your learning on this course and take it from theoretical to practical, so take the opportunity to engage and get the most out of what you're learning here!

Section 1

Notes

Pedagogy: [1]Theory & **[2]Practice** of Teaching.

What the Different Theories of Learning Inform:

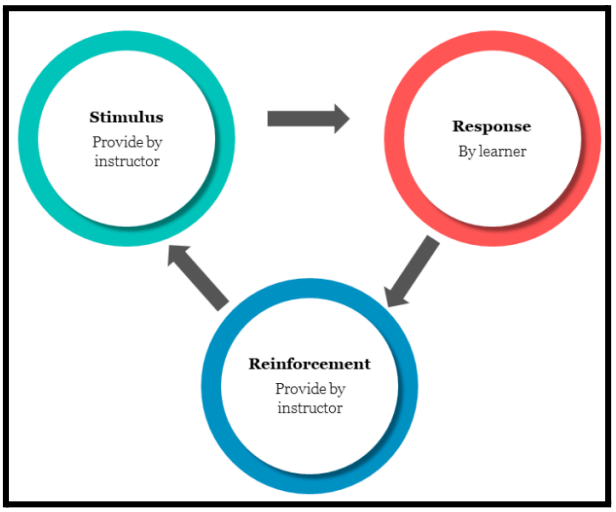
- Instructional **[1]strategies** & **[2]approaches** to meet the Diverse Needs of Learners.

Learning Theories are ***not*** Mutually Exclusive.

Factors influencing the **Efficacy of a Theory**:

- Learner Age
- Cultural Context
- Subject Matter

Behaviourism



Behaviourism Zooms in on **Two Focuses** that **Shape Behaviour**:

- Observable **Behaviours**.
- The Role of **[1]Stimuli** and **[2]Rewards**.

According to Behaviourist Theory:
Learning = Association between [a]Stimuli and [b]Responses.

- **Stimulus** = Any Object or Event.
- **Response** = Reaction to a Stimulus.

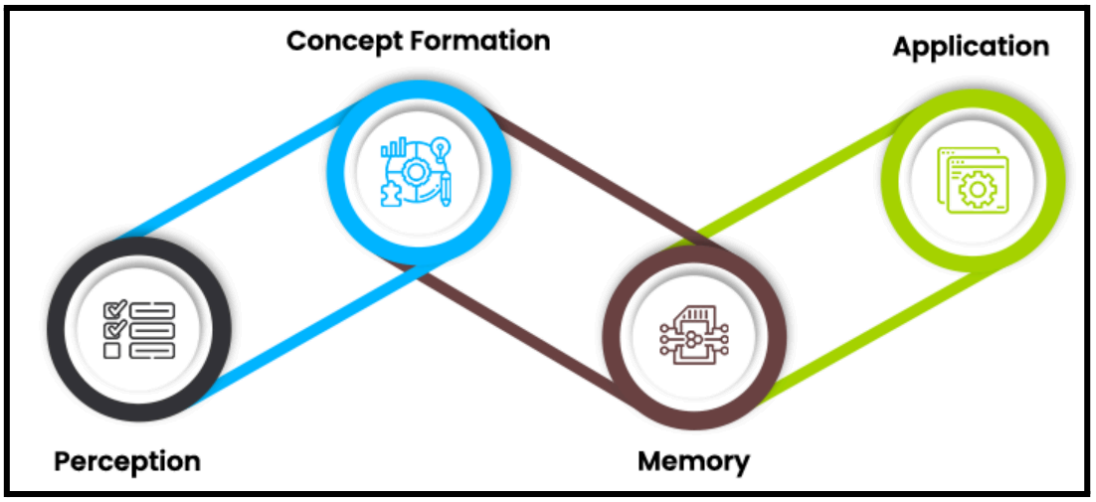
A means to apply Behaviourist Principles
Positive Reinforcement ([1]Praise, [2]Rewards, [3]Privileges):

- Encourage **Desired Behaviours**, i.e.:
  - Active Participation
  - Completing Assignments
  - etc...
- Providing **Clear Expectations** & **Consequences**.

Behaviourism Cons:

- Too Simplistic
- Overlooks Internal Mental Processes

Cognitive Theory (Socio-Cultural Theory)



The Emphasis is on:

- **Mental Processes (Knowledge Construction)**
  - A Break from Behaviourist Theories

According to Piaget's theory, **Learners**:

- **Progress** through Distinct Stages of **Cognitive Development**.
- **[1]Interactions** and **[2]Experiences** shape one's understanding of the world.

The Application: Design Activities that Promote **[1]Active Engagement**, and **[2]Critical Thinking**, e.g.:

- **Problem-Solving** Tasks

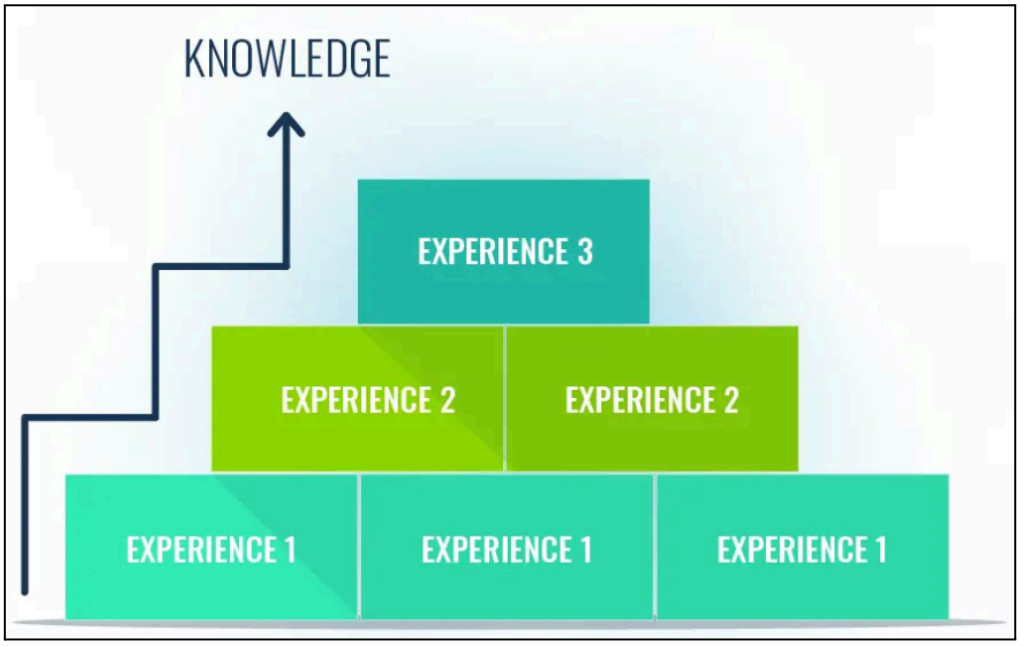
- **Discussions**
- Hands-On **Experiments**

Created Opportunities Need to Spark:

- Peer Learning
- Group Work
- Classroom Discussions

Teachers can Scaffold Learning Experiences via [1]**Guidance** & [2]**Support**.

Constructivism



A Learner's Knowledge is Constructed by **Integrating**:
[1]**New Information** + [2]**Existing Mental Structures**.

Constructivist Approaches Encourage Learners to:

- **Engage** in Hands-On Experiences
- **Explore** Multiple Perspectives
- **Reflect** on their Own Learning

The Application: **Open-Ended Tasks** [(a)Projects, (b)Experiments, (c)Inquiry-Based Learning] that Promote:

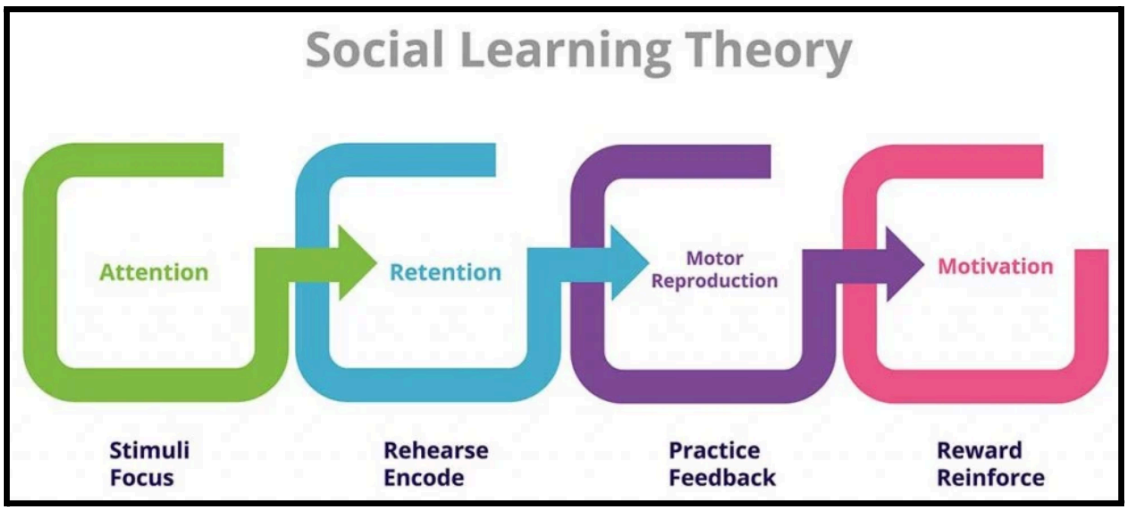
- **Critical Thinking**
- **Problem-Solving**
- ↪️ Which in Turn allows Learners to: [1]**Explore** Concepts, [2]**Make** Connections & [3]**Construct** their Understanding.

{**Collaboration** + **Discussion**} among Learners Promote:
Exchange of (a)Ideas and (b)Perspectives.

The Role of the Teacher in Constructivist Classrooms:

- ❌ Sole Provider of Knowledge ❌
- ✅ A **Facilitator & Guide** to Support the Learners' [1]Exploration and [2]Sense-Making.

Social Learning Theory



There is a lot of **Importance** on the:
[1]**Observation** + [2]**Modelling** in the Learning Process.

According to Social Learning, how do **Individuals Learn?**

- **Observing** Others
- **Imitating** the Behaviour of Other People

How do Teachers **Apply** Social Learning?

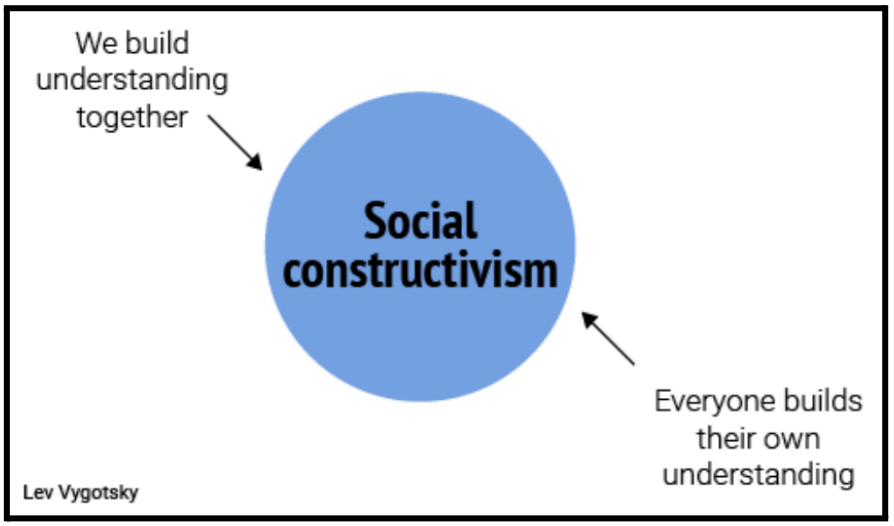
- **Providing** Positive Role Models
- **Creating** a Supportive Learning Environment
- ↪️ For Example: [1]**Demonstrations** & [2]**Modelling** to Teach New Skills / Behaviours.

If teachers use social learning principles, then they:

- Foster a [1]**Collaborative** and [2]**Interactive** Classroom Environment.
- ↪️ Which in Turn: Promotes **Learning** from One Another.

Social Constructivism (Constructivism + Social Learning)

This is **Constructivism** Theory with:
Core Focus on **Collaborative Learning** for the Construction of Knowledge.



As in the Social Learning Theory:
Collaboration is very Important.

Multiple Intelligences

The different types of Intelligences are:

- 📖 **Linguistic** *Word Smart*
  Write a short story or poem to express the understanding of a Historical Event

- 🧩 **Logical-Mathematical** *Logic Smart*
  Solve Math Puzzles or conduct experiments to understand scientific concepts.

- 🗺️ **Spatial** *Picture Smart*
  Creating a detailed map or drawing to represent Geographical Features or Historical Routes.

- 💪🏻 **Bodily-Kinesthetic** *Body Smart*
  Acting out a Scene from a Play OR Building a Model to Demonstrate a Concept in Physics.

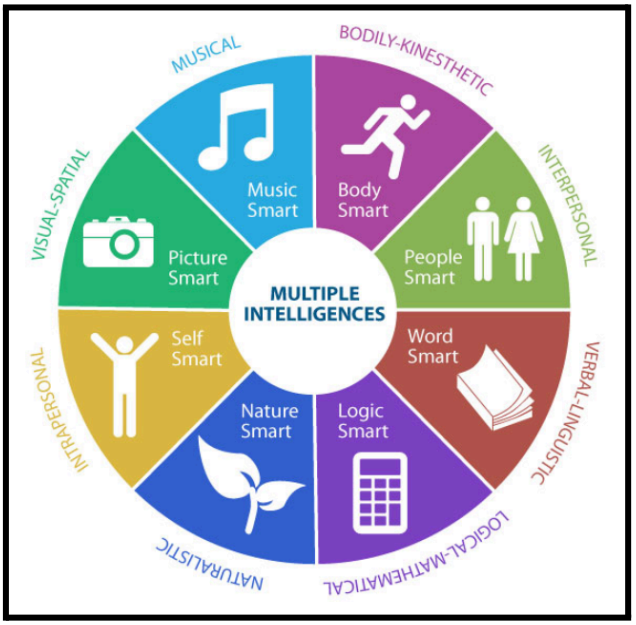
- 🎵 **Musical** *Music Smart*
  Composing a Song or Rhythm to help memorise facts or concepts.

- 👥 **Interpersonal** *People Smart*
  Engaging in Group Discussions or Collaborate Projects to Explore and Solve Problems.

- 📝 **Intrapersonal** *Self Smart*
  Reflecting through journaling or self-assessment to set personal learning goals.

- 🌿 **Naturalistic** *Nature Smart*
  Observing and Classifying different types of plants or animals during a nature walk to learn about ecosystems.

[1]**L**ittle [2]**L**ions [3]**S**nuggle [4]**B**y [5]**M**y [6]**I**ncredible [7]**I**ndoor [8]**N**ook. **#Cute** 🥹



Teachers can **Provide** Opportunities for Learners to:

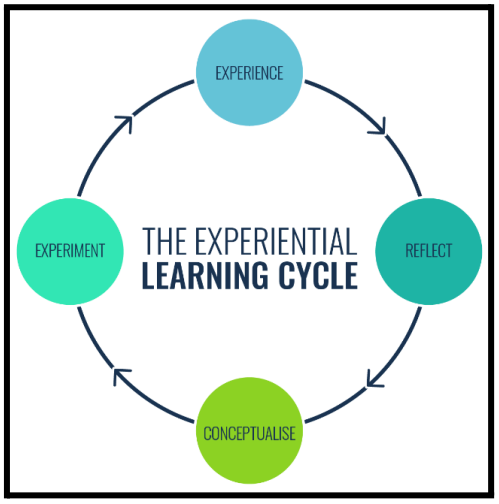
- **Express** themselves, and
- **Demonstrate** their Understanding through Different Modalities.

Experiential Learning

Learning through [1]**Direct Experiences** & [2]**Reflection**.

The 4-Stage Cycle of Experiential Learning:

1. Concrete **Experience**
2. Reflective **Observation**
3. Abstract **Conceptualisation**
4. Active **Experimentation**



Example Applications:

- Hands-On **Activities**
- Field **Trips**
- Real-World **Applications of Knowledge**

The Socratic Method

Inquiry-Based Instruction that Emphasises:

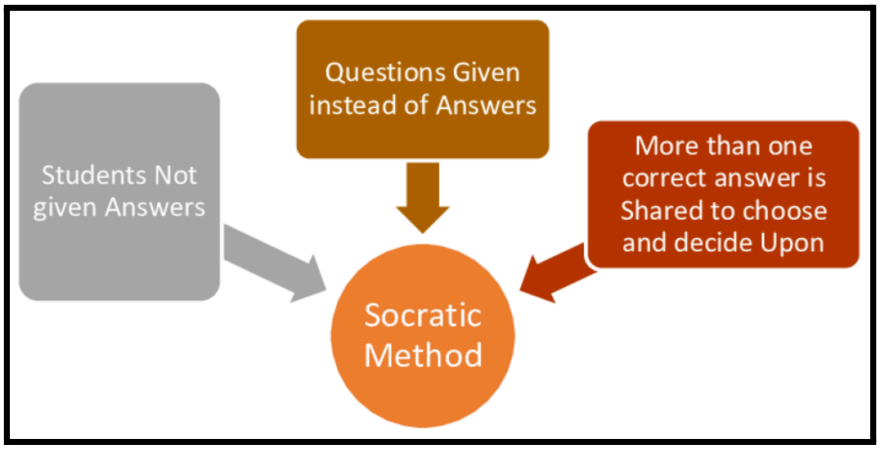
- Critical **Thinking**
- Active Learner **Participation**

In the Socratic Method, Facilitators use a **Series of Probing Questions** to:

- Stimulate the **learners' thinking**
- Encourage them to **arrive at answers & conclusions** through their own reasoning.

Why is the **Socratic Method an Influential Approach** in Education?

- Fosters **Intellectual Curiosity**
- Fosters **Active Participation** in a learners Learning Process



... The Attendant Joy and Excitement of discovering (often complex) ideas on their own...

An approach to phrasing the right questions to teach a concept in the Socratic Method:

Logically Leading VS **Psychologically Leading** Questions:
➡️ **Logically** Leading Questions:

- Require an Understanding of the
  - Concepts
  - Principles

  to be answered correctly.

➡️ **Psychologically** Leading Questions:

- Can be answered by students **Keying in on the Clues** other than the Logic of the Content

The **Criteria** of Socratic Questions:

- **Interesting** to the Learners
- Lead by **Incremental and Logical** Steps, to be:
  - Readily Answered
  - Evidenced toward a Conclusion
- Designed to get the learner to **See Particular Points.**

Summary

1. Behaviorism

Focuses on [1]**Observable Behaviours** & [2]**Role of Stimuli and Rewards** that shape Behaviour.

Emphasizes **Reinforcement** to Shape Behaviour.

2. Cognitive Theory

Emphasizes **Internal Mental Processes** (thinking, memory, and problem-solving). Learners have distinct phases of cognitive development. Interactions & Experiences shape one's understanding of the world.

Teachers design activities which involve [1]**Active Engagement**, and [2]**Critical Thinking**.

3. Constructivism

A Learner's Knowledge is Constructed by **Integrating**:
[1]**New Information** + [2]**Existing Mental Structures**.

Constructivist Approaches Encourage Learners to:

- **Engage** in Hands-On Experiences.
- **Explore** Multiple Perspectives.
- **Reflect** on their Own Learning.

4. Social Learning

Emphasizes learning through [1]**Observation** and [2]**Modelling**, highlighting the role of modelling and social interaction.

In this construct, individuals learn through [1]**Observing** Other People and [2]**Imitating** the Behaviour of Other People.

Teachers need to:

- Provide Positive Role Models
- Create a Supportive Learning Environment

5. Social Constructivism

Combines [a]**Constructivism** with the importance of [b]**Social Interactions** and Cultural Context in the development of understanding and knowledge.

- **(a)** Everyone Builds their **Own Understanding**
- **(b)** We Build **Understanding Together**

6. Multiple Intelligences

Proposes that there are various forms of intelligence, each independent of the others and that teaching should cater to a diverse range of intelligences.

7. Experiential Learning

Emphasizes learning through experience and reflection on doing.

Teachers design [1]**Hands-On Activities**, [2]**Field Trips**, and [3]**Real-World Applications** of Knowledge.

8. The Socratic Method

Uses questioning to stimulate [1]Critical Thinking and [2]Active Learner Participation, encouraging dialogue and deep inquiry to explore complex concepts.

Reflect and Apply 1.1

Consider your own professional practice facilitating learning. Which of the learning theories we've covered today is closest to the thinking underlying your current approach, and why? Give an example of something you have done when teaching or mentoring that aligns with a specific element of one of the theories we've covered, and explain how it aligns.

Answer

Which theory best approximates my current approach, and why?

The Constructivism theory, because:

- My **TEFL** education placed a strong emphasis on Hands-On Experiences, and learners reflecting on their own learning.
    - The TEFL approach budgets a lot on eliciting answers from students through Logically-Guided Questions.
    - The TEFL community considers it as taboo when a teacher is just a provider of information. Rather, the teacher must act as a facilitator and guide to support the learners' exploration and sense-making.

Give an example of what you have done as a teacher that align with a specific element of one of the theories we've covered:

In my final TEFL assignment, I designed a lesson for Intermediate-Level students to critically think about the ethics of self-driving cars. In sequential order, I:

- Firstly scaffold their vocabulary to easily absorb the content of an upcoming media clip.
- I show them a TED-Ed video with the title ***"The ethical dilemma of self-driving cars"***.
- After clarifying some questions the students had after their first viewing of the clip, I played it again to them to cement their understanding of the content in the video clip.
- The class is split up into three groups:
    - [A] People lobbying for self-driving cars.
    - [B] Anti-self-driving car activists.
    - [C] A panel of (neutral) people probing the validity of self-driving cars by raising questions to both groups mentioned above.
- The teacher preps each group to do some research based on the role they have been assigned.
- A mock-debate ensues between [A] and [B], whereas [C] raises thought-provoking questions to stress-test the ideas of both [A] and [B].
- If the teacher senses that either [1]the debate has derailed from the main focus, or [2]the students seem unsure how to proceed, then (s)he provides input and/or suggestions to get the debate back on track again.
- The teacher tasks [C] to discuss among themselves whether [A] or [B] seems to be more convincing in their persuasive arguments. Group [C] must then announce their verdict.
- The teachers wraps up the lesson by:
    - Asking what the students found most interesting.
    - Prodding the students to do some further self-investigation on this topic.
    - Resolving any aspects that were unclear to the students.

Explain how your example specifically aligns with the Constructivism Theory

In the lesson I described above, the following elements prevail:

- The teacher acts as a **facilitator and guide**: [1]Scaffolding their vocabulary to better absorb the TED-Ed talk, [2]Instructing teams what preparation they must do for the upcoming debate, [3]Getting the debate back on track if it starts to derail.
- Students explore **Multiple Perspectives**: [1]The benefits and attractive features of self-driving cars, [2]The ethical dilemmas that creep in with self-driving cars.
- Students must use **Critical Thinking**: Learners from Groups A and B must collaborate with their peers to formulate and articulate their viewpoint in a convincing manner.
- Students must apply **Problem-Solving Skills**: [1]Group C must "vote" whether Group A or B sounds more convincing.
- The Learners' knowledge is Constructed by Integrating:
    - **New Information**: The attractive and novel concept of self-driving cars, and the murky waters they tread with regards to ethics.
    - **Existing Mental Structures**: Deciding which option between two available ones is the best to take, or whether a middle-ground should be established. In short, rationalising and conceptualising a problem to arrive at the most sensical solution.

Section 2

Notes

Pedagogy at HyperionDev

Definition, according to Dewey (1938), of the **Constructivism Theory**:
People Actively construct their own knowledge

The "Add-On" of **Social Constructivism**:
Engagement with other people ([1]lecturers, [2]mentors, [3]peers) assists with learning.

What Does HyperionDev Believe About Learning?

Foundation:
Existing Knowledge.

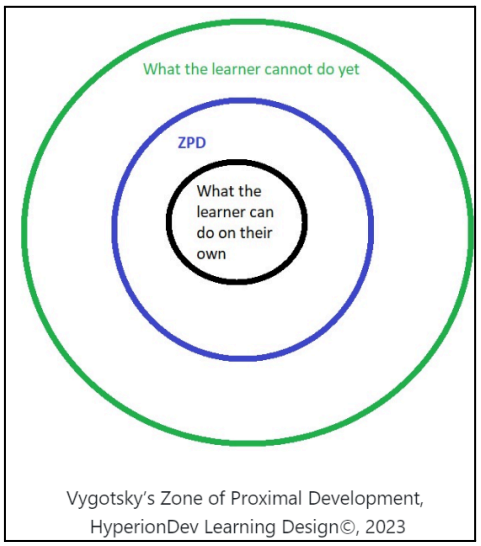
Newly-Learned Things:
Built onto the Foundation.

~~Jug-and-Mug Model~~: Outdated.
Receipt of Information ≠ Learning.

What is Learning?

- Newly-Taught Information must be **Considered**.
- An Interpretation must be **Constructed**.
- Teachers are **Helpers** / **Facilitators**. ~~Authority Figure~~.
    - Help Learners arrive at their **own understanding of the content**.

Zone of Proximal Development (ZPD):



Vygotsky's Zone of Proximal Development, HyperionDev Learning Design©, 2023

ZPD Theory:

- **Blue Circle**: Things the Learner is **Close to Mastering**.
    - (With Practice), Black Circle **expands** to Blue Circle.
- **Green Circle**: What Learners could **not do** at all in the Beginning.
    - **The New Area of Skills** Learner is Closer to Master.
    - **ZPD now shifts** over to Green Circle.

What is Scaffolding?:

- **Support** given by [1]Peers, [2]Mentors, [3]Teachers, to:
    - Help the learner **function in the ZPD**.
    - **Extend the range** of what students can do alone.

Learning in the **Constructivist** Scenario:

1️⃣**Learning is Contextual**:

- Concepts are **not addressed in isolation**.

2️⃣**Learning is Social**:

- Work with [1]**Peers** and/or [2]**Facilitators**.

3️⃣ **Learning is Active**:

- Performed by Learner.
- The Facilitator Guides/Scaffolds.

4️⃣ [1]**Motivation** + [2]**Engagement** → **Key to Learning**:

- New Information and Experiences must be:
  - **Engaged** with
  - **Processed** by Learner

5️⃣ **Unique Perspectives Influences One's Learning**:

- All start learning any particular thing with:
  Different Existing Mental Models.

6️⃣ **Reflection is Important**:

- To **Consolidate** Information.

How Do Our Beliefs Impact Teaching?

The **Emphasis** of Constructivist Learning Environments:

- Active Learning
- Collaboration
- Reflection
- Multiple Viewpoints

What Scaffolding Entails:

- **Modelling** a Skill
- **Providing** [1]Hints or [2]Cues
- **Adapting** Materials or Activities to be Appropriate

The 12 Descriptors of Constructivist Teaching Behaviours

1️⃣
Encourage and Accept Learner Autonomy and Initiative.

2️⃣
Use Raw Data & Primary Sources + Interactive Materials / Exercises.

3

When Framing Tasks, use **Cognitive Terminology**: [1]**C**lassify, [2]***A***nalyse, [3]***P***redict, [4]***C***reate.

- **The 6 Major Levels in the Taxonomy of Learning (Bloom's Wheel)**:
    a. Knowledge / Remembering
    b. Comprehension / Understanding
    c. Application
    d. Analysis
    e. Evaluate
    f. Create / Synthesis

4

Inquire about the Learner's Understanding of Concepts *BEFORE* sharing your own understanding.

- Rubber Duck Debugging / Rubber Ducking
    - Debugging Code by articulating a problem in a spoken or written natural language.
    - Eureka Moment about their own problem

5

Allow **Learner Responses** to [1]Drive Lessons, [2]Shift Instructional Strategies, and [3]Alter Content.

- Put the Learner in the Driver's Seat.
- Create Examples on the Fly
- Adjust your Approach to Meet the Learner where they are

- The Point of a Mentor Session:
    - Provide Scaffolding (Vygotskian Method)
    - Let Learner Extend their Own Skills

6

Encourage Learners to **engage in dialogue**: [a]With Teacher + [b]With Others.

- Join Coding Community ([1]Hashnode, [2]Freecodecamp, [3]StackOverflow)
    - Facilitate Peer-Programming
    - Enable Knowledge and Resource Sharing
    - Teaching Tips and Tricks
    - Organising Coding Events and Meetups
    - Provide the Opportunity to Both Teach and to Learn from Others.

7️⃣
Encourage Learner Inquiry by [1]**Asking** Thoughtful, Open-Ended Questions, and [2]**Encouraging** Learners to Ask Questions of (a)Themselves and (b)Others.

"How would you handle the iteration needed in this problem?
Code it as you explain so we can see where you get stuck.
Take 5 min and sketch out some pseudo-code for doing this while I wait."

8️⃣
Seek Elaboration of the Learner's Initial Responses.

9️⃣
Promote Critical Thinking through Contradictory Experiences

- … Engender Contradictions to Initial Hypotheses, which then encourage discussion …

🔟
Allow wait time after posing questions.

- Break down into simpler questions.
- Let them Look Up Concept in Learning Materials
- Establish Baseline of what they know.

1️⃣1️⃣
Provide Time for Learners to [1]**Construct** Relationships and [2]**Create** Metaphors.

- Guided. Not Rushed.

1️⃣2️⃣
Nurture the Learner's Natural Curiosity by [1]**Using** Questions, and [2]**Posing** Scenarios.

Reciprocal Learning

When Learning is Enhanced:

- Learner **Takes on the Role** of both [1]Teachers and [2]Learners.
- **Structured Dialogue** between Learners and Mentors / Lecturers / Peers.

Four Main Strategies/Activities Learners Engage In:

1️⃣ **Predicting**

- **Predict** what will happen in a particular code example.

2️⃣ **Questioning**

- Ask questions about the problem to [1]**deepen** their understanding and [2]**identify** areas where clarification is needed.

3 Clarifying

- **Identify** confusing parts.
- Work with someone to **Clarify** their Understanding.

4 Summarising

- Learners **synthesise** [1]main ideas & [2]key details of the problem.
- **Consolidate** their understanding.
- **Identify** the most important information.

Reflect and Apply 2.1

There were a lot of ideas for facilitating learning in this section, so if you're feeling overwhelmed, don't worry! We suggest you review the section and try to make your own summary of HyperionDev's constructivist approach to helping learners learn to code, and ***note down all the strategies you think you could realistically try out, depending on your role*** *(as some suggestions lend themselves more to lectures and others to* ***mentoring or small group/1:1 engagement with learners****). For your next 5 lectures of mentor sessions, see how many ideas you can try out, and then record how successful you were, what went wrong, and what you could do better or try instead next time. This sort of application and self-reflection is vital to your continuing professional development as an academic at HyperionDev.*

Answer

Provide Scaffolding to the Learner:

- **Modelling** a Skill.
- **Providing** [1]Hints or [2]Clues.
- **Adapting** Materials or Activities to be Appropriate.

Continually adjust the level of my help/facilitation in response to the learner's level of performance. I.e. get an accurate baseline of the student's current level of understanding.

Encourage Learner Autonomy & Initiative

- Respond to answers/comments.
- Let learners provide ideas to problems and/or critiques.
- Lead to understanding concepts by asking questions of increasing difficulty.

Use Primary Sources & Interactive Materials

- Let students share their screen & have them write code.
- Let the learner create trace tables: figure out what the code is doing.
- Guide the learner through their task resources.

Use **Cognitive Terminology** when framing tasks:

- Classify
- Analyse
- Predict
- Create

Try and let the student do “rubber duck debugging”. I.e., let them clearly articulate in English [1]what the problem/bug is, [2]what they want their code to achieve. It is possible that the student will have a Eureka experience.

Find opportunities to “put the learner in the driver’s seat”.

- Let them steer the conversation as much as possible. Let the student take initiative.

Ask open-ended questions:

- “How would you handle the iteration needed in this problem?”
- “Code it as you explain so we can see where you get stuck.”
- “Take 5 min and sketch out some pseudo-code for doing this while I wait.”

Seek elaboration of the learner’s initial responses:

- “Could you further explain what exactly you mean by what you’ve said.”

Promote Critical Thinking via Contradictory Experiences:

- “So following your line of thought, if we implement it here, what do you think would happen? Is this in line with what you initially thought?”

Wait for some time after posing a question.

- Promote critical thinking.
- Break the question further down if necessary.
- Establish a baseline of what the student knows.

Stimulate the learner’s curiosity:

- What happens if:
    - “… we do this?”
    - “… we change it like this?”
- Can we simplify this?
- What would happen if the user provided unexpected input?
- How can you make your program more resilient here?

Ask the learner to predict what would happen if a piece of code was to be implemented.

Ask questions to the learner in order to deepen their understanding and to identify the areas where clarification is needed. Guide the student through confusing areas that need clarification.

Give the student an attempt to summarise the main takeaways of the session:

- Let them consolidate their understanding.
- Let them identify the most important information.

Notes - Continued

Knowles' 5 Assumptions of Adult Learners

- **Self-Concept**
  Dependant Personality ❌ | **Self-Directed Human Being** ✔️

Learning experience must offer [1]**Minimum Instruction** & [2]**Maximum Autonomy**.

- **Adult Learner Experience**
  Person accumulates **growing reservoir of experience**
  → Increasing Resource for Learning

Include a wide range of **Instructional design Models & Theories** to appeal to varied experience levels and backgrounds.

- **Readiness to Learn**
  Oriented to **Developmental Tasks** of Social Roles.

Utilise [1]**social media** & [2]**online collaboration tools** to tie learning to social development.

- **Orientation to Learning**
  - Time perspective changes from one of ~~postponed application of knowledge~~ → **Immediacy of Application**.
    - Orientation towards learning shifts from one of ~~subject-centeredness~~ to one of **problem-centeredness**.

Emphasise how the learning will help **solve problems** that adults regularly encounter.

- **Motivation to Learn** becomes Internal.

Must be a **valid reason** behind every educational activity.

Knowles' 4 Principles of Adult Learning

- Adults must be involved in the [1]**Planning** & [2]**Evaluation** of their instruction.

Adults must have a **hand** in the design & development of their LX.

- **Experience**:

Basis/Root for all Learning Activities.

- **Most Interest →** Subjects with **immediate relevance & impact** to their life.

Real-Life **Applications** & **Benefits** must be tied to the LX.

- **Adult learning**: **Problem-Centred** ✔️ **|** Content-Oriented ❌

Give adults opportunities to **absorb information** (rather than memorising it).

Praise and Motivation

- Praise the **process, effort & thought** (not the outcome).
- Praise must inspire curiosity & exploration:
  - Give confidence to push boundaries in their learning.
- Right vs Wrong ❌
  - Patronising
  - Power-Gap
- Thoughtful & Positive Observation between Equals. ✅
- Reward from an important role to a less important role. ❌

Fixed Mind-Set:

- Abilities are what they are **→ won't change**.
- **Results**-Focussed.
- Have **Risk-Averse** Behaviour.
- Find it **harder** to try and master a skill.

Growth Mind-Set:

- One's abilities are **not set in stone**.
- **Process**-Focussed:
  - With Effort, their **skills** can improve over time.

How to Create Intrinsic Motivation with Praise

Don't give **Person-Oriented** Praise:

- ❌ *"I'm proud of you"*
- ❌ *"You're good at this"*

Give **Process-Oriented** Praise:

- ✔️ *"I can see you put a lot of work into this".*
- ✔️ *"This is a great strategy; with some tweaks to the implementation, it's going to work well".*

Task-Oriented Praise → Identifying aspects a learner has done well:

- **E.g.:** *"I can see where you've got tangled up here, but you've mastered the fundamentals - you just need practice in applying them. Every time you do that it will get easier and easier".*

Establishing a **Growth Ethos**:

- [1]**Intelligence** & [2]**Ability** are not set in stone.
- **Effort**:
  - Required for **Learning**.
  - **Grows** Physical Connections in your brain.
- ***"Work out"*** the brain to get stronger.
- **Difficulty** ≠ Fixed Intelligence.
- **Avoid** Defensive Withdrawal of Effort.

Adult Learners are more like Colleagues.

Reflect and Apply 2.2

*Consider **one way** **in which Knowles identifies that** **adults learn differently** to children (Knowles' assumptions of adult learners) that you have seen in your professional practice. **Explain the aspect** you've selected and **the experiences you have had with adult learners** that align with that assumption.*

Answer

Consider one way in which Knowles identifies that adults learn differently to children:

Motivation to Learn becomes Internal. That is, there must be a valid reason behind every educational activity.

Explain the aspect you've selected and the experiences you have had with adult learners that align with that assumption:

During my tenure as a facilitator in 1st-year mathematics (at the North-West University), I stressed to learners that, for example:

- A certain integration rule is extremely important because:
  - it will be utilised a lot in other (parallel) modules as well.

    - If not giving it due consideration, they will struggle a lot in upcoming modules in their 2nd and 3rd years.
    - It constitutes a building block for solving more complex mathematical problems.

This advice motivates them to put effort into grasping the mathematical concept I am trying to scaffold for them. It ensures that the concept doesn't become *'just another thing they should learn by rote memory and then discard once the semester is over.'*

Furthermore, the students also become more engaged w.r.t. the effort put into solving problems relying on the mathematical concept.

I have observed many times where learners try to "parrot" something just for the sake of getting it over and done with once their semester ends ***if*** they don't see any value in what they are supposed to learn.

Notes - Continued

Outcomes-Based Education (OBE)

Definition: Teaching that focuses on the [1]**End Goals** & [2]**Learning Outcomes (LOs)** of the learning process.

Goals: Represent things that learners **should be able to do** at the end of a LX. Stated as:

- **Skills**
- **Competencies**
- → Stated from the **Learner's Perspective**.

What Does this Look Like at HyperionDev?

Example: A lesson on the topic *"Beginner Control Structures: The Boolean Data Type and If, Else, and Elif Statements"*.

By the end of this lesson, learners should be able to:

- **Explain** the concept of "flow of control"
- **Use** If statements to determine whether a criterion is true or false and perform (a) certain action(s) based on the outcome
- **Explain** boolean values and use them with control structures
- **Use** Else and Elif with If statements to test multiple criteria

Learning Outcomes ≠ Learning Objectives.

Learning Objectives:

- Aims the Lecturer has.

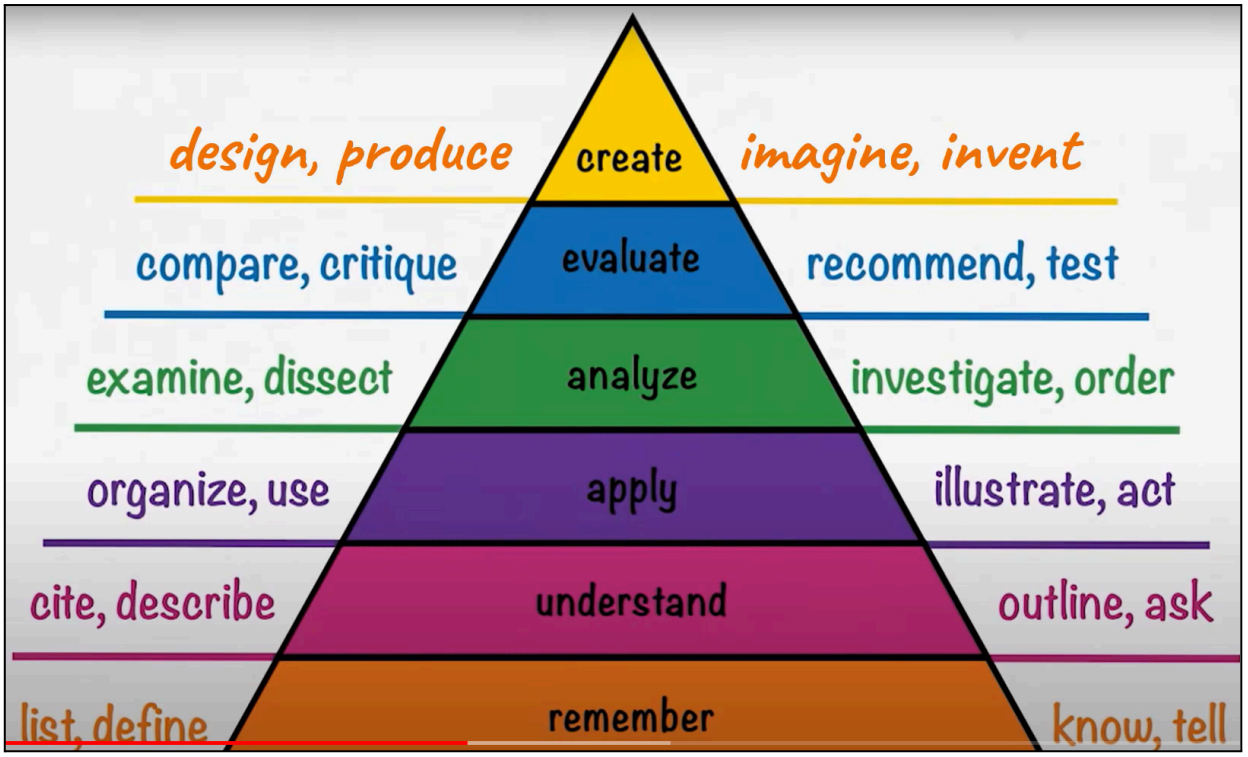
- The teaching intentions of the Lecturer

Setting Outcomes

LOs need to state something [1]**Doable** by the Learner, and [2]**Measurable** by the Educator.

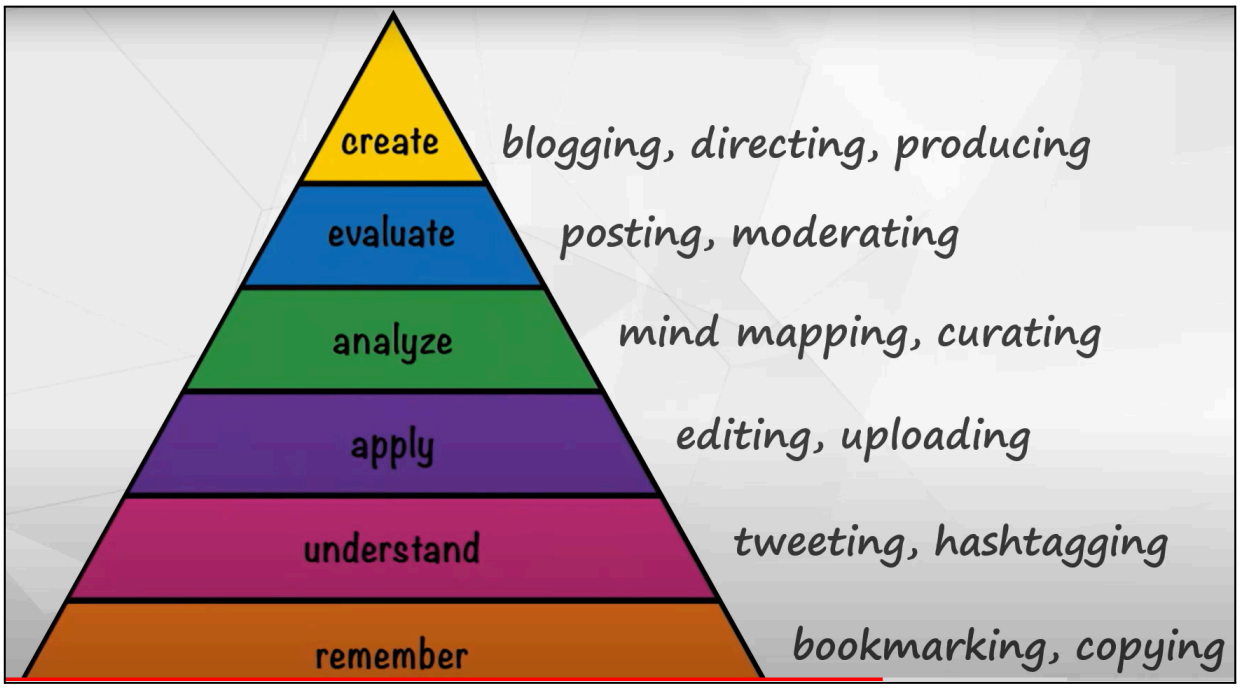
- LOs should **start** with a verb.
    - Calculate, Explain, Use.
    - Verbs must be **specific enough** in order to be **measurable**.

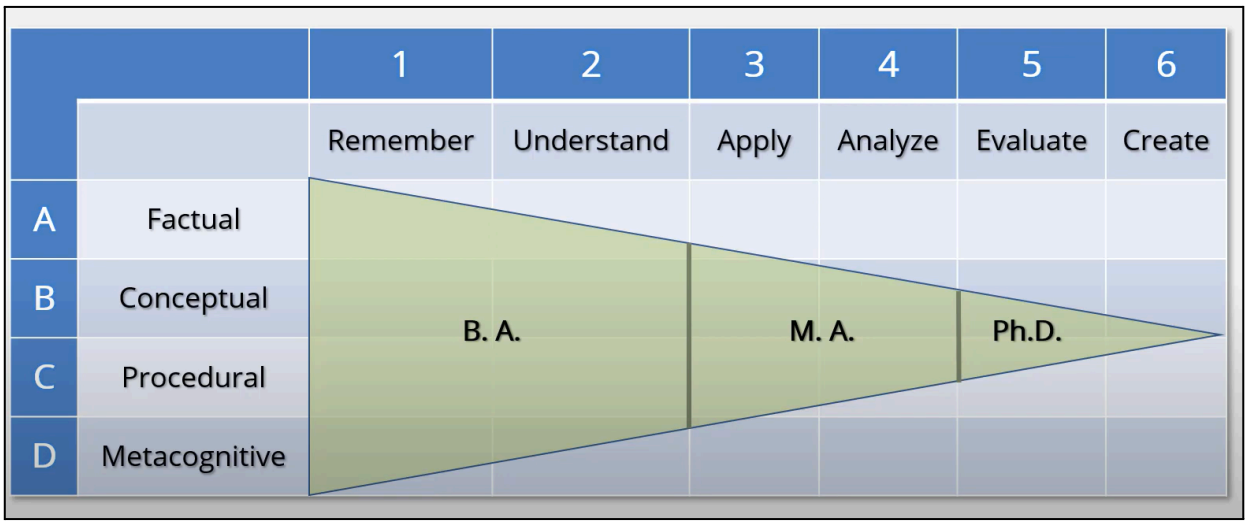
[a]By the end of this Task, Learners should be able to: [b]Calculate simple and compound interest accurately using a simple Python program. **(a)** Stem Sentence **(b)** Concluding Clause



- ***C*reate**:
    - design, formulate, build, invent, create, compose, generate, derive, modify, develop.
- ***E*valuate**:
    - choose, support, relate, determine, defend, judge, grade, compare, contrast, argue, justify, support, convince, select, evaluate.
- ***A*nalyse**:
    - classify, break down, categorise, analyse, diagram, illustrate, criticise, simplify, associate.
- ***A*pply**:

    - calculate, predict, apply, solve, illustrate, use, demonstrate, determine, model, perform, present.
- ***U*nderstand**:
    - describe, explain, paraphrase, restate, give original examples of, summarise, contrast, interpret, discuss.
- ***R*emember**:
    - list, recite, outline, define, name, match, quote, recall, identify, label, recognise.





[1]**R**unning [2]**U**nder [3]**A**ll [4]**A**nimals [5]**E**nds [6]**C**almly.

Merrill's Principles of Instruction

Provides Robust **Instructional Support**:

- Demonstrations
- Practice Opportunities

→ Foster the **progressive building** of [1]skills and [2]knowledge.

How Do I Integrate Bloom's Into My Teaching?

Step 1:	First, select an action verb from one of the levels of Bloom's hierarchy (Mass, 2012).
Step 2:	Use the action verb to complete the stem sentence "By the end of [relevant learning unit], learners should be able to: "
Step 3:	Check that the resulting LO is doable and observable/measurable.
Step 4:	Check that the resulting LO meets your requirements in terms of cognitive complexity.

Repeat the Process, Steps 1 - 4.

For a set of LOs, you need:

- A **spread** of lower-order to higher-order verbs.
- To ensure **not to have all LOs** at a single cognitive level.

How Do I Integrate **Merrills' Principles** Into my Teaching?

Learning is promoted when Instruction:

1. Is **Problem-Centred** / Establish **Relevance**
2. **Activates** Existing Knowledge
3. Includes **Demonstrations** (Showing / Multimedia / Practical Examples)
    a. Knowledge demonstrated is [1]Informational & [2]Skill-Based.
4. Provides Opportunities for **Application**
    a. **Perform** Real-World Tasks.
    b. **Solve** Real-World Problems.
5. Supports **Integration** into the Real World (Holistic Understanding)
    a. [1]Reflection, [2]Discussion, [3]Debate, [4]Presentation of New Knowledge.

Criterion-Referenced Assessment

Centres on:

- **Absolute Standards** of Proficiency.

How to ensure CRA is successful? Ensure there is **Alignment** of:

- Assessment Criteria & Standards
- Intended Learning Outcomes

→ [1]**Provide** Guidance to Learners & [2]**Facilitate** Understanding of Task Expectations.

Methods and Models of Assessment

Formative Assessment:

- Any means by which learners receive [1]**input** & [2]**guiding feedback** on their relative performance to help them improve.
- Assessment ***for*** **learning**.

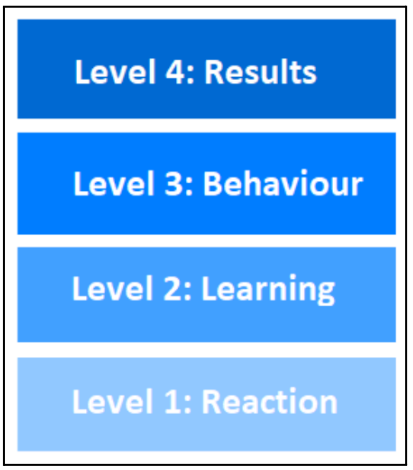
Summative Assessments:

- [1]**tests**, [2]**quizzes**, [3]**projects**, [4]**graded course activities → measure** learner performance.
- Cumulative
- Determine ***what*** learners have learned by the end of the unit or course.
- Assessment ***of*** **learning**.

The Kirkpatrick Model

Framework to measure the impact of training in a business context.

The 4 Levels of the Kirkpatrick Model:



Assessment at HyperionDev

	UNSATISFACTORY	NEEDS WORK	ACCEPTABLE	OUTSTANDING
Completeness / Correctness	Doesn't seem to have understood the task. Solution does not match the spec or has severe bugs.	Solution is guided by spec but misses key aspects and edge cases	Solution matches the spec. All instructions were followed and implemented correctly	Solution perfectly matches spec and all edge cases are eloquently handled.
Efficiency	Clearly does not understand efficiency. Use of nested loops, list lookups, etc even though it is not a natural solution	Has problems understanding efficiency. Obvious ways to easily improve the efficiency of the programme	Understands efficiency. Has used approprate data structures and algorithms to implement a solution that is efficient	Has clearly thought a lot about efficiency. Uses advanced algorithms and datastructures to eke out extra efficiency
Style	No attempt at good spacing or following of coding conventions. Bad style makes the code hard to understand and read.	Code follows some conventions, but has many spacing mistakes and convention violations.	Code is mainly well styled, spaced, and follows conventions.	No errors in coding style. Vertical and horizontal spacing is well chosen. A style guide is followed consistently throughout the project.
Documentation	No comments or README file, or comments and/or a README that are unhelpful.	Some attempt at documenting code and/or project, but documentation is not very useful.	Code is commented according to spec (if applicable). Good grammar and spelling and clear explanation makes the code easy to follow.	Code contains standard style docstrings and consistently documents all functions, classes, etc. Comments are well chosen to explain ideas behind code.

Meta Reviewing

	Description	Unsatisfactory	Needs Work	Acceptable	Outstanding	Weightings
Length of feedback	How complete is this feedback? Does it highlight appropriate achievements and areas for improvement?	No feedback, or feedback too short to be useful in relation to the task aims.	Feedback makes at least one substantial point, either a positive point or an area to be improved.	Feedback makes at least two substantial points: one positive and one area to be improved.	Feedback goes beyond the submission task, showing the student where they could improve even if the code fulfilled the the specification for the task.	10
Technical comprehensiveness	Has the reviewer been accurate in their understanding of the purpose of the task, and the student's solution to that task?	Student's code contains unaddressed issues which are the focus for this task and / or the course.	Students work contains some unaddressed issues, which should be addressed given the task aims and the course content.	All task and course related issues are addressed, if reasonably possible. Otherwise, the most important issues for the task and the student's development level are addressed, with effective explanation and examples.	All issues in the students work are addressed. Mentor has left feedback on how to improve beyond the task spec and course expectation, if appropriate.	25
Technical Quality of feedback	Do the comments show an understanding of the code, the task and the programming language?	Feedback is wrong or misleading	Feedback is technically correct but does not explain why the code improvements are needed: it's unlikely the student will understand the underlying aims of the task from the feedback given.	Feedback is correct and is likely to help the student understand a new concept or resolve an issue with their code.	Feedback shows deep technical understanding and/or draws helpful analogies to help the student internalize the aims of the task.	40
Communication style and tone	Is the reviewer engaging the student in a mentoring role?	No attempt to be friendly or supportive or engaging	Some attempt to communicate with the student outside of technical knowledge transfer, but comes across as short or rude, or otherwise unprofessional.	Feedback includes encouragement outside of what is directly required, mentor builds personal relationship with student, such as greeting and signing off, or referring to their other work.	Mentor puts in special time and effort to build a special relationship with the student, makes it very clear that they're their to support, and is likely to exceed the students' expectations for what mentoring entails	15
Written communication and presentation skills	Is the feedback well planned, well written and well presented?	Spelling and grammar errors are marked and affect comphrehension, or no effort has been taken with the presentation of the feedback for effective understanding.	Some attempt at professional language and formatting, but typos, grammatical mistakes, unprofessional language or poor planning are obvious and detract from the final product.	Language, grammar, and presentation are consistently good. Review can be used in instructional material to train new reviewers.	Perfect language, grammar and formatting. This review can be used in client-facing material as examples of the work we do.	10

Reflect and Apply 2.3

Pause for a moment here and think about **a recent lecture/workshop/mentor session** and **what concepts you covered in your teaching or mentoring**. **Answer the following:**

- If you had to retrospectively write a lesson plan for the learning session (for mentors, assume **you know exactly what topic the student will want help with**), what [1a]**three LOs would you set, and** [1b]**why?**

- Explain the [2a]**Cognitive Levels** (with reference to Bloom's taxonomy) at which **those LOs would be establishing learning**, and [2b]**how the three LOs come together** to **create** a graduated and nuanced learning experience.

Jot your thoughts down below.

Answer

My Journal Link 👆

The Topic the Student needs help with:

Python **Logical Operators**:

- **and**
  - Returns True if both conditions are true.
  - E.g.: (x < 5) and (x < 10)
- **or**
  - Returns True if one (or both) of the statements is true
  - E.g.: (y < -1) or (y == -1)
- **not**
  - Reverse the result of the evaluation. Negation.
  - E.g.:

```
is_open = False

if not is_open:
    print("The store is closed.")
```

What 3 LOs would I set, why would I set them, and what Cognition Level of Learning would it stimulate?

By the end of this task, learners should be able to:

LO 1: Explain, by means of Python comments, what the Logical Expressions in their scripts are busy evaluating.

Why: To measure/determine whether the student understands what their code is actually doing.

Cognitive Level: **Understanding**. The student is tasked to describe (using natural language) what their Logical Expression is busy evaluating.

LO 2: Run a program in debugging mode to investigate and compare whether their predictions correspond to the output in the debug console.

Why: Debugging is a valuable skill to have in any Programming field. Critical thinking is stimulated in the student, and a deeper understanding of what the code is doing is nurtured. It helps students to become more autonomous in their capacity as a programmer.

Cognitive Level: **Analyze**. The student must proactively investigate their own `print("...")` statements (in debugging mode) to gauge whether the output corresponds with their predictions.

LO 3: Write a simple program to determine which criteria (see bullet list below) are satisfied based on any three numbers provided as input by a user:

- All three numbers are positive.
- At least one number is greater than 8.
- None of the numbers is equal to 33.

Why: This is a fun task/challenge that will assess whether the student has become competent and proficient in the usage of Python Logical Operators (`and`, `or`, `not`). It will also assess the quality of code (i.t.o. syntax & efficiency) provided by the student.

Cognitive Level: **Create**. The student must tap into all their knowledge and experience of Python Logical Operators, and write a simple script from scratch. In writing this script, students must design accurate testing conditions to make a "verdict" about the input provided by the user. Students must also invent robust features in their script to elegantly handle any invalid input provided by the user.

How would the three LOs come together to create a graduated and nuanced learning experience?

My three LOs are *not* concentrated at one Cognitive Level. They are spread across [1]Understand, [2]Analyse, and [3]Create. I also structured my LOs in such a way that the learning experience surrounding Logical Operators is **gradual** and **incremental**. Viz.:

- **Basic**: Can a student describe what a Logical Expression is doing? At the very least, can they attempt to put into their own words what the code is testing for?
- **Intermediate**: Is the student autonomous in testing the validity and robustness of their own code? Have they attained a new level of mastery in employing Logical Operators.
- **Above Intermediate**: Can students demonstrate in a single programming script when (and where) to use "and", "or", and "not"?

In short, my 3 LOs build on one another, and are designed in such a way to guide the student into integrating all the different Python Logical Operators into a single script. By examining when (and where) the Operators serve their intended purpose, students develop a nuanced understanding of their code. I personally consider this as optimal as the learning behind the three operators are not siloed into separate "assignments"/"tasks".

In conclusion, the LOs are gradual and cumulative, but also have a holistic design built into them.

Section 3

Notes

Section 3.1: Practical Teaching methodology:

Lesson Planning:

Controlled Tasks:

- There is only **one wrong** and **one right** answer.

Free Tasks:

- I am **confident enough** to do this.
- Mentor is **no longer involved** in the decision-making process.

Proper Planning of Lessons include:

- **Clarity & Structure**:
  Sequence & Present Coding Concepts in a Logical & Understandable Manner.
- **Effective Communication**:
  Use of [1]Clear & Concise Language, [2]Visual Aids, [3]Demonstrations, and [4]Real-Life examples to facilitate understanding.

The **Components** of a **Well-Designed Lesson Plan**:

- Objectives
- Activities
- Assessments

Henri: Lesson Plan Template.

Steps in Lesson Planning:

1 ➡️ **Outline** intended Learning Outcomes (LOs).

SMART:

1. **S**pecific
2. **M**easurable
3. **A**chievable
4. **R**elevant
5. **T**ime-Bound

Narrowed Down to 2 or 3 Concepts / Ideas / Skills.

2 ➡️ **Assess** learners' Prior Knowledge of the topic.

Gauge Learners' Familiarity with the topic through [1]Questions, [2]Polls, or [3]Preliminary Information.

Have a Backup Plan.

Based on the Feedback, Reinforce whatever Concepts are Necessary.

3 ➡️ Develop the Introduction.

Set the Stage for an Engaging and Focused Learning Experience.

Give Clear Direction & Purpose for Both you and the Learners.

Hooking your Learners' Attention:

- Storytelling
- Analogy
- Curiosity
- Anecdote

Brief Overview of the Lesson Content:

- **Highlight** Relevance & Connections to Previous Knowledge or Real-World Applications

4 ➡️ Plan the [1]Specific Teaching and [2]Learning Activities that make up the lesson body.

Determine the most Effective Instructional Strategies and Resources to Facilitate Learner Understanding.

1. Real-Life Examples
2. T/F Quiz
3. Code Analysis
   Share Coding Snippets
4. Interactive Polling
5. (Practice)
6. Mini Coding Challenges
7. Error Spotting
8. Collaborative Problem-Solving
   Breakout Rooms
9. Concept Visualisation
10. Peer Instruction
    Breakout Rooms

AI Prompt: Learning Design Mode (LD).

5 ➡️ Plan to **Check** for Understanding. (CFU)

Checking for Understanding:

- Probing Questions
- Brief Quizzes / Polls
- Think-Pair-Share Activities
- Emoji Systems: Instant Feedback in the Online Classroom.

Active Participation by Inviting Learners to:

- Share Thoughts
- Ask Questions
- Small Group/Breakout Room Discussions

Be aware of responses which can Communicate (lack of?) Understanding:

- Double Empathy Problem
  - **Neurotypical** vs **Neurodivergent**.
- Adjust in Response.

6 ➡️ Develop a Recap and Conclusion.

- **Clear & Concise Summary**:
  - Key Concepts
  - Takeaways

Best Practices:

- [1]**Revisit** LOs & [2]**Briefly Recap** Main Points.
- **Encourage** Learner Reflection.
- **Emphasise** [1]Relevance & [2]Practical Application.

Closing Activity / Assignment:

- Allow Learners to Demonstrate their Understanding.
- Allow Learners to Apply their Knowledge.

End the Lesson on a Positive Note:

- **Appreciation** for *Learners' Participation*.
- **Highlight** the *Student's Achievement*.
- **Provide** a *Sense of Closure*.

7 ➡️ Create a Realistic Timeline.

Useful Steps to Start With:

- What is the **Allocated Time** for the Lesson & the **Specific LOs** to be Achieved.
- Break content into Smaller Chunks → Get **Time** needed for Each.
- **Consider**: [1]Potential Transitions, [2]Learner Engagement + [3]Additional Resources / Materials Required.

- **Flexible** i.t.o. [1]Unforeseen Circumstances / [2]Learner Needs.

8 ➡️ Practice makes Perfect.

Consolidation Activities (to Consolidate the Learning): [1]Interesting, [2]Practical & [3]Engaging.

- **Homework**
- Follow-Up **Activities**
- **Ideal**: Relate directly to something you will do in the next lesson.

9 ➡️ Wrapping up the Details.

[1]***Materials*** & [2]***Resources*** you will need for the Lesson.

Materials and Resources Needed by Lecturer

- **Books/Readings:** xx
- **Worksheets:** xx
- **Technology:** xx
- **Other Tools**: xx

Educator Resources

- **Examples to Include:**
  - Xx
  - xx
- **Interactive Tools for the Lesson:**
  - xx

Example Lesson Plans to serve as References:

- **Object-Oriented Programming**.
- **Introducing Students to Django**.

Reflect and Apply 3.1

Review what you have learned about lesson planning. Then:

1. Select a **topic relevant** to either a lecture you will need to give soon, or a topic that learners often have difficulties with, and create a lesson plan for teaching that topic, using the lesson planning template.

2. Use the "cheatsheet" for lesson planning that is provided as an additional reading with the learning material for this section to help you set Learning

Outcomes using Bloom's taxonomy and related action verbs, and to align your lesson plan with Merrill's principles of instruction.

Answer

Paste your lesson plan, or a link to it, below this line.

👆 **Lesson Plan Link** 👆

"Lecturer": Henri Branken
Lesson Topic: Python Dictionaries
Date: 2024-07-31

Notes - Continued

Classroom Management Strategies

1. Clear Communication and Expectations

- Clearly communicate **expectations**.
    - HyperionDev Student **Code of Conduct**.

2. Structured Online Routines

- Clear starting and ending procedures.
- Transitions between activities.
- Guidelines for turning in assignments.
- Participating in Discussions.

3. Interactive Learning Activities

- Breakout Rooms
- Online Polls / Quizzes
- Interactive Whiteboards
- Multimedia Presentations.
- **VSCode LiveShare Addon**.
- **HelpWire** for Remote Sharing.

4. Behaviour Management Strategies

- Reward System / Positive Reinforcement.
- Address Behavioural issues Promptly.

5. Foster Online Community

- Sense of Community and Connection:
    - Icebreaker Activities
    - Group Projects
    - HyperionDev Discourse Chat Forums.
- Virtual Social Interactions.
- Opportunities for Peer Collaboration & Networking.

Learner Engagement

Promote Active Participation & Student-Centred Learning.

1. Polls and Surveys

- Gather real-time responses from learners.

2. Breakout Room Discussions

- Engage in focused discussions or collaborative activities.

3. Chat and Q&A Features

- Foster an interactive and engaging virtual classroom environment.

4. Multimedia & Visual Aids

- Enhance the Engagement
    - Videos
    - Images
    - Infographics
    - Interactive Presentations
- Visual Aids

5. Gamification & Interactivity

- Online Quizzes
- Virtual Scavenger Hunts
- Interactive Simulations
- Educational Games

Promote Active Participation & Add an Element of Fun to the Learning Experience.

6. Cold Call

Warmly Encourage Learner Participation (regardless of whether they have volunteered to participate).

Remote Teaching: Positive Cold Call Online.

[1] Step Into a Classroom:

Ensure a Positive Culture of Cold Call.

- Give the students enough time to prepare.
    - Writing First.
    - Wait Time.

[2] Study the Technique:

1. **Warm, Welcoming Tone & Smile**:
    - Believe in the Student's Potential.
        i. "Johnny, talk to me."
        ii. "Tell me about the …… Johnny."
        iii. "What do you think about that, Mark?"
        iv. "Johnny, I want you to start speaking about the …… "
        v. "Brit, you mentioned something previously on ……."
        Use Cold Call to steer the conversation back to the comment.
        vi.
    - You want them to be successful.
2. **Cold Call Predictably**:
    - You've given them a specific heads up.
    - You make Cold Calling a consistent and regular way to invite students in the classrooms.
    - Make the students accustomed to Cold Calling in the beginning.
3. **Make it Universal**:
    - Do not Pick on a Student.
    - Ask Questions of Different Students in a Batch.

Three Pieces of Advice:

- Give students some **time to think**.
- Anxious Students:
    - Foundational Question → More Challenging Question.
    - Private Heads Up
- Give everyone a **chance to speak**.

[3] Practice:

The sheer act of **practising planning** should set you up to begin **Cold Calling predictably**.

7. Code Along

Write Code Live while Sharing your Screen.

Gather input and assistance from learners on what to do next, what errors you've made, and what the code does.

Differentiation & Individualisation

1. Differentiated Instruction

Offer a variety of instructional strategies, materials, and resources to cater to the diverse learning needs of learners.

2. Multimodal Instruction

Combine visual, auditory, and kinesthetic elements in your teaching, such as videos, images, audio recordings, and interactive activities.

3. Individualised Support and Accommodations

Providing a dedicated one-on-one mentor to provide this sort of individualised support.

4. Language Support for English Language Learners (ELLs)

Incorporate strategies to support English language learners (ELLs) in understanding and participating in the online lessons.

5. Enrichment Opportunities for Learners Requiring Additional Challenge

Provide [1]**Additional Challenges**, [2]**Independent research projects**, or [3]**Virtual Extension Activities** that align with their [a]interests and [b]abilities.

Managing Challenging Behaviours

1. Positive Reinforcement

Acknowledge and Encourage desired behaviours.

2. Private Feedback

Use one-to-one video conferences, private messaging, or email to maintain confidentiality and provide guidance for behavioural improvement.

3. Behaviour Intervention Plans

Collaborate with the learner support team, the learning experience team, and special education coordinators or behavioural specialists, to create individualised strategies that address specific behavioural concerns.

4. Restorative Approaches

Encourage open dialogue, active listening, and the opportunity for learners to express their feelings and perspectives. Help learners find resolutions, foster empathy, and encourage understanding among peers.

5. Collaborative Support

Collaborate with other lecturers, mentors, and other learner-facing staff to address challenging behaviours and develop strategies for addressing these.

Reflect and Apply 3.2

Work through the web resource on **Positive Cold Call Online**. Script your own **Five Cold Call questions**, using the **three tips** given in section 3. Do the recording exercise that is also in this section (if you have any difficulty with the web recording functionality, you can either use the free version of **Loom** or just use your smartphone to make the recordings).

- Round:
    - 1: Just **try it out**.
    - 2: Focus on using a **warm tone**.
    - 3: **Smiling** in Addition to using a warm tone.

Afterwards, **Move to Section 4** and watch all three videos from your practice. As you watch, look for the following:

1. Round 1: **Try It Out**
2. Round 2: **Name-Pause-Question** & **Come Off Mute**
3. Round 3: **Warm and Welcoming Tone**

Reflect on the process of doing this exercise:

- How **Easy** or **Difficult** was it?
- Did you **Learn** anything?
    - If so, **What**?
    - If not, [1]**Why Not**, and [2]**What could you do Differently** to extract value from the exercise?

Answer

*Include the **links to your video recordings** here.*

The ***Link*** to my video recording.

Question 1:
Andrew, how does a Python dictionary differ from a list?

Question 2:
How would you create a dictionary to store the names and ages of these three people? *Sarah*, any ideas?

Question 3:
Jack, using the dictionary that Sarah created, how would you access Bob's age?

Question 4:
Now, suppose Bob has a birthday, and turns 31. How can you update the dictionary to reflect his new age? *Anna*?

Question 5:
Suppose we have another person called David, and he is 40 years old. Can *anyone* tell me how we can add David to the dictionary?

- Because I had TEFL training before, this was relatively easy.
- Yes, I did learn something new. I learned that I don't have to get a fright if a student gives the wrong answer upon my cold calling prompt. I need to very calmly steer the conversation in the right direction.

Section 4

Notes

Introduction to Education Psychology

Metacognition refers to the ability to [1]**think about and** [2]**reflect** upon one's own cognitive processes. It involves being

- **aware** of our thinking
- **understanding** how we learn,
- and **making conscious decisions** about how to approach a learning task.

Metacognitive Knowledge, which involves understanding

- **what** learning and thinking strategies to use,
- **when** to use them,
- and **why**.

Metacognitive Monitoring, which is the ability to

- **assess** our own [1]understanding and [2]progress.
- This then leads to:
    - Seeking Clarification
    - Reviewing Material
    - Seeking Additional Resources

Metacognitive Control:

- actively **managing** one's learning process
- **setting** goals
- **planning** strategies
- **evaluating** progress

Extra Reading:
The Power of Metacognition in Everyday Life, David Handel (2020).

Metacognition & Teaching:

It empowers you to **develop a growth mindset**, and to be constantly **improving and evolving** in your professional practice. These mindset changes **positively impact** how you relate to and interact with learners at a very fundamental level.

How to **provide learners with an opportunity** to observe their coding workflow and thought process:

- how they discern the **purpose** of their coding task
- where they pause to **inquire**
- how they **connect** novel coding concepts with their existing knowledge
- how they **evaluate** their comprehension of the code
- **when** they decide to review and revise their code
- how they **assess** their learning outcomes

By openly demonstrating their metacognitive thinking during coding tasks, facilitators offer **learners valuable insights** into

- effective **coding strategies**
- **problem-solving** approaches

Encourage learners to [1]**articulate** their own coding strategies and [2]**reflect** on their decision-making.

Facilitators must **empower learners** to become more self-regulated learners.

Building Metacognition in Learners

Articulating and Examining your own Thinking plays a huge role in [1]**Planning and** [2]**Debugging Code**.

Some **Teaching Approaches** to Build Metacognitive Capacities in Learners:

- **Creating simple tasks for learners to demonstrate their thinking**
  For example, small coding exercises that they can attempt while sharing their screen with the class.
- **Increasing reflective feedback on their learning**
  Ask learners to reflect on their answers to questions and approaches they have taken to solve problems.

- **Pre- and post-work polls**
  Poll learners' attitudes and preconceived notions about a concept before and after teaching it.
- **Build in one question for learners to ask themselves**
  "How did you figure that out?"
    - Unconsciously Competent
    - Consciously Competent
        - People with this really add value to a discussion → they can model the **power of metacognition** for their peers.
- **Peer or model assessment**
  . . . commenting on what they think is done well and what isn't, and why:
    - **dealing** with edge cases
    - **sanitising** user input
- **Make revision part of learning**
  They resubmit multiple times with no penalties, which [1]**embeds revisions** and [2]**metacognitive review** of their own work into the learning process.

Pitfalls to Avoid

The Dangers of Assumptions

The **Problem** with Assumptions

- is that because they are so often **implicit** or **subconscious**
- we are **not aware** we're making them

One must develop a **greater capacity** to:

- **be aware of and think** about your own thinking
- **critically analyse** it
- and thereby **improve how** you teach

The Dangers of the Deficit Model

Extra Reading:
Mind the Gap Toolkit - Cambridge Centre for Teaching and Learning.

A Brief Definition:

The **"Deficit Model"** focuses on **what students lack or can't do**, rather than their strengths and potential. It often leads to a **narrow view** that blames students' backgrounds or abilities for their challenges.

This approach can overlook the importance of supportive teaching methods and resources that help all students succeed.

In **Simple Terms**, the deficit model is an explanation for learning difficulties based on the idea that learners who struggle academically do so because ~~***they're deficient in something***~~.

Reflect and Apply 4.1–4.2

Let's do a little exercise on assumptions, drawn from the "Train the trainer" workshops of Halse (2019). Consider the following **quote from an essay by Rick Garlikov (n.d.)**.

"When I first bought a close-up attachment set for my camera -- a set of lenses that allow you to photograph relatively small objects from closer than you can focus with a normal lense -- I went out in search of subject matter to try them. I was in a vacant, uncared for field near where I lived and in it stood a fairly tall, particularly pretty Queen Anne's Lace -- a flowering plant with a horizontal flat flower that resembles a round piece of finely made lace material. I got it in my head that it would be neat to photograph it with the sun coming through the flower, so I got down on the ground to shoot up from under it toward the sun. I could not get down low enough on my stomach to get the angle on the sun, so I turned over on my back, and shinnied under the plant. The sun was still too high in the sky and the plant too short for me to get the angle I needed. I decided I would have to come back later when the sun was lower and I did not have to be directly under the plant in order to have it be between the camera and the sun."

1. What do you **think** of the author's **solution**?
   He initially encountered some setbacks. After reflecting on why the photo did not "work out", he adapted to the problem and thought more thoroughly about a better solution to achieve the desired outcome.

2. What is being **assumed**?
   The primary problem is with the positioning of the sun and the plant. He further assumes that the problem will definitely be solved when he comes back later, even though he has not implemented it before.

3. What might you have **done differently**?
   I would have further investigated the setup of my camera to see if any changes made there would solve the problem. In other words, I would investigate whether the fault is not with my photography approach. Furthermore, I would have tried other angles, or stabilisation with a tripod.

4. Did you also make the assumption that the plant could not be moved?
   Indeed, yes.

5. If so, why do you think you did that and what specific actions could you have taken to help you to identify this assumption and question it? Is there anything to be learned from this for your role as a facilitator of learning?
   🟢 I was too focused/infatuated with my initial idea of solving the problem at hand.
   🟢 I could have paused and reevaluated whether my current approach was indeed the most logical one at hand. I could have been more creative and/or analytical in my approach to take the photo.

🟢 I must be vigilant to my mentoring approaches, and have regular "spot checks" where I evaluate whether my method of delivery is optimised for the facilitation session.

Answer

1. **What do you think of the author's solution?**
   He initially encountered some setbacks. After reflecting on why the photo did not "work out", he adapted to the problem and thought more thoroughly about a better solution to achieve the desired outcome.
2. **What is being assumed?**
   The primary problem is with the positioning of the sun and the plant. He further assumes that the problem will definitely be solved when he comes back later, even though he has not implemented it before.
3. **What might you have done differently?**
   I would have further investigated the setup of my camera to see if any changes made there would solve the problem. In other words, I would investigate whether the fault is not with my photography approach. Furthermore, I would have tried other angles, or stabilisation with a tripod.

Once you've completed the above answer, read the follow-up excerpt on Moodle and then answer the questions below.

Answer

1. **Did you also make the assumption that the plant could not be moved?**
   Indeed, yes.
2. **If so, why do you think you did that and what specific actions could you have taken to help you to identify this assumption and question it? Is there anything to be learned from this for your role as a facilitator of learning?**
   🟢 I was too focused/infatuated with my initial idea of solving the problem at hand.
   🟢 I could have paused and reevaluated whether my current approach was indeed the most logical one at hand. I could have been more creative and/or analytical in my approach to take the photo.
   🟢 I must be vigilant to my mentoring approaches, and have regular "spot checks" where I evaluate whether my method of delivery is optimised for the facilitation session.

Notes - Continued

Inverting Deficits & Finding Strengths

What appear to be 'deficits' are often indications of **different areas of strength** that can be quite powerful when harnessed to support learning!

Using a **range of different examples**, and providing diagrams and video clips or using real world observation in the field.

Using metacognition to support teaching is a process of **uncovering our assumptions** and **removing dependence** on these to ensure **equitable access to education for all learners**.

Form as diverse as possible a small group of academic staff and have everyone **review and critique** everyone else's exam questions.

Learning Challenges - Establishing Causes and Implementing Interventions

Problem Situations

When teaching a new concept, **examining hard data in addition to your own thinking process** can be helpful to make learning **more accessible**.

Simple English Wikipedia → Make information **accessible** to people with different English proficiencies.

Think more deeply about any **causative factors**.

Be **more aware** of the possible complexity involved.

- Gender Role
    - Differing communication and collaboration **norms** between different genders.
    - Masculine and Feminine Attribution of Causation Differ.
- **Culture** / Country of Birth
- **Causal Attribution**
    - How we explain why things happen.
    - Figure out the reasons behind someone's behaviour or an event.

Correlation vs Causation

Beware of **conflating** Correlation and Causation.

- Just because two things occur at the same time **doesn't mean** one is the reason for the other.

. . . Even if you gather data on your learners, [1]analyse it, [2]do research, and [3]critically analyse your thinking

- it is **possible to make assumptions that trip you up**.

The 5 Whys for Root Cause Analysis

Repeatedly asking "Why?" to identify the underlying cause(s) of an issue.

- It helps to unravel the **layers of causality** and uncovers **hidden factors** that contribute to the problem.
- . . . Encourages **critical thinking** and helps you avoid making assumptions or jumping to conclusions.
    - . . . Promoting a culture of **continuous improvement**.
- . . . ask the right questions and have an open and **honest discussion**.

What you can do as a facilitator:

- providing **additional resources**
- offering **targeted explanations**
- encourage the learner to **book more 1:1 mentor sessions**
- guide the learner through exercises that specifically **focus on these concepts**
- provide skeleton code to learners to **reduce the complexity** of the task

Reflect and Apply 4.3–4.4

Reflect on your personal experiences in facilitating learning (if you don't have much experience lecturing or mentoring, consider a time you helped a peer, friend, or a younger sibling understand a difficult concept, or a similar situation).

1. Describe a situation in which you made **any sort of assumption** that, in retrospect, made successfully **facilitating learning more difficult**. Were you to encounter the same situation again, what **would you do differently**, and **why**?

Answer

I tried to explain the solution to a problem (in the field of 2nd year Applied Mathematics) to a friend not fully grasping the logic behind the solution. **My assumption** was that their level of scaffolding (or pre-existing knowledge) was completely on par with mine.

In future situations, I would first spot check whether the friend/student understands "prerequisite" concepts that are vital to solving the problem at hand.

It is a possibility that the person is majoring in a field other than Applied Mathematics. As such, they might give less priority to theorems/definitions/concepts in the Mathematics domain. This, in turn, "sets them up" for quicker frustration when trying to solve the problem because certain "basics" have not been cemented in their understanding.

I, on the other hand, who majored in Applied Mathematics, would give higher priority to maths-related subjects.

2. Recall the earlier exercise based on Rick Garlikov's description of his problem photographing a plant. When you first read that section, we asked you to try and identify the assumption Garlikov was making, but had yet to introduce a framework for root cause analysis. "When you know better, do better!", as the saying goes, so it is now time to try **5 Whys root cause analysis** of the plant-photography problem. For this exercise, assume you didn't already know the solution, and try to formulate your **why questions** in such a way that someone who hadn't been able to identify the assumption could use the set of questions you formulate to identify it so successfully. This is much harder than you might at first think; there is a real art to **formulating the Whys**. Write your final 5 Whys below.

Answer

Why 1: Why can't I get a decent-looking picture of the Queen Anne's Lace on my camera with my new lens kit?

➡️ The relative positioning between the camera, flower and sun is not correctly related to each other to form a beautiful picture.

Why 2: Why is the relative positioning of the whole setup incorrect?

➡️ It is difficult to "balance" the flower between the camera and the sun.

Why 3: Why is it difficult to "balance" the flower between the camera and the sun?

➡️ I cannot properly position my camera beneath the "short" flower, and therefore I cannot get the correct camera angle.

Why 4: Why is it difficult to get the correct camera angle from beneath the "short" flower?

➡️ It is not practical to take an image of the flower while lying on my back on the ground.

Why 5: Why is it not practical to photograph the flower while lying on my back on the ground?

➡️ There is little flexibility available to me given the limited "leeway" imposed by the flower-to-ground arrangement. Given this restriction, I should consider alternatives which offer more flexibility to accommodate the correct camera-flower-sun "ratio". As I want a photo of the sunlight through the flower (and not the stem), I should consider lifting the flower off the ground. . .

2. Once you've done this, reflect on the process. How **easy/difficult was it** using **The 5 Whys**? Write your thoughts below.

Answer

It was difficult because I haven't done this sort of reflection in which I drill 5 Levels deep. Society is too accustomed to the quick-fix mentality in which we try to find an immediate answer to a multi-faceted question.

It is a different ball game to reach the *5-Why* contemplative state to deeply probe a problem in an attempt to find the root cause.

3. How easy/difficult do you think it would be to **identify a particular conceptual challenge** your learners commonly have with an aspect of learning to code **by using this approach**? Write your thoughts below.

Answer

Given that I haven't mentored/lectured coding sessions up until present, I wager that it would be somewhat difficult.

Then again, I could use anonymous polls or open conversations to gather the "hard data" to better frame my mind of how sophisticated my students' current level of understanding is. With this insight, I would be better positioned to at least meet my students halfway in their learning journey, and catapult them further in their quest of discovering and applying new coding concepts.

In addition, I should always be open to any complexity involved in grasping and applying a coding concept. Finding the root cause of a stumbling block is a continuous process of reflecting, checking, and implementing possible solutions.

Future application

Do you think that you could formulate a set of questions about a learning problem so that if you gave your learners a model problem and got them to ask themselves those questions, they might be able to **discover the root cause of their poor understanding for themselves**? Try it with some learners at some point in the future, and then come back to your previous answers and **reflect on how it worked!**

- What went **well**?
- What **failed** hopelessly?
- Could you **tweak your approach** on the basis of what you learned, to make it more effective?
- If not, would the same be the case for a **different common coding problem**?

Answer

<text/>

If you can start reflecting in this manner on your learning about teaching, and then make this part of your routine practise as an educator to find ways to apply what you have learned and test it's efficacy, refining your approach as you go, you will find you are soon head and shoulders above many other educators, and that your continuous professional development will **not be limited to formal learning opportunities!**

Answer

<text/>

Section 5

Notes

Introduction

The OARS framework is a set of **communication skills** used in motivational interviewing (MI), a **counselling approach** that helps people **make positive changes in their behaviour**. OARS stands for:

1. **Open-Ended Questions:**

These are questions that cannot be answered with a simple "yes" or "no." They encourage the person to **explore their thoughts and feelings** more deeply. For example, "What brings you here today?" or "How do you feel about the changes you've made so far?"

2. **Affirmations:**

Affirmations are positive statements that **recognize a person's strengths, efforts, or achievements**. They help **build the person's confidence** and reinforce their ability to change. For example, *"You've shown a lot of commitment by coming here today"* or *"It's impressive how you've managed to handle this situation."*

3. **Reflections:**

Reflective listening involves repeating or paraphrasing what the person has said to **show that you are listening and understanding their perspective**. It can also help the person hear their own thoughts and feelings more clearly. For example, *"It sounds like you're feeling overwhelmed by all the changes," or "You're unsure if this is the right path for you."*

4. **Summaries:**

Summaries are used to **recap the conversation**, highlighting the main points and reinforcing the person's motivation for change. They help to organise the discussion and ensure that **both parties are on the same page**. For example, *"So, what I'm hearing is that you're committed to making this change, but you're concerned about how to manage the challenges ahead."*

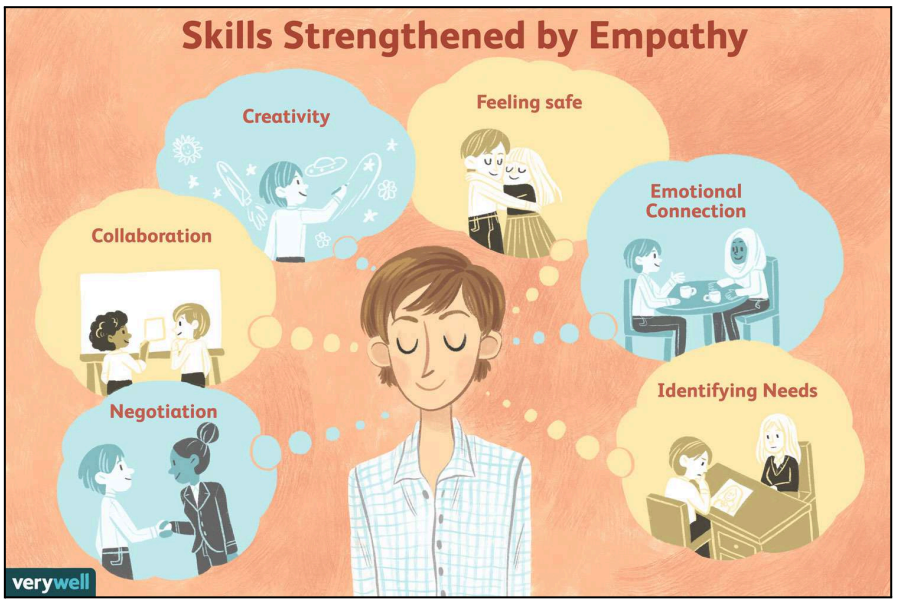
The OARS framework is fundamental in creating a **supportive and non-judgmental environment**, helping individuals feel heard and understood, and guiding them toward **self-motivated change**.

Empathy

Empathy as a soft/people skill plays a pivotal role in **Facilitating Learning**.

Recognising and understanding the [1]feelings, [2]perspectives, and [3]challenges of each learner contributes to creating a **safe and supportive learning environment**.

- Encourages **Effective Communication**.
- Enables Teachers to Build **Trusting Relationships**.
- Enhances the learner's **academic performance**.
- Helps them **develop** essential social & emotional **skills**.



How to practise empathetic communication with your learners?

OARS

OARS is an acronym for a framework of four foundational skills for working with people.

Encourage [1]**metacognition** and [2]**self-awareness** to facilitate [a]personal growth and [b]change.

The Four Components of the OARS Framework:

1. **O**pen-Ended Scaffolding Questions
2. **A**ffirming
3. **R**eflecting
4. **S**ummarising

(O) Open-Ended Scaffolding Questions

Using open-ended questions gives learners the opportunity to **share their thoughts and experiences**:

- **Interest** in the Learner's Process of Constructing Knowledge
- Assists in **Building Acceptance and Trust**

"Cheat Sheet" of Open-Ended Questions:

- What is [fundamental concept]?
- How is [fundamental concept] important here?
- What role does [fundamental concept] play here?
- What are your ideas to...
- What steps can you take to...?
- What happens when you try x/y/etc?
- How did that impact a/b/etc...?
- How do you think you can...?
- How does [thing x] do [thing y]?
- Why does [thing x] do [thing y?]

Avoid Leading **Questions** and **Statements**.

Probe for more information.

(A) Affirming

Affirming refers to **positively reinforcing** beneficial behaviours.

The learner must **feel and believe what you say to them** – if you are not genuine, they tend to pick up on this, and trust may be lost.

Affirming a learner **acknowledges and supports their [1]learning struggles** and **[2]hard work**.

Example Affirmations:

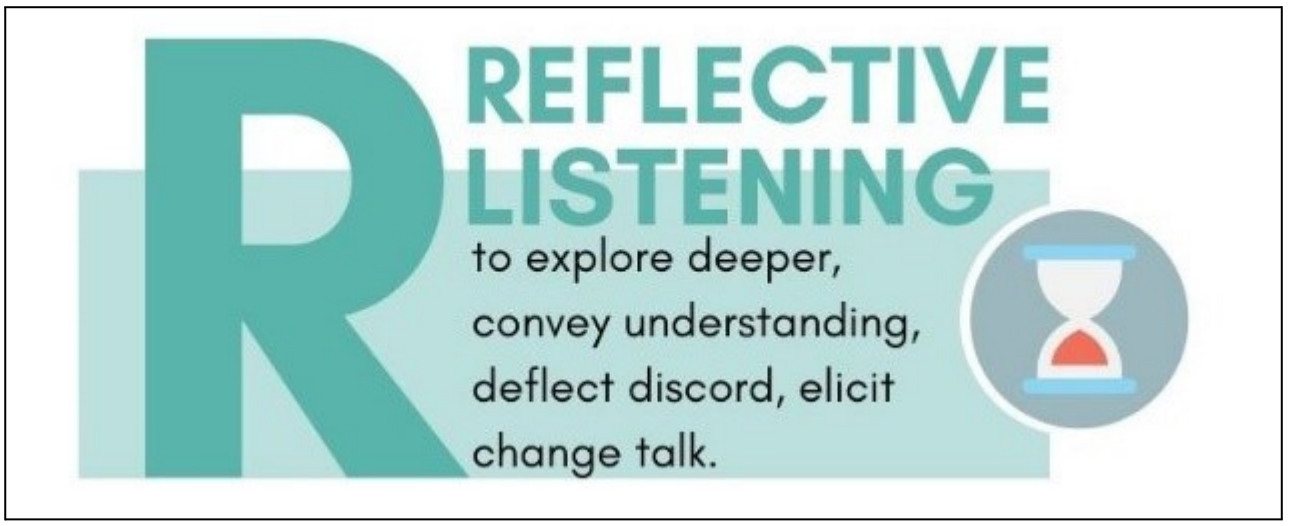
- *"I can see that you've put a lot of thought and effort into this code"*
- *"You seem really passionate about solving this problem!"*
- *"I know debugging can be frustrating, but you're doing a great job at identifying the issues step by step."*
- *"I love your creativity in approaching this problem from a different angle. It shows your willingness to explore new solutions and think outside the box."*
- *"It's completely normal to get stuck and get frustrated while coding, which can be quite hard for beginners. Your perseverance in tackling the issues you've had with this Task is impressive."*
- *"I noticed how you took the mentor feedback from the previous capstone project and applied it here. Incorporating mentor feedback to incrementally build your skills like that will really help you in this bootcamp!"*
- *"Your attention to detail in writing clean and organised code is outstanding. It shows a strong understanding of the best practices that are so important in industry."*

(R) Reflecting

Reflecting is essentially a type of active listening that **forms a mirror for the learner**, showing them **where they are on their learning journey**.

Do not get trapped into what becomes an ~~interrogation~~.

Reflective statements encourage [1]**further communication** and [2]**collaboration** with learners.



(S) Summarising

- Concise Overview of the most Important Points.
- At the most, **3-4 sentences**.
- A summary can also be used to help **shift direction in a session** and to move the **conversation forward**.

Don't be scared to **allow a little silence** and give your learner(s) a chance to fill it.

A good question for a learner who tells you they "don't understand anything" about a topic is to ask them **which lesson/task the topic is covered in**, and then ask them to open the lesson/task and walk you through the concepts being explained.

Reflect and Apply 5.1

1. Consider a concept or **problem you've noticed learners find difficult**. How could you use an **empathetic approach** to teaching this? Work out **5-10 open-ended scaffolding questions** that you could use in a lecture/workshop/mentor session to facilitate learning on the concept. Jot them down below.

Answer

Question 1:

What about the idea of a function calling itself do you find intriguing and/or confusing?

Question 2:

What are the similarities and differences between recursion and the loops we've covered so far?

Question 3:

In what situations do you think recursion might be more useful than a while or for loop?

Some Examples for Interest's Sake:

- ***Fractals***:
  Sierpinski Triangle, Snowflake Pattern
- ***Sorting Algorithms***:
  QuickSort, MergeSort.
- ***Mathematical Computations***:
  Fibonacci Numbers, Factorial Calculations
- ***Parsing Nested Structures***:
  Nested Data Structures in data formats such as XML or JSON.

Question 4:

When you hear the term "base case", what comes to your mind? Why do you think it is important in recursion?

Question 5:

Given the examples that we worked through, what helped you the most in understanding recursion? What concepts do you still need help with?

---

2. Try applying the OARS framework to working with one or more learners. Reflect on the experience. **2.1** How easy or difficult was it for you to remember the components of the framework and apply them effectively in a live learning situation? **2.2** What do you think made it easier/more difficult for you? **2.3** What could you do in future to get more value out of using the framework?

Answer

Question 2.1 - How easy or difficult was it to remember the components of the framework and apply them effectively in a live learning situation?

I wouldn't say it would be a "total breeze", but I would be fairly confident in applying the OARS Framework.

Question 2.2 - What do you think made it easier/more difficult for you?

In a previous project, I came across the notion of "The Curse of Knowledge". As a result, I am more gracious in my approach to students who are completely new to difficult programming concepts. Put another way, I am more pliable to understanding the other party's level (and sophistication) of mastery.

Question 2.3 - What could you do in the future to get more value out of using the framework?

- Make my teaching/mentoring approach as hands-on as possible. Leverage technology / white-boards / Quizizz / Anonymised Polls. Use visualisation as much as possible.
- Start the discussion with simple and relatable examples that can be found in the real world.
- Use "ice-breakers" where necessary.
- Know my audience well, and use that knowledge to create a safe learning environment.
- Foster a Growth Mindset (***NOT*** a Fixed Mindset).

Course Content Feedback Form

https://hyperionde.wufoo.com/forms/z2ho0im1j0tav9/

Were there any specific sections, topics, or resources you found notably good or bad during this course? Please be as detailed as possible.

Sections I found very interesting were [1] The Socratic Method, [2] The Zone of Proximal Development (ZPD), [3] Adult Learning vs Children Learning, [4] Growth Ethos, [5] Bloom's Taxonomy, [6] Merills' Principles, [7] Cold Calls, [8] Metacognition, [9] The Dangers of Assumptions. Here and there there were small typos and inconsistencies. For example: "The Template Lesson Plan" versus "Example Lesson Plans". I also spotted one multiple choice question (regarding Bloom's Taxonomy) in which the correct answer was actually incorrect. Lastly, the quality of one YouTube Video (in Section 2 if I am not mistaken) was a bit poor.

The exercise on building a Lesson Plan was of great value to me. Overall, I consider this course to be of excellent quality that prepares reviewers and mentors for assisting students along their learning journey.

Do you have any specific recommendations to improve any aspects of the content?

Build in a section that deals with "The Curse of Knowledge" or "The Curse of Expertise". This happens when someone who knows a lot about a subject forgets that others might not have the

same level of understanding. Tips for avoiding this include: [1] simplifying complex ideas, [2] avoiding jargon as much as possible, [3] use clear explanations and analogies. My personal opinion is that “The Curse of Knowledge” would dovetail nicely with the “The Dangers of Assumptions” section.

The Link to my Teaching and Learning Journal:

Henri Branken - Teaching and Learning Journal
https://docs.google.com/document/d/1miA2sGU6J9w4sprYTiT4TvmUqLRX5pcGO7_6KPdf3Kw/edit?usp=sharing