WELCOME

ACADEMY FOR INTERNATIONAL SCIENCE AND RESEARCH

AISR LEARNING

B-STEM

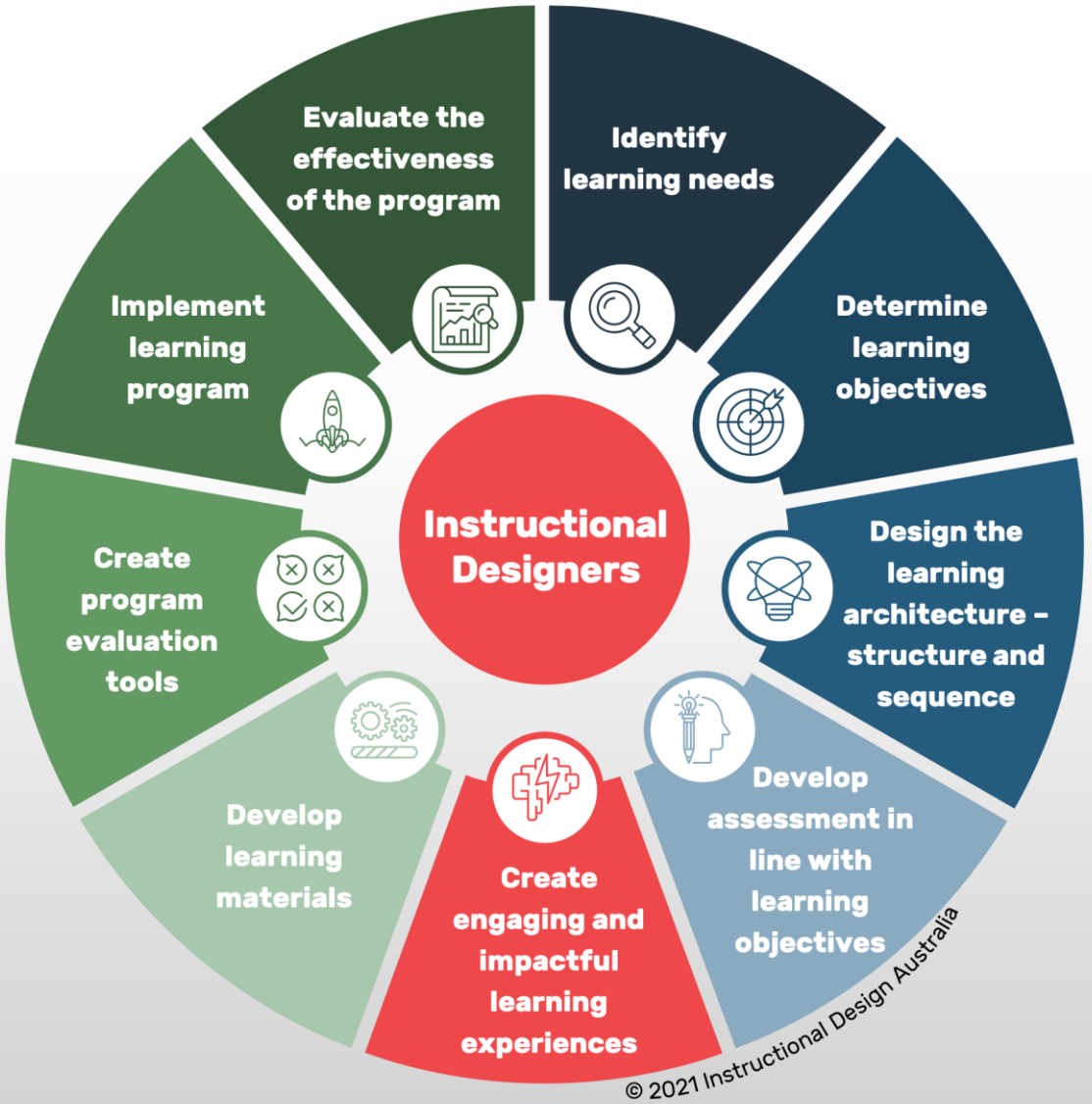
STEM TEACHING: INSTRUCTIONAL DESIGN & INQUIRY-BASED LEARNING

INTRUCTIONAL DESIGN

- Systematic process for creating effective and efficient learning experiences

- Interdisciplinary field

- Draws on learning science, human-computer interaction, educational psychology, systems theory and more…

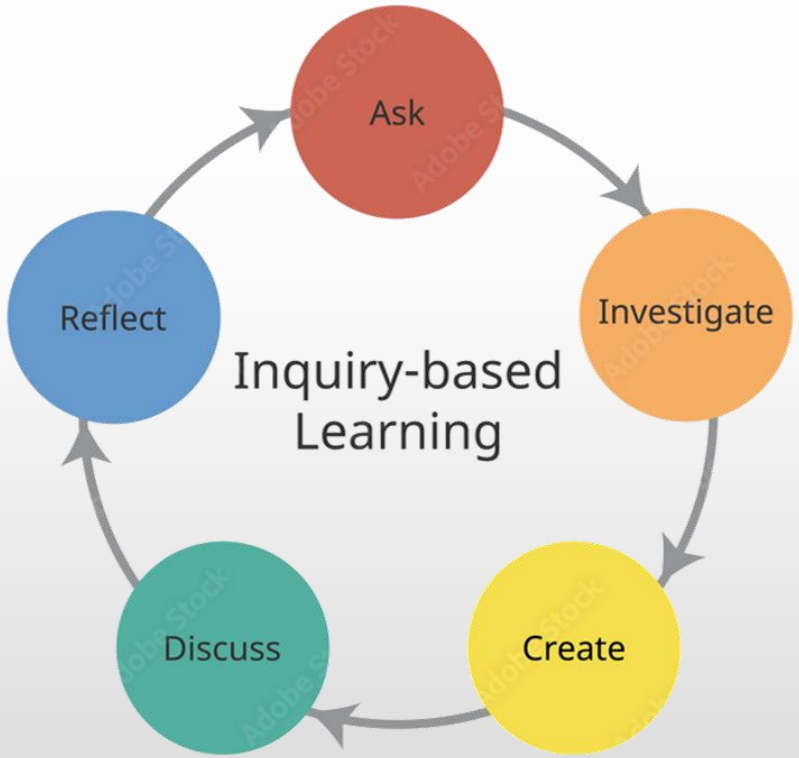


INTRUCTIONAL DESIGN

- Systematic process for creating effective and efficient learning experiences
- Key principles that are particularly relevant to online learning:
  - Identify the learning objectives: easier to develop lesson plans and structure & easier for adult learners to adapt to these new topics.
  - Analyse the learner's needs: Who are they? What are their goals and motivations for learning? Once this is established, it’s easier to create an effective learning experience
  - Select appropriate technologies
  - Create engaging content
  - Provide opportunities for interaction
  - Assess learning outcomes

INQUIRY-BASED LEARNING

- Teachers act as facilitator, rather than a provider of information
- Actively involve students in their learning
- Open ended questions OR a Topic so students can define their own questions



5E MODEL Phases

- Engage
- Explore
- Explain
- Elaborate
- Evaluate
- The 5E model provides a carefully planned sequence of instruction that places students at the centre of learning.
- Encourages all students to explore, construct understanding of scientific concepts, and relate those understandings to phenomena or engineering problems.

CONNECTION

- Instructional design principles and the 5E STEM lesson plan align in their shared focus on systematic, learner-centred approaches to teaching and learning.
- Combining instructional design principles with the 5E model can result in well-structured, engaging, and effective STEM lessons that promote deep understanding and meaningful learning experiences for students.

LEARNING OBJECTIVES/OUTCOMES

- To identify the objectives, first identify the type of learning knowledge, skills, or attitude:
  - Knowledge-based - essay-heavy subject that requires a lot of revision and memorisation (English or History)
  - Skills-based
  - Attitude-based - more focused on understanding and values (Ethics, Philosophy, and Politics)
- Apply different templates to develop the objectives

SMART TEMPLATE

- S stands for Specific - what do they need to achieve?
- M stands for Measurable - how do you measure their success?
- A stands for Achievable - are these objectives achievable?
- R stands for Relevant - are these objectives relevant to the student in the long term?
- T stands for Time-Bound - how long will it take students to complete these objectives?

ATTITUDE BASED LEARNING: A-B-C-D

- A is for Audience - Lay out the learning audience within the objective
- B is for Behaviour - What behaviour do you want to see your students exhibit?
- C is for Condition - Under what conditions/scenarios will these behaviours occur?
- D is for Degree - To what degree will the learner be enabled? In other words, is there more of this to learn going forward?

- EXAMPLE: My students (A) will be able to write an argumented thesis (B) on their own without assistance from me (C) to an extent that they can create a five-page paper based on this thesis (D).

ANALYSE THE LEARNERS' NEEDS

- Learners' needs aren't simply their goals and aspirations for the future
- An analysis must be carried out to determine the needs of those from underprivileged backgrounds and those with physical and learning disabilities.
- Adult learners from these categories can feel left out and find the traditional means of learning difficult for a variety of reasons.
- Learning should be contextualised, multisensory, and experimental
- Those with disabilities - how their condition relates to their learning? Autistic students typically have deficits in executive functioning and struggle to relate to peers, and accept and use feedback and organisation.
- Differentiated instruction in a trial and error fashion – for autistic students

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APPROPRIATE TECHNOLOGY

- Learning management systems
- Social media platforms
- Online whiteboards
- Interactive slides etc.
- Technologies need to meet the needs of the learners and support the learning objectives
    - Do students have access to the devices necessary for your plans?
    - Do they all have adequate connections to the internet to carry these tasks out?

CREATE ENGAGING CONTENT

- Learners can quickly become disengaged if the content is dry or dull.
- Use multimedia resources such as videos, images, and audio to make the content more engaging.
- Use tools such as Moviemaker, Powerpoint or a video from Youtube to get your point across.
- Assign learners with a task of their own to share with the rest of the class. This will ensure that they are focused and have a goal to keep them motivated.

PROVIDE OPPORTUNITIES FOR INTERACTION

- Discussion forums, live chat sessions, and collaborative projects.
- Group project and collaborative activities
- Practical, hands-on experiments and projects.

ASSESS LEARNING OUTCOMES

- Important to assess whether the learners have achieved the learning objectives to be able to plan the next phase of their development.
- This can be done by giving the learners quizzes, assignments, or other forms of assessment to complete.
- End-of-lesson assessment – questions, student presentations

AISR RESOURCES

- FOR ENGLISH TEACHERS:
  - SpeLiN Mobile app for Android and iOS to practice American or British pronunciation, packed with practical daily situations
  - Numerous Lesson Plans
    - https://www.word-articulation-project-erasmus.com/outputs
  - GREAT Project, English teaching resources:
    - https://www.livebinders.com/play/play?id=2704167
- FOR STEM TEACHERS:
  - RoboCode course for secondary school teachers (suitable for complete beginners and more advanced coding practitioners)
    - http://robocodeproject.com/e-learn-it
  - PhysioFit Minecraft game and Lesson Plans to incorporate healthy living topics into your lessons.
    - https://www.physiofit-erasmus.com/outputs

AISR RESOURCES

- FOR STEM TEACHERS:
  - STEM Careers Guidance Videos and STEM Lesson Plans for primary and secondary schools:
    - https://improving-stem-education.eu/teaching-materials/
  - STEM Teacher training on 9 topics from coding, and delivering engaging STEM lessons to inquiry-based mobile learning and game creation:
    - https://e-learning.improving-stem-education.eu/
  - STEM Careers Advice with Augmented Reality App and Career personality Quiz:
    - CARES app for Android
    - CARES app for iOS

THANK YOU
ANY QUESTIONS?