

# Is it possible to develop a parsimonious approach to Design-aware Learning Analytics?

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# Outline

- How do we define a learning design for teachers to use?
  - What does it take to learn?
  - How can technologies help?
  - Is this a parsimonious account?
- What are the key features of a learning design?
- What counts as a good learning design?
- How can AI technologies help with learning analytics?

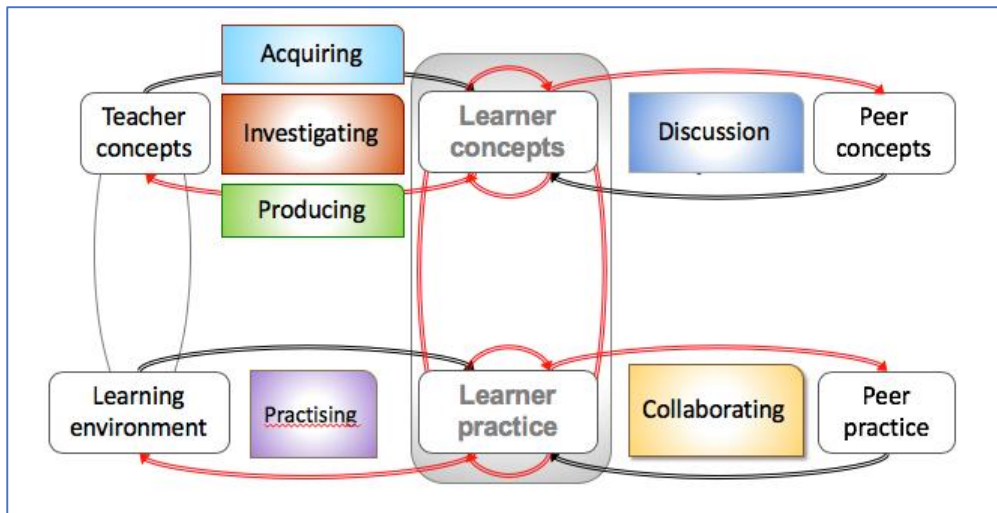


# What does it take to learn?

Derived from theories and research on learning and teaching

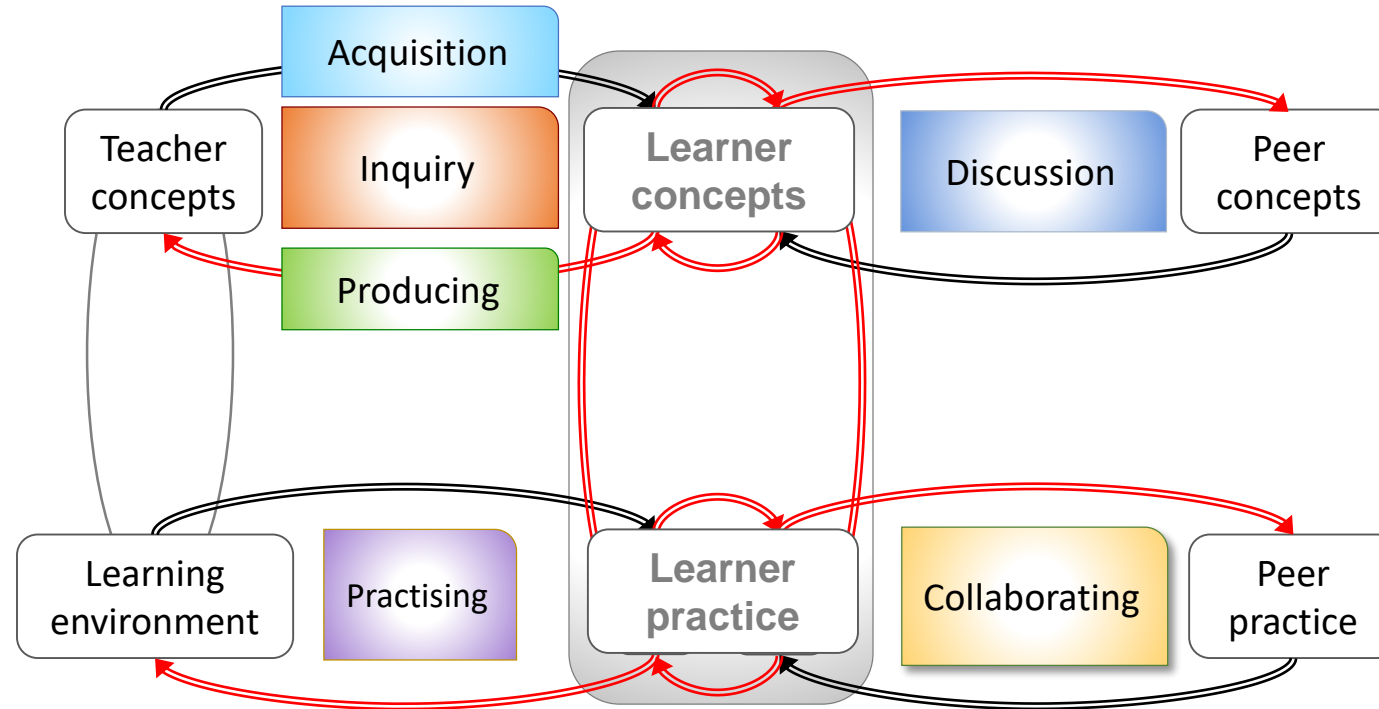
Represents the teaching-learning process as

- a series of iterative exchanges
- between learner and a 'teacher', and
- between a learner and their peers
- at two levels of concepts and practices
- in any context *(Laurillard, 2012)*



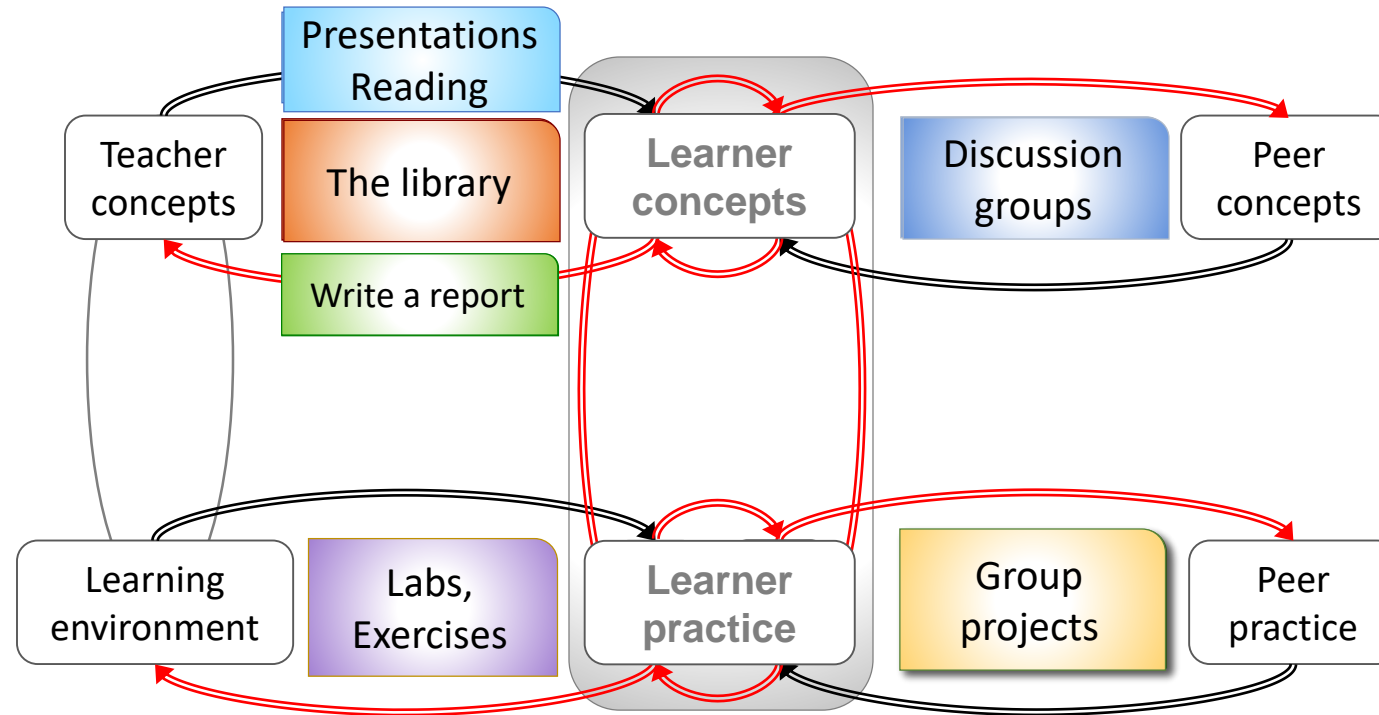
The Conversational Framework

# The Conversational Framework: What does it take to learn?



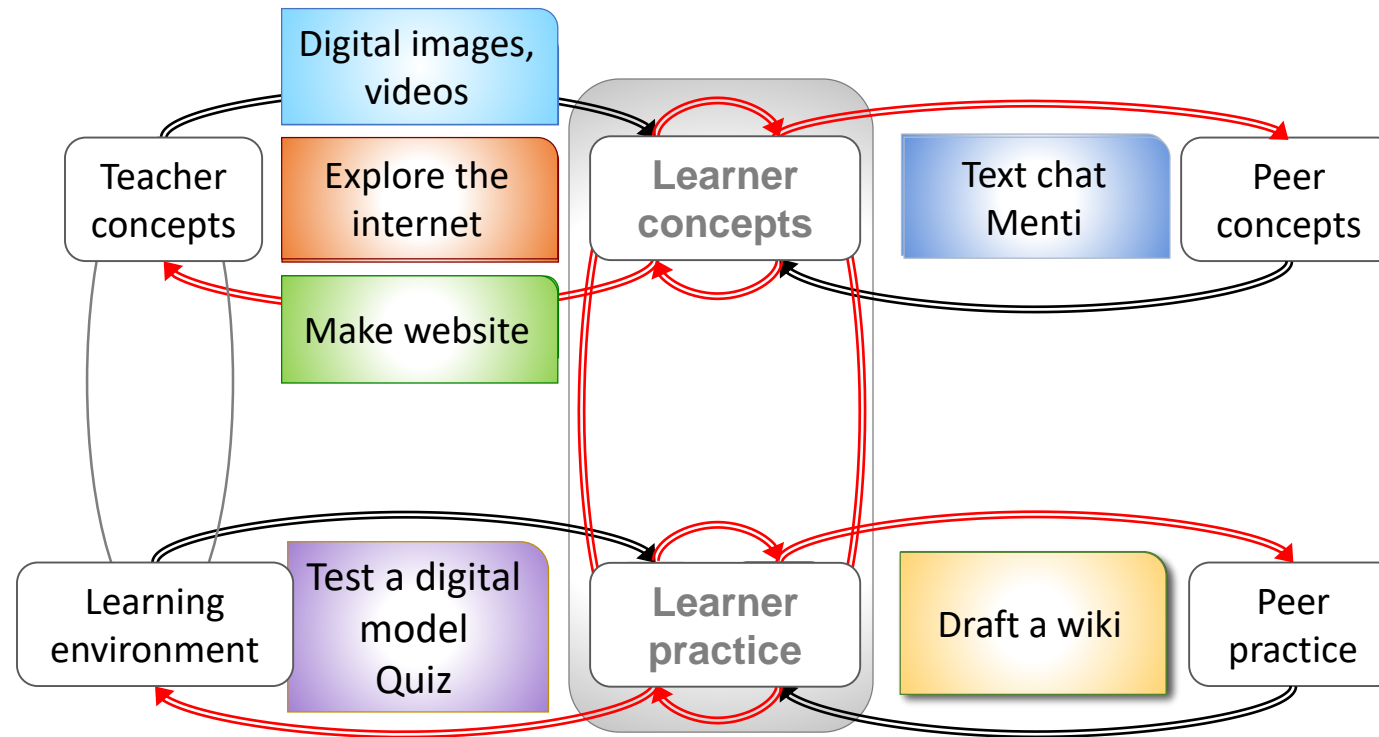
*Derived from educational research on how students learn: all these types of learning work together to complement and enhance each other*

# How do technologies help? Conventional methods



*These learning types are encouraged through a variety of conventional methods*

# How do technologies help? Digital methods



*The same learning types are encouraged also through a variety of digital methods*



How can digital technologies help to improve learning?

Learning through

- Acquisition
- Inquiry/Investigation
- Discussion
- Practice
- Collaboration
- Production



# Learning through acquisition

Digital methods can enhance the teacher's presentation, or the text, images, animation, as ways of improving explanations, situating ideas in context, clarifying relationships...

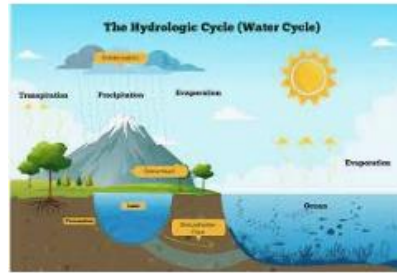


*[Source: NASA]*



# Learning through inquiry

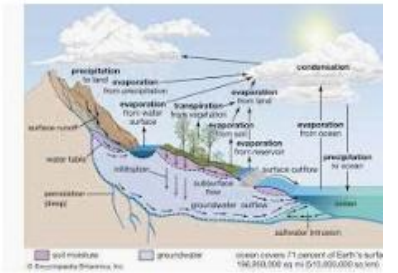
Alternative representations of scientific concepts images and animations assist understanding at any level – giving students agency to discover



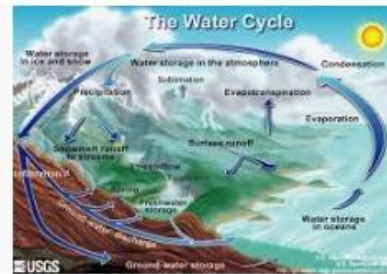
The Water Cycle - WorldAtlas  
worldatlas.com



The Water Cycle | Precipitation Education  
gpm.nasa.gov



water cycle | Definition, Steps ...  
britannica.com



The Water Cycle for Kids - How it Works ...  
sciencekids.co.nz



Water Cycle Diagram- A Demonstration ...  
youtube.com



The Hydrologic Cycle (Water Cy...  
h2odistributors.com



Why is the water cycle important ...  
icounteredu.com



65 Water Cycle Diagram Stock Photos ...  
istockphoto.com



The Water Cycle for Schools and Students  
water.usgs.gov

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# Learning through discussion

*Every* participant can respond to the question on a Menti site, for the presenter to talk through and give feedback

Join at [menti.com](https://menti.com) use code 6737 7224

What are the problems with using learning design to plan your course?

9 responses



I think it is worth if you deliver the same course more than once, and/or more teachers collaborate.

The time for planning and for evaluate the others teachers planning

The possibility of having mixed didactics at the same time

One of the huge problem is the workload for the teachers... learning design requires time, competences and energy

It takes time and motivation to have all involved teachers to learn the model and the tool

Right evaluation of time necessary to do activities of production, discussion, collaboration and investigation (as learning types)

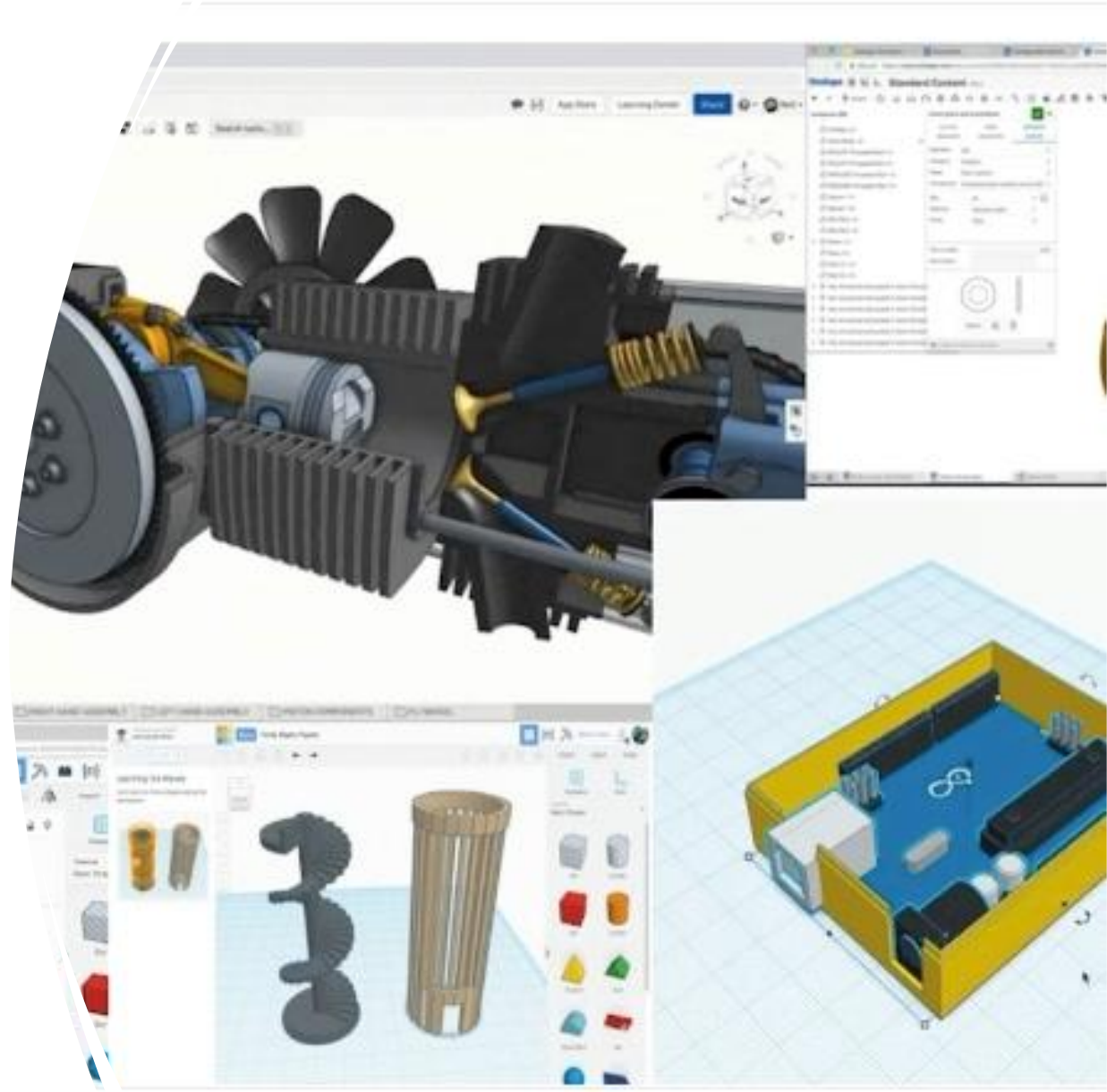
Involve students in asynchronous e-tivities

it is difficult to predict complex events that will take place in the future in such an analytical way. It would

In planning it is important to start thinking so that not only what to do (contents) but also the "mood" that

# Learning through practice

Digital models and  
simulations enable  
students to explore  
embodied concepts for  
'situated learning'

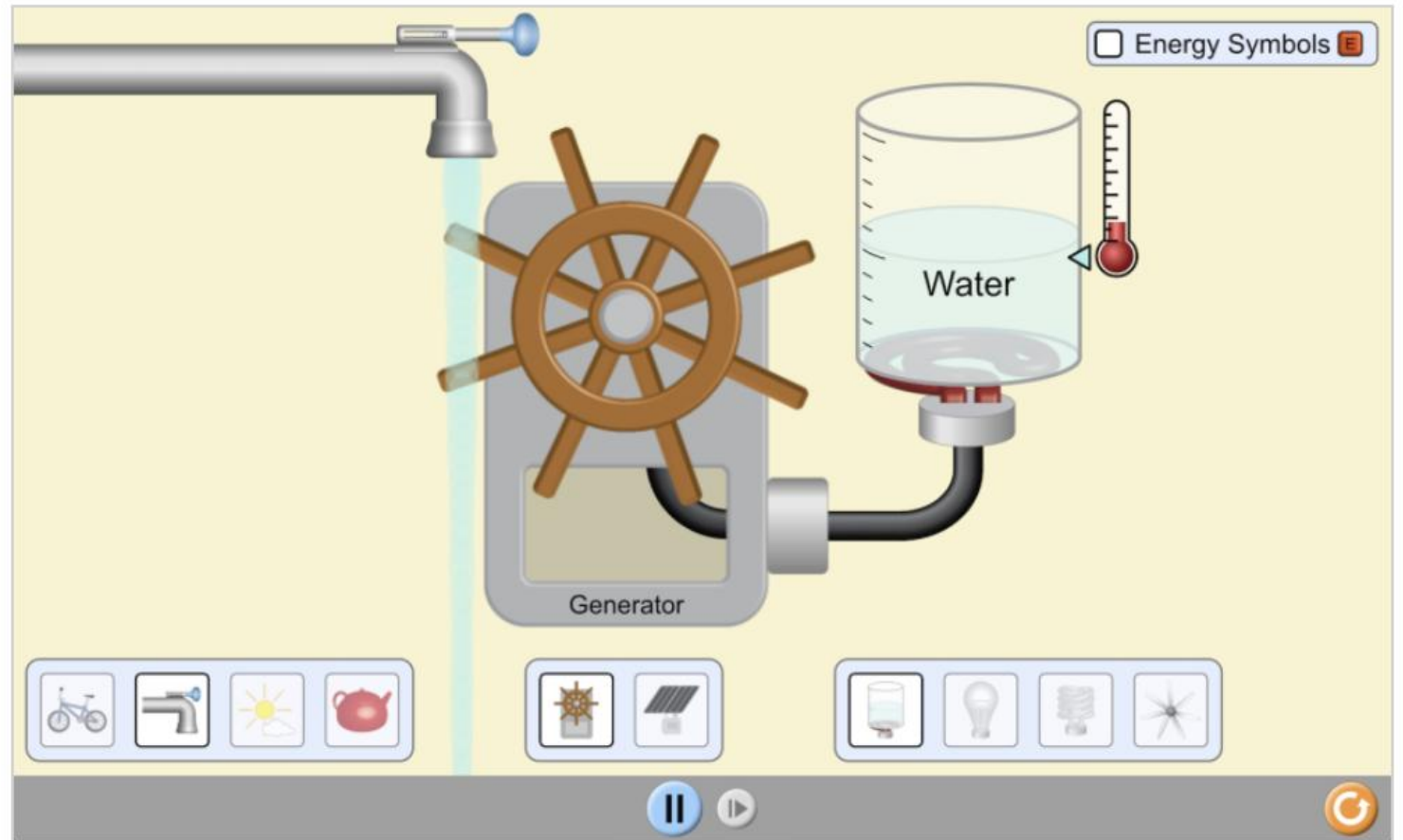


# Practice with meaningful feedback

A program is the ultimate digital model

Students interact with a model of a task or process, and see what happens as a result

## Energy Forms and Changes



Source: University of Colorado, Boulder



# Learning through collaboration

Students use a Padlet wall to collaborate by showing and commenting on what they have found on a topic – promoting constructivism

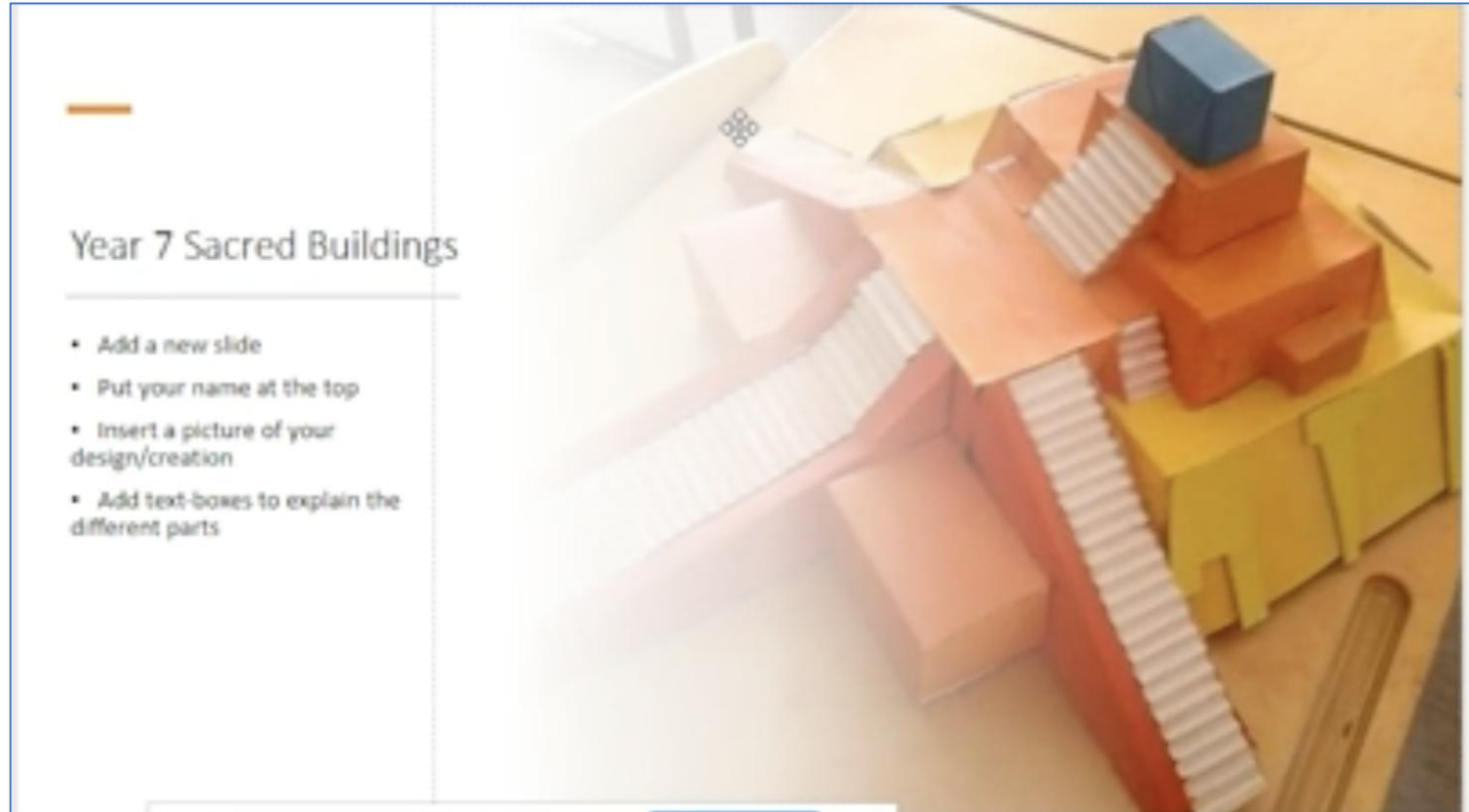
The collage features several key elements:

- Using Padlet as a tool whilst students are on placement:** A central text block explaining how Padlet enables students to post links, knowledge, and questions, and how it can be used for reflective practice.
- Hot topics:** A section discussing a single question posed to a discussion forum, designed as a challenge or conversation starter.
- Formative and Summative feedback Screencast:** A section describing the use of screencasting to record assignment briefs and feedback for students, noting its flexibility and the reduction of pressure.
- Can Edmodo suitable for use with Adults in the VET training/learning context or if not what is similar. I like the posts I**
- MonkeySurvey:** A section mentioning that MonkeySurvey was recommended.
- Using vialogue classroom:** A section mentioning the use of vialogue in the classroom.
- Bez tytułu 1:** A video titled 'Bez tytułu 1' (Documento ODT) from a padlet drive.
- Driving Test Pr:** A section titled 'Driving Test Pr' with a URL <http://www.driving1>.
- Take tests:** A section titled 'Take tests' discussing student autonomy and the use of study reference material for a Heavy Vehicle test.
- Outside\_the\_Box:** A video titled 'Outside\_the\_Box' (Video di 0:54) from a padlet drive.
- the guardian:** A screenshot of a Guardian article featuring a dish of food.
- Moodle:** A section titled 'Moodle' with text about going to feedback education.
- Certificate III CHC33015:** A screenshot of a certificate titled 'Certificate III CHC33015 in Individual Support' made with Charisma.
- Using voicethread:** A section titled 'Using voicethread' describing a screenshot of a tool used to help students think about 'learning theories' and 'how I learn'.
- Edmodo:** A screenshot of an Edmodo interface showing a 'Week 6 - Hot Topics' discussion.
- Padlet Wall:** A screenshot of a Padlet wall interface with various posts and comments.

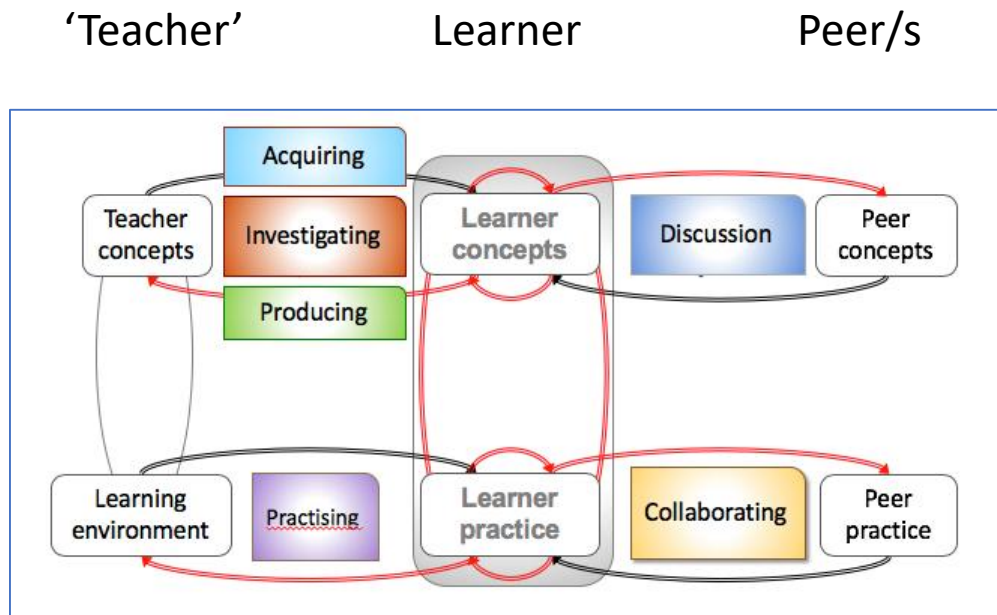
# Learning through production

Teachers' presenter tools also enable students to express what they know or have learned.

In this case their understanding of the features of sacred buildings, using ppt.



# Is this a 'parsimonious' account of the teaching-learning process?



The **Principle of Parsimony** says

“Entities should not be multiplied beyond necessity”  
(*Entia non sunt multiplicanda praeter necessitatem*,  
William of Occam, 14<sup>th</sup> C)

- Teacher, Learner, and Peers are all necessary
- The two levels of knowledge/action, or ideas/experience, or concepts/practice cannot be reduced
- The 6 types of learning could be reduced to 5 (collaboration is a combination of the other types).
  - Bloom was allowed 6 levels of learning outcome...
  - It is not necessary to increase the learning types



# What are the key features of a Learning Design?

## **The people**

- The 'teacher' or source of content
- The learner
- Their peers
- Their concepts and practices

## **The learning types**

- Acquisition
- Inquiry
- Discussion
- Practice
- Collaboration
- Production

## **Logistics**

- Duration
- Blended/Online
- Group sizes
- Teacher present/Not
- Use of internet
- Synch/Asynch
- Digital resources (content)

T designs learning types + logistics as the pedagogy.

The pedagogy describes what learners will DO to learn

Actions leave data for LAs

## **The pedagogy**

- Intended learning outcomes
- Sequence of TLAs (Learning types + Logistics)
- Guidance to learners
- Enabling the cycles of learning

# Designing activities for learning

## The Learning Designer

A free open online design tool to help with planning blended learning.

Based on the six learning types from the Conversational Framework – a model of what it takes to learn.

Supports teachers and educators to

- design a sequence of blended and online teaching and learning activities
- analyse their pedagogic design
- evaluate and reflect on how to optimise it

<https://www.ucl.ac.uk/learning-designer>

The screenshot displays the Learning Designer interface. At the top, a banner reads "Express the details of your pedagogy" with a "Learn more" button. Below this, three main sections are visible: "Adapt/Create", "Analyse/Review", and "Share/Publish", each with a brief description and a "View details" button. The main workspace shows a design for a wiki activity. The "Name" field contains "Which ICT tool? wiki activity", and the "Topic" is "Teacher education". The "Learning time" and "Designed learning time" are both set to 60 minutes, and the "Number of students" is 50. The "Description" field contains: "This activity is based on a learning design used by Tim Neumann at the IOE to introduce trainee teachers to". The "Aims" field contains: "To practice using a wiki for learning" and "To discuss a range of learning technologies and their uses for". The "Outcomes" field contains: "Construct a group wiki", "Compile a list of learning technologies and", "Apply peers' ideas to your own practice", and "Give feedback". A pie chart on the right shows the distribution of learning types: Production (33.33%), Create, and Discuss. The bottom of the interface features a navigation bar with "Home", "Browser", and "Designer" tabs, and a user profile for "Administrator". Below the navigation bar, there are buttons for "+ Add TLA", "New design", "Import design", "Export design", "Share", and "Save". The main workspace is divided into three panels, each with a title bar and a toolbar. The first panel is titled "Create a shared resource of learning technologies for education" and contains a "Produce" activity with a duration of 20 minutes and 1 student. The second panel is titled "Comment on others' contributions" and contains a "Discuss" activity with a duration of 20 minutes and 50 students. The third panel is titled "Create a folksonomy for the wiki contents" and contains a "Collaborate" activity with a duration of 20 minutes and 50 students.

# Building on what you and others know

Learning Designer Start Browser Designer en diana

**Timeline** Analysis

**Name** Copy of Sustainable development (classroom) **Mode of delivery** Classroom-based

**Topic** Reduce the use of plastics **Aims** Develop awareness among participating students about the amount of plastic they use on a daily basis, identify strategies that contribute to reducing "single-

**Learning time** 1 hours 0 minutes


**Designed time** 1 hours 0 minutes

**Size of class** 25

**Description** How can the use of plastics affect our region? And the planet?

**Outcomes +**

- Identify  
Able to identify different types of plastic and how
- Critique  
Able to critique the use of plastic
- Generate  
Able to generate ideas for using less plastic



+ Add TLA Expand notes

New design Import design Export this design Share Collaboration Save

Thinking about the use of plastics - in class

- Read Watch Listen 15 25
- Discuss 5 25
- Investigate 5 1
- Read Watch Listen 10 25

Improving our use of plastics - in class

- Collaborate 10 2
- Read Watch Listen 5 25
- Collaborate 5 3
- Read Watch Listen 5 25

After the class...

- Produce Mir Size

# Articulating your learning design ideas

The image displays two side-by-side screenshots of a learning management system (LMS) interface, likely Canvas LMS, showing lesson plans for a unit on plastics. Each screenshot represents a different lesson or activity within the unit.

**Left Screenshot: "Thinking about the use of plastics - in class"**

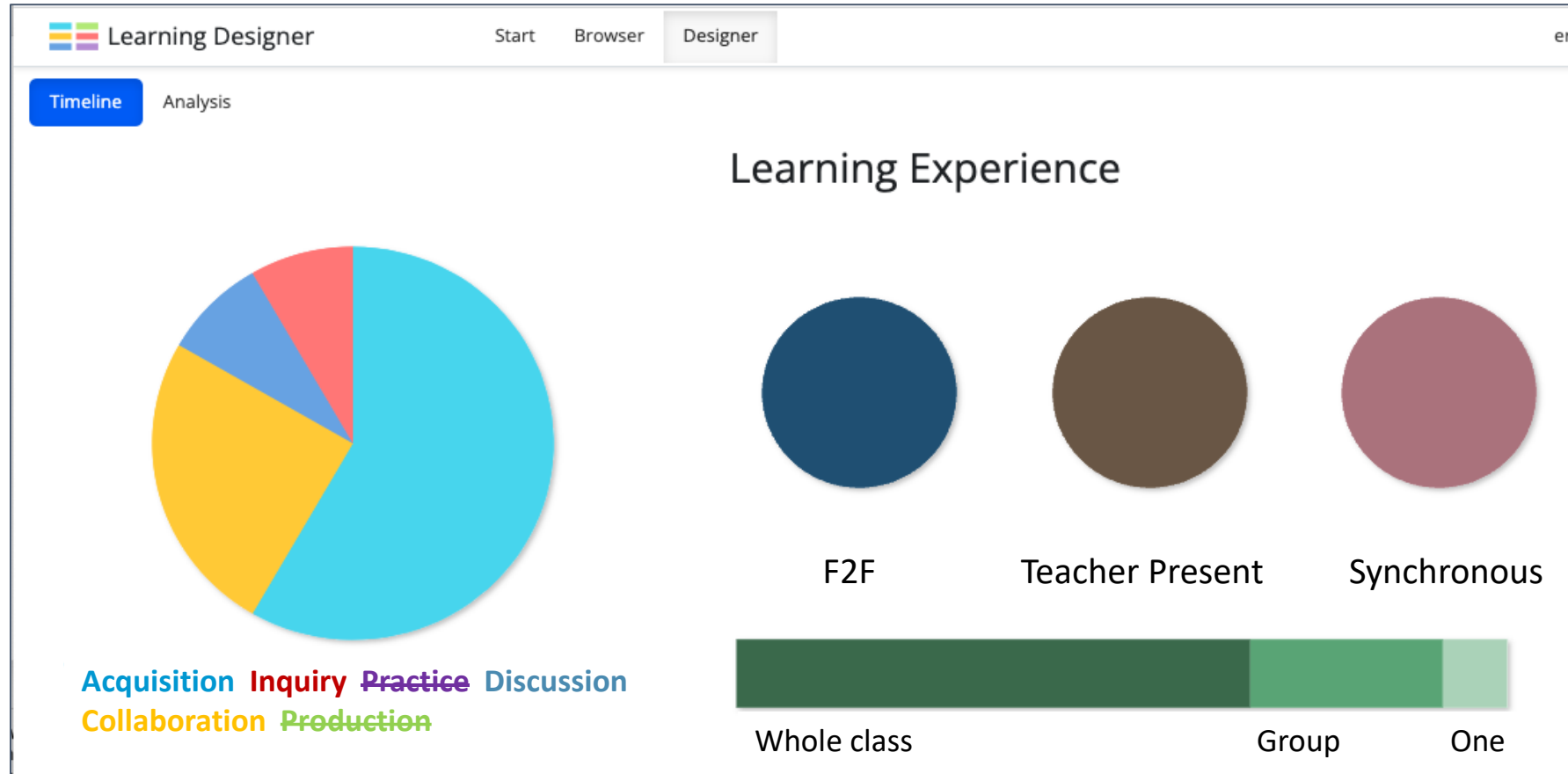
- Activity 1:** "Read Watch Listen" (15 minutes, 25 students). Instruction: "Watch the teacher's presentation about the use of plastics and make notes on what questions you have."
- Activity 2:** "Discuss" (5 minutes, 25 students). Instruction: "Ask any questions you have about what the teacher presented"
- Activity 3:** "Investigate" (5 minutes, 1 student). Instruction: "Now 'inspect yourself' - make a list of the different types of plastic you carry with you: clothing, books, mobile devices, utensils used for lunch and their packaging. The teacher will be looking at the lists you are all making."
- Activity 4:** "Read Watch Listen" (10 minutes, 25 students). Instruction: "Watch the teacher's explanation of how we can replace some of the types of plastic the class has listed with alternative materials or practices."

**Right Screenshot: "Improving our use of plastics - in class"**

- Activity 1:** "Collaborate" (10 minutes, 2 students). Instruction: "With your partner look at the list of the items you both identified and discuss which ones could be recycled or replaced or reused. The teacher will be looking at the ideas you are all suggesting"
- Activity 2:** "Read Watch Listen" (5 minutes, 25 students). Instruction: "Listen as the teacher comments on some of the ideas that you and the other groups have suggested."
- Activity 3:** "Collaborate" (5 minutes, 3 students). Instruction: "In your group, think about 'what can we do better?' Think of three ways that you, your classroom or the school can reduce the use of plastics and increase the practice of recycling. You can include things you use at home. Make notes of your ideas. The teacher will be looking at the notes you are all making. Discuss in your group any points you want to make in the final discussion. Are there any you would not like to take part in?"
- Activity 4:** "Read Watch Listen" (5 minutes, 25 students). Instruction: "Listen to the teacher's summary of what we learned from this session."

Both screenshots show a consistent interface with activity type dropdowns, duration and student count indicators, and instructional text boxes. The bottom of each window features a summary bar with "Add Learning Type", a total duration (35 for the left, 25 for the right), and a "Notes" button.

# Analyzing a learning design/redesign



There are no rules about what this analysis should be  
Just consider if that looks appropriate for your class

# Optimizing digital methods for learning - data for LAs

The screenshot displays a learning management system interface for a session titled "Scheduled session: Planning for designing a poster". The session is divided into three main sections: "Practice", "Collaborate", and "Follow-up".

- Practice:** Includes a task to "Produce" a draft plan and a "Practice" task to read feedback and revise the draft.
- Collaborate:** A task to "Collaborate" in groups of six, discussing ideas and writing on a Googledoc.
- Follow-up:** A task to "Produce" a draft plan and a "Practice" task to read feedback and revise the draft.

Three "Resources linked" pop-ups are overlaid on the interface, each listing a resource and an "OK" button:

- Pop-up 1: "Resources linked" with the resource "Googledoc to collect ideas".
- Pop-up 2: "Resources linked" with the resource "Group forums on Moodle".
- Pop-up 3: "Resources linked" with the resource "Link to a Miro Board for each group".

## Digital tools

For a session on 'learning how to design a digital poster' this teacher has used 3 different online tools for Discussion and Collaboration

## Data traces

Googledoc – text  
Miro Board – text, structures, relations  
Forums - text



# Learning design: Enabling teachers to innovate together



Designing activities for learning

Building on what you and others know

Articulating what students DO

Analyzing the learning design

Optimizing digital methods for learning

Evaluating the learning design

Sharing learning designs



# Evaluating a learning design – by students

The screenshot displays a learning management system interface with a course schedule and student feedback notes.

**Course Schedule:**

- Before the scheduled session: Watching cricket – learning through watching**
  - Activity: Read Watch Listen (10 min, 1 person)
  - Task: Watch an over of Test cricket. Turn the commentary off! It's fun, but try watching and deciding for yourself what is going on. England vs. Australia, Investec Test series 2013, 1st Test, Day
  - Activity: Investigate (10 min, 1 person)
  - Task: Really watch — what does the batter do with each ball? How do
- Scheduled session: What's going on out there – presentation of analyses**
  - Activity: Discuss (20 min, 16 people)
  - Task: Present report and discuss with peers & coach. 4x5 minute presentations
  - Activity: Read Watch Listen (10 min, 16 people)
  - Task: Coach's View – coach to present his own analysis
  - Activity: Discuss (10 min, 16 people)

**Student Feedback Notes:**

- Notes 85:**
  - Loved the investigate activity but spent much more than 10 minutes on it!
  - Only one person turned up to collaborate but it was ok.
- Notes 40:**
  - The discuss part was too hurried, trying to keep to time.
  - We didn't get to discuss some of the issues that came up in the final session – we could have shared answers on Menti like we did before?

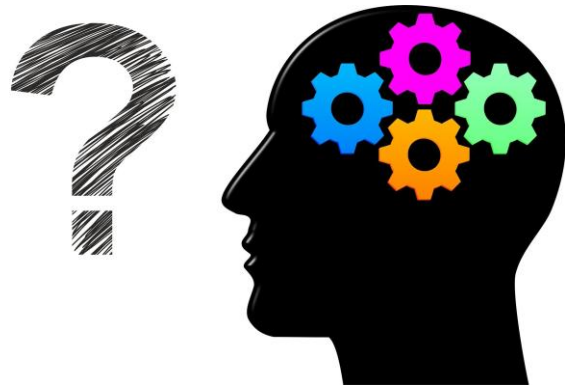
## Student evaluation

Share your design post hoc with students.

Invite them to comment in the Notes.

Collect their comments in a Google Doc.

# For useful Learning Analytics, we need to know: What makes a good learning design? Our rubric... Do LAs help?



1. Clear learning outcomes
2. Appropriate use of pedagogic choices
3. Sufficient guidance in text for students to follow
4. Use of digital resources
5. Balance of learning types
6. Appropriate time allocation for learning activities
7. Meaningful feedback to students
8. Alignment between intended outcomes, activities, and assessable actions by students

Resources used  
Amount of use  
Number of posts

# What makes a good Learning Design? Could LAs help?

## Rubric for self/peer/expert review

- √ 1. Clear learning outcomes
2. Appropriate use of pedagogic choices
3. Sufficient guidance in text for students to follow
- √ 4. Use of digital resources
5. Balance of learning types
6. Appropriate time allocation for learning activities
- √ 7. **Meaningful feedback to students**
- √ 8. Alignment between intended outcomes, activities, and assessable actions by students

## Potential Learning Analytics for auto review

1. Analyse outcomes against Bloom keywords?
2. Too hard?
3. Too hard?
4. Check how they are used; advise on alternatives?
5. Not much to add to pie chart? No rules
6. Too hard? (even for humans)
7. **Advice and analysis could be done**
8. Could analyse words in text to suggest advice

## Forms of feedback to students – How could AI help?

<b>Forms of feedback/assessment</b>	<b>Design-Generated Learning Process Analytics</b>
Self-assessment against a model answer text	AI could compare and advise?
Peer review of text/digital design vs rubric	ChatGPT could offer extra feedback on text in terms of rubric
Teacher feedback on text/digital design	ChatGPT could offer extra feedback on text in terms of rubric
Digital tool/model/environment response	Intrinsic feedback from tool; AI could offer additional interpretation in terms of output?
Automated feedback	AI could analyse student outputs against the set goal to advise on gaps? misconceptions?

## A parsimonious approach to Design-aware Learning Analytics?

- We can define a parsimonious approach to learning design in terms of the 6 learning types, and the key pedagogical features of a good design
  - The Learning Designer supports the development of good learning designs, based on the Conversational Framework and logistic and pedagogic features
- AI could develop support for a parsimonious approach as Design-**Generated** Learning **Process** Analytics for some aspects of the teaching-learning process

