



Κύκλος διαλέξεων του Μεταπτυχιακού προγράμματος
“Ψηφιακός Μετασχηματισμός και Εκπαιδευτική Πράξη”, 23/06/2021

Designing Digital Tools for Learning Design

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Outline

- Learning design and digital tools
- Challenges/open problems
- Understanding LD practice
- Initial findings
- Summary
- Concluding remarks

Learning design and digital tools

**DESIGN for
LEARNING is
IMPORTANT**



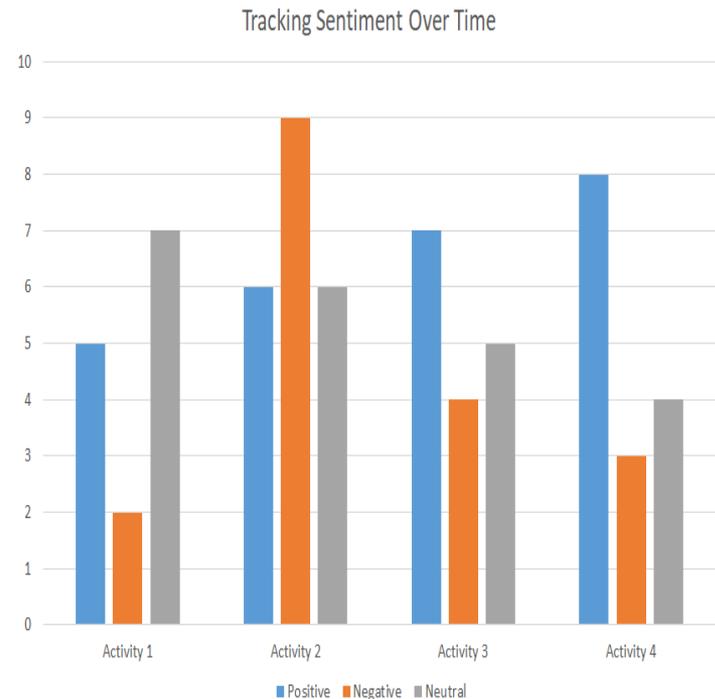
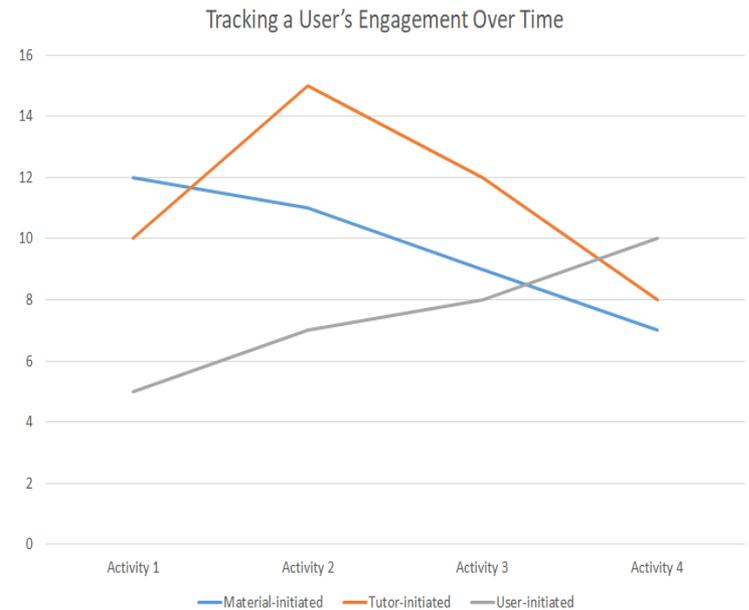
Quality Assurance Agency (QAA) in 2016 : “learning design – the quality of teaching materials, assessment strategies and workload – offers the most significant contribution to overall student satisfaction” (www.qaa.ac.uk).

Studies by Stanford University (Kizilcec et al., 2013) and Open University (Ferguson & Clow, 2015) showed ***that learners’ engagement depends on the pedagogical strategies of the course.***

Wells, Wollenschlaeger, Lefevre and Magoulas, Poulouvassilis (2016) Analysing engagement in an online management programme and implications for course design. *LAK '16*

Data analysis

- Engagement events may be:
 - Material-initiated (events that result from prompts within course materials, e.g. quizzes, polls, open discussions)
 - Tutor-initiated (replies to forum discussion topics initiated by course tutors)
 - User-initiated (forum discussion topics initiated by individual users)
- Analyse participants' individual and collaborative reflections as they progress through the course
 - *Sentiment analysis* techniques based on natural language processing, sentiment lexicons, and probabilistic reasoning, can be used to detect expressions of positive/negative/neutral sentiments towards the course content



Learning design and digital tools

Map My Programme

CADMOS

LD SHAKE

PPC Designer

Compendium

cloudworks

CopperCore

Glue!ps

College

LAMS FOUNDATION

myCALS

ReCourse
Learning Design Editor

LAMS activity planner

Selection of OULDI tools

OpenGLM

ScenEdit

Learning Design Studio

GLO Maker
Generative Learning Object Maker

LD Learning Designer

HEART

LAMS LAMS v2.0

ReMath

LDTool

DIALOGPLUS

MOT+

Phoebe
Pedagogic planner

Laurillard's Conversational Framework

Learning Content

Learning Subjects

Learning Technology

Design Inquiry of Learning

Success Factors for TEL Models

Best Practice Principles for e-Learning

Student Situations

Celik, D.; Magoulas, G. D. (2016). A Review, Timeline, and Categorization of Learning Design Tools.

Attempts to organize and evaluate LD tools

- Britain: **authoring environments, run-time environments, and integrated environments**
 - (2004): *A Review of Learning Design: Concept, Specifications and Tools*. A report for the JISC E-learning Pedagogy Programme.
 - (2007): *Learning design systems: current and future developments*.
- Conole: **visualisation tools, pedagogical planners, generic tools, and learning design resources**
 - (2008): *Tools and Resources to Guide Practice*.
- Persico and Pozzi: **based on functionality into reflection tools and pedagogical planners, authoring and sharing tools, repositories, and delivery tools**
 - (2015): *Informing Learning Design with Learning Analytics to improve Teacher Inquiry*

(2016): A Review, Timeline, and Categorization of Learning Design Tools

An approach that is based on a reconceptualization of the framework proposed by Britain

| | |
|-------------------------------|----------------------|
| GENERAL PROPERTIES | Scope |
| | Release date |
| | Target users |
| | Export/Import |
| | VLEs |

| | |
|----------------------------|---------------------------|
| LEARNING DESIGN | Design language |
| | Activity model |
| | Workflow model |
| | Learning analytics |

| | |
|------------------|-------------------------------|
| TECHNICAL | Form of software |
| | User interface |
| | Technical requirements |

Multi-dimensional framework

| GENERAL PROPERTIES | LEARNING DESIGN | TECHNICAL |
|---|--|--|
| Scope: What is the main function of the tool? | Design language: What notation language does the tool use? | Form of software: What is the form of the software of the tool? |
| Release date: What is the release date of the tool. Does the tool still exist? | Activity model: How does the tool illustrate activities? | User interface: What does the tool present in terms of user interface? |
| Target users: Who is the system for? | Workflow model: What is the model used in the representation of the LD flow? | Technical needs: Does the tool have any technical requirement or additional software to run the application? |
| Export & Import: Can the tool import and export of LDs into other file formats? | Learning analytics: Does the tool have any functionality regarding learning analytics? | |
| VLEs: Can the tool deploy LDs into Virtual Learning Environments? | | |

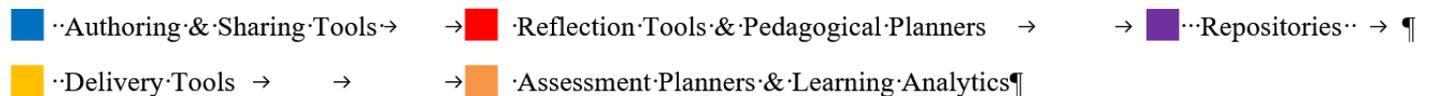
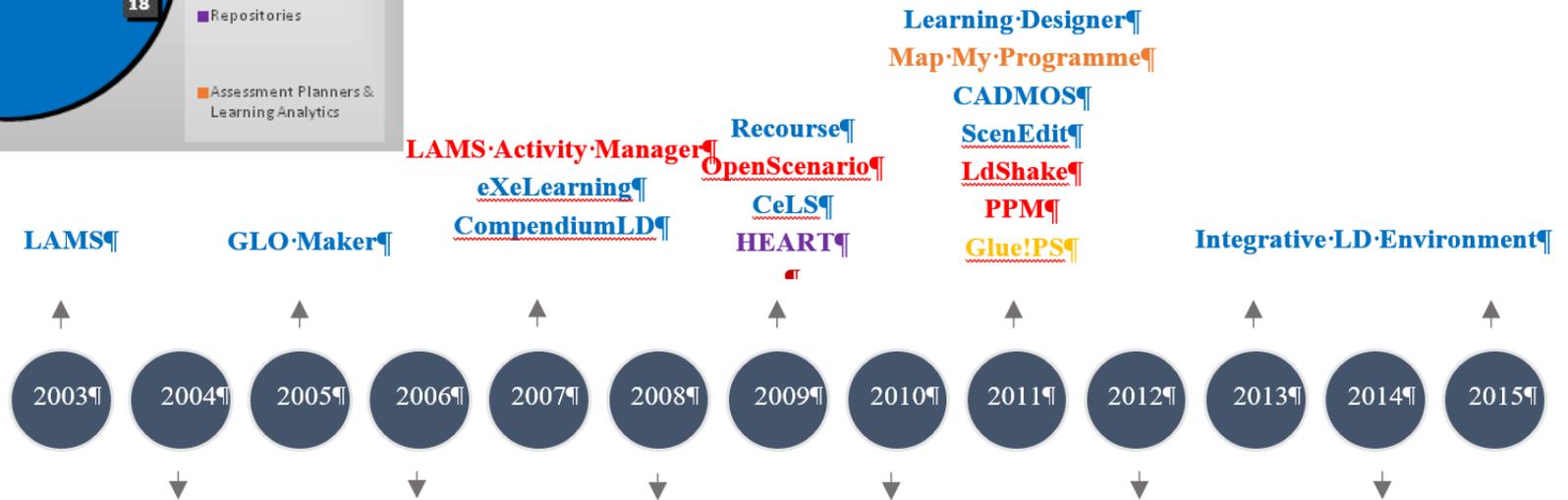
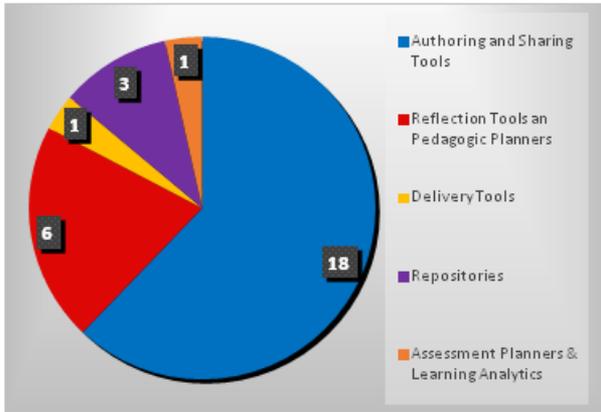
Learning design and digital tools

Authoring and sharing tools

| | ILDE | HKU LD Studio | Learning Designer | GLO Maker | <u>CeLS</u> | Web Collage | Dialog PLUS | MOT+ |
|----------------------------|---|--|---|----------------------|----------------------------|--------------------------------|----------------------|----------------------|
| Scope | Authoring, sharing, editing, exploring | Authoring (For self-directed activities) | Authoring (create, share, edit and reuse) | Authoring | Create and re-use activity | Authoring tool (pattern-based) | Authoring tool | Authoring tool |
| Release date | 2012– still running | 2013 – still running | 2011 – still running | 2006 – Not available | 2009 – still running | 2006 – still running | 2006 – Not available | 2008 – Not available |
| Target users | Teachers | Teachers | Teachers, | Teacher-designers | Teachers and researchers | K-12 teachers | Teachers | Teachers |
| Export & Import | | JSON file. | MS Word, shared as an URL | N/A | XML-based model | IMS LD (A level) | IMS LD | IMS LD |
| Deploy into VLEs | Moodle, SCORM, <u>metisVLE</u> , <u>MediaWiki</u> | N/A | N/A | N/A | N/A | LAMS, Moodle | N/A | LAMS, Moodle |

GENERAL PROPERTIES

Categorisation of tools



Reflection tools and pedagogical planners

| | PPC | PHOEBE | LdShake | OpenScenario | Lams AP | PPM | |
|---------------------------|----------------------------|-------------------------------|---------------------------------|--------------------------------|---|----------------------------|---|
| GENERAL PROPERTIES | Scope | Pedagogical Pattern Collector | Pedagogic planner | Social network oriented tool | Scenario-based tool | Create learning activities | Pedagogic planning of LDs |
| | Release date | 2011 – still running | 2006 – Not available | 2011 – still running | 2009 – Not available | 2007 – still running | 2010 – still running |
| | Target users | Teachers | Teachers | Teachers | Teachers | Teachers | Teachers |
| | Export & Import | N/A | N/A | N/A | N/A | N/A | N/A |
| | Deploy into VLEs | N/A | N/A | N/A | N/A | Moodle | N/A |
| LEARNING DESIGN | Design language | Pattern-based | Wiki-based, and set of resource | Various pedagogical approaches | Scenario-based design | Sequential | Hierarchical entities |
| | Activity model | Cognitive model | Sequence structures | 4SPPIces Model | Scenario-based model | Sequential | Pedagogical Hierarchy |
| | Workflow model | Cognitive model | Sequence structures | 4SPPIces Model | Organization, learning, observation, evaluation | Sequential | Pedagogical Hierarchy |
| | Learning analytics | N/A | Assessment and activities | N/A | N/A | N/A | N/A |
| TECHNICAL | Form of software | Web-based | Web-based | Web and desktop based | Web-based | Web-based | Web-based |
| | User interface | Browser, designer, abstractor | N/A | N/A | Flexible | N/A | Hierarchy Manager, Field Sector Data Area |
| | Technical needs | N/A | N/A | N/A | N/A | Flash Player | N/A |

Learning design and digital tools

Constructivism

The 4SPPIces model

The 4Ts

The Conversational Framework

3P

The e-Design Template

Constructive Alignment

The Design Principles Database

Design Narrative Approach

The 7Cs of LD Framework

ISiS

Quality Matters

3E

Connectivism

The Learning Ecosystem Model

The Learning Designer: Building Community Knowledge

Helps you with

- Developing new teachers and CPD
- Managing the Key Information Set
- Doing more with existing resources
- Complementing the value of OERs
- Promoting reflection
- Encouraging creativity and innovation

By delivering

- Explicit pedagogical value in designs
- Awareness of pedagogy in design tools
- Research impact on learning design practice
- Usable and re-usable learning design pattern
- Advanced visualisation of designs.

Resulting in

- Knowledge building of shareable learning design artefacts
- A world wide community

- Over thousand international members of the Learning Designer Community
- Over 13 thousand active users of the tool
- Over 5000 shared designs
- The tools and designs are embedded as part of international teaching and learning

I think that is very useful to see what someone else has done... that's an idea I hadn't got in my course"

2011: Java-based desktop tool enabling a Semantic Web3.0 Learning Design Space for teachers
<https://sites.google.com/a/kl.ac.uk/ldse>

2014: Web-based version providing an easy way to share designs
<http://learningdesigner.org/index.php>

Analysis of the learning experience updating as you design

Recommends adapting the design

Offers an existing learning design

Calculates the designed learning time as you design

Gives an analysis of the learning experience you have designed

The teacher creates a link to a useful resource for students to work with

Edits the text, duration, group size, etc

Exports for students and other teachers

2014: CRAM (Course Resource Appraisal Module)
<http://web.lkldev.ioe.ac.uk/cram/index.html>

How many hours per week?

Does it all have to be done by the higher cost staff?

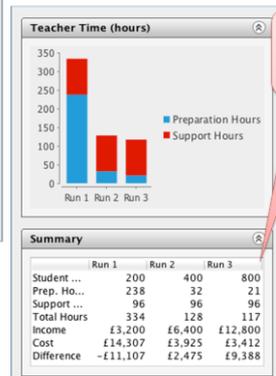
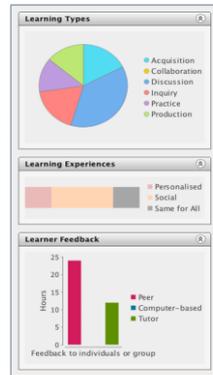
How long to prepare?

How long to teach?

Pie chart shows proportion of learning types in the selected activity

What is CRAM?

A tool to analyse the learning benefits and teaching costs of transferring traditional teaching models online



Break-even by Run 3 on these assumptions

Building and sharing knowledge through peer review

Change the name of the design by adding "Review of" at the beginning

As you read through each TLA you can comment in the Notes section at the bottom.

To leave feedback overall, Add a new TLA, make its title "Review by [your name]"

You can select 'Discuss' for the activity, and then type in your feedback to note:

- 1 Test? - is there a 'Produce' activity, or some way the teacher can use to test whether outcomes are met?
- 2 Aligned? - are outcome, activities, and produce activity aligned?
- 3 Feedback? - is there feedback from the teacher, other students, or the technology?
- 4 Technology? - is there good use of technology?
- 5 Other?

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International Community and International Challenges
<https://buildingcommunityknowledge.wordpress.com>
<http://www.coursesites.com/s/LDC>

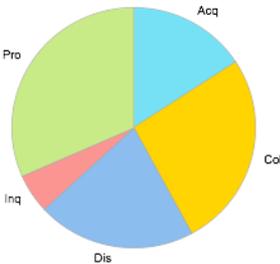
Example of module design in LDer

LD Learning Designer Home Browser **Designer** 🔧 👤 diana

Curated design: Explaining a complex concept (water cycle)

Name Curated design: Explaining a complex
Topic The water cycle
Learning time 190 minutes
Designed learning t... 190 minutes
Number of students 30
Description The idea is that for students to understand a system they should be able to explain the role of the critical

Aims Students able to give an account of the water cycle
Outcomes Explain
To be able to explain the role of the



+ Add TLA

New design Import design Export design Share Save

Revise your understanding of the system or the process
Read Watch Listen 30 1 0 +
Work through 'water cycle' video to ensure you understand the role of the critical factors in the water cycle, and feel ready to explain it to others.

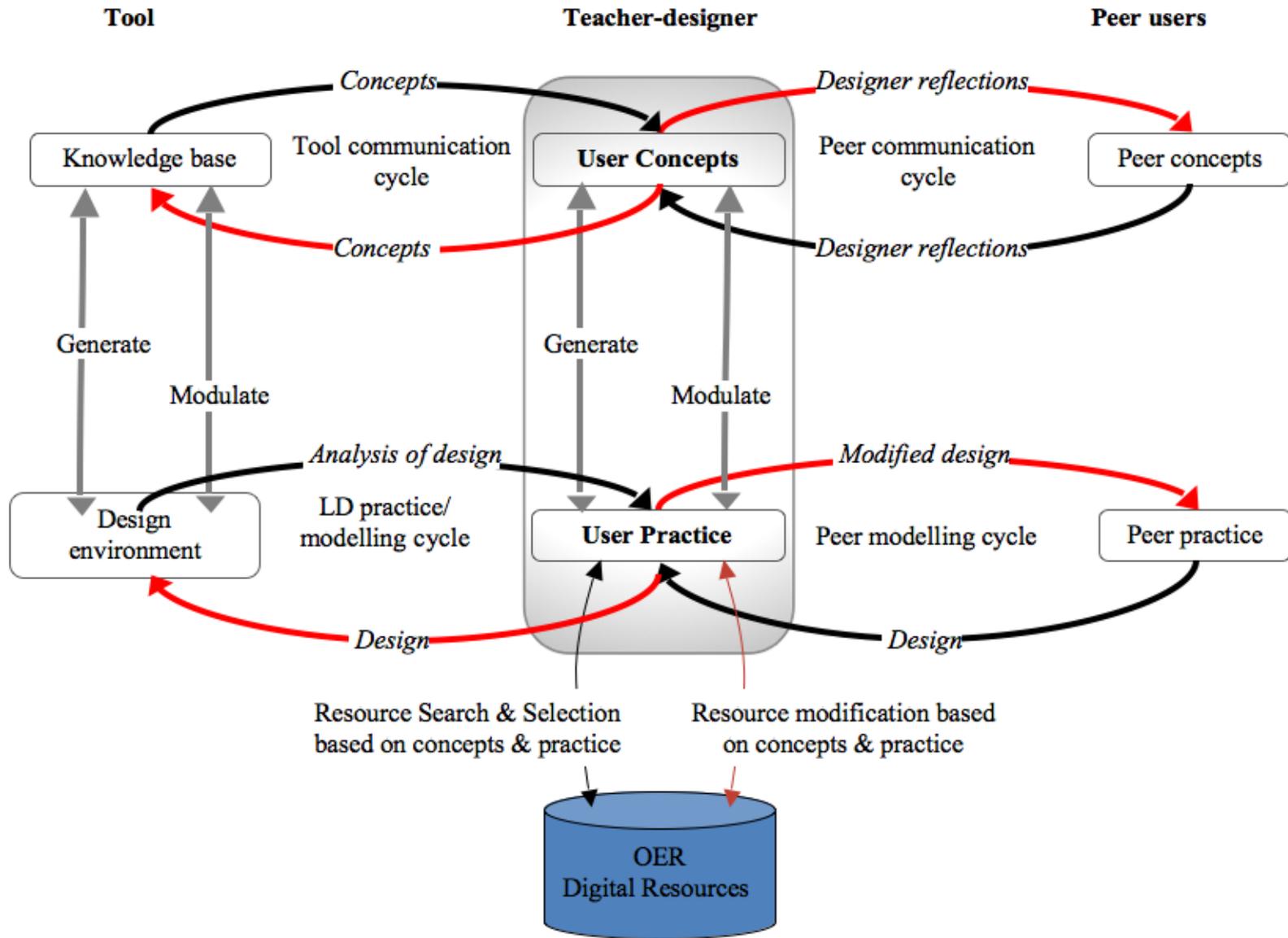
Produce 20 1 0 +
Prepare your own animation describing the water cycle, focusing in particular on what you feel are the critical factors, and the role they play. Explain just the basics, as if to

Investigate 10 1 0 +
Use the 'water cycle' video to check that you have done a good description that covers all the critical factors.

Collaborate to produce an agreed account
Collaborate 20 3 0 +
Share your animation with the other members of your group, and look through what they provide to you, noting any similarities and differences, preparing the questions you

Discuss 20 3 0 +
Discuss the similarities and differences in the animations you and your peers have produced, to see if you can agree on a best approach

Embedding the Learning Designer into the learning design process



Challenges/open problems

- None of these LD tools/frameworks has emerged as de facto standard
- No agreed common language used among the tools so far
- Lack of convergence and proliferation of new LD approaches inevitably leads to fragmentation of the field
- Widely acknowledged difficulties in capturing and representing LD practices' complexity in the tools (Bennett, Agostinho, & Lockyer, 2014; Persico & Pozzi, 2015).
- HE context: studies (Prieto et al., 2014; Bennett et al., 2011; Charlton et al., 2009) did not consider the complex socio-material environment but were mainly human-centric.

Understanding LD practice

Explore the factors that prevent the use of these digital tools in lecturers' learning design practice and influence their adoption in educational organisations through the lens of **socio-materiality**.

Aim:

Develop an enhanced conceptual understanding of factors influencing LD tools adoption and embedding in educational organisations, and of the requirements for these tools.

Develop a new conceptual model for the design of the next generation of LD tools.

Sociomaterial theory

Socio-materiality considers that social and material are constitutively entangled in everyday life.

LD practices are bound up with materiality in a sophisticated manner, and this relationship is inadequately reflected, or sometimes not reflected at all, in empirical studies.

1. What are the human and non-human actors involved in the LD practice of HE lecturers?
2. What are the entangled relations of these actors in the LD practice of HE lecturers?
3. What boundaries or networks are created when human and non-human elements are enacted in the LD practice of HE lecturers? What do these boundaries or networks tell us?
4. How do existing LD approaches, conceptual models or frameworks, and LD tools align with LD practices?

Understanding LD practice

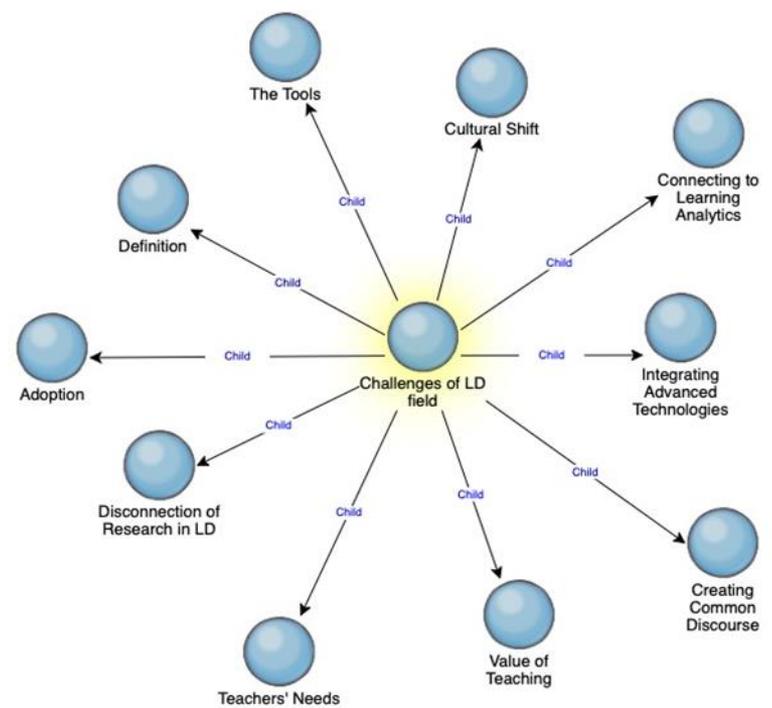
- Interviews (60 - 120 min) : 10 experts, from five countries, with established expertise in learning design (10+ years) who are also HE lecturers and had designed their own courses.
- Survey: 110 lectures (10+ years avg. LD experience), 27 countries
- Creswell (2014)'s qualitative data analysis steps : preparing the data for analysis, reading all the data, start coding, using coding to generate description, advancing how the themes will be presented, and interpretation.

Analysis

Tesch's (1990) eight steps procedure for coding to analyse the LD field from the experts' or HE lectures' perspective

The screenshot displays the NVIVO software interface. The left sidebar contains navigation options: **IMPORT** (Data, Files, File Classifications, Externals), **ORGANIZE** (Coding, Codes, Cases, Case Classifications, Notes, Memos, Annotations, Memo Links), **Sets** (Static Sets), and **EXPLORE** (Queries, Query Criteria, Query Results, Coding Matrices). The main window shows the 'Explore' tab with a toolbar for 'Last Run Query', 'Text Search', 'Word Frequency', 'Matrix Coding Query', 'Queries', 'Chart', 'Hierarchy Chart', 'Maps', and 'Diagrams'. Below the toolbar, the 'Themes' section is active, showing a hierarchical diagram. The root node is a blue circle labeled 'Themes'. It branches into five nodes: 1. A purple box: 'What LD tools did you use and what are the things you like about it?'. 2. A red box: 'What LD tools did you use and what challenges do you face when you design learning using these tools?'. 3. A purple box: 'How Learning Design should be presented in online learning design environments?'. 4. A purple box: 'What challenges do you see in the Learning Design field?'. 5. A red box: 'What could be the future direction of the Learning Design field?'. Further sub-nodes are shown below: 'Pros and Cons of LD tools' (red box) is connected to the first two nodes; 'How to present Learning Design' (purple box) is connected to the third node; and 'Challenges and Future of LD Field' (purple box) is connected to the fourth and fifth nodes. A 'Maps List' button is visible at the bottom left of the main window.

Example: Challenges of LD Field based on analysis of LD expert's data



Relevant texts about “Teachers’ needs”

The screenshot displays a software interface for analyzing text. On the left is a navigation pane with categories: DATA, CASES, NOTES, SEARCH, and MAPS. The 'Learning Design Field' is expanded to show 'Challenges of LD field', which includes 'Teachers' Needs'. The central pane shows the text for 'Teachers' Needs' with two references highlighted. The right pane shows a coding density bar with labels E10, E4, and E7.

Teachers' Needs

Summary Reference

You are asking the questions that we are asking to find out what it is that teachers do across schools and higher education.

Files\E4
1 reference coded, 3.77% coverage

Reference 1: 3.77% coverage

The future directions. I think that there need to be more works with teachers to try to understanding the needs of teachers and how this can be totally integrated in their current practices. They already do learning design in their own way so we need to see how we are doing and really allowing them to continue what they do. So, this one is one thing. We need to work more work with the practitioners in a long-term basis. This is one thing.

Files\E7
2 references coded, 3.86% coverage

Reference 1: 1.11% coverage

Once is how it connects with every day practice and, in the sense of theoretically or idealistic or in a utopian universe.

Reference 2: 2.75% coverage

The proposal that come from The Learning Designer can seem valuable. But then, the practical connection with the every day activities that lecture has sometimes is a

Q8. What challenges do you see in the Learning Design field/how could these problems be solved/What co

Coding Density

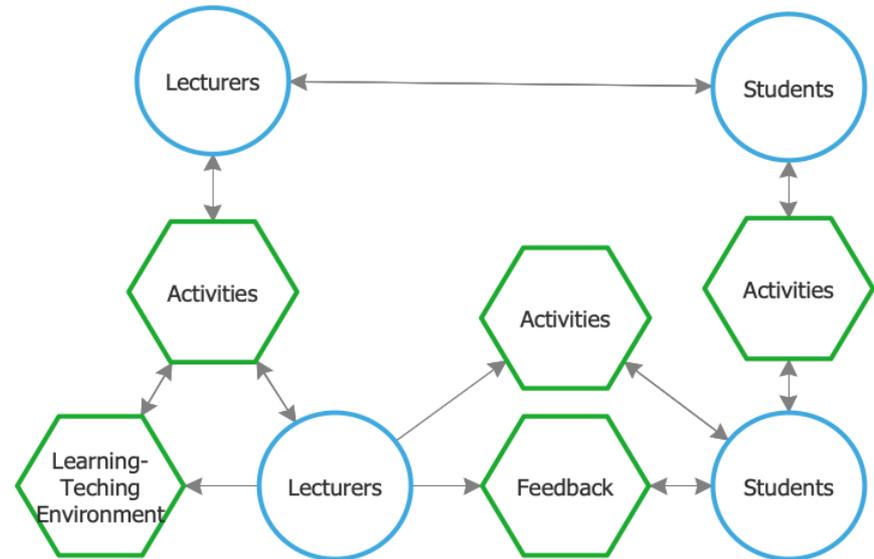
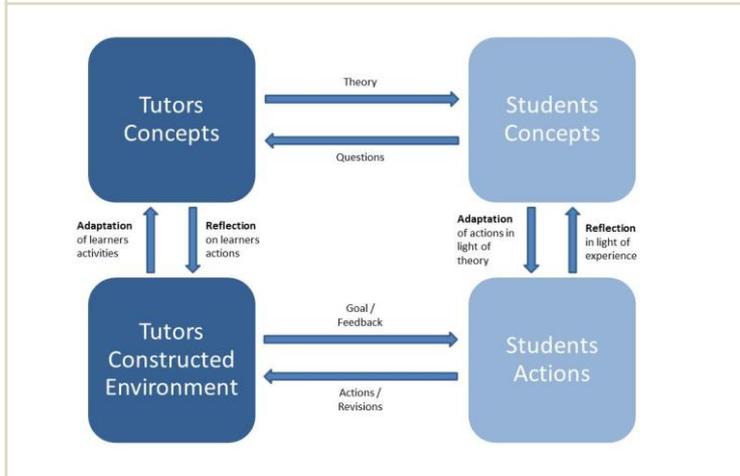
E10

E4

E7

Findings

CONVERSATIONAL FRAMEWORK



THE LEARNING DESIGNER

The screenshot shows the Learning Designer interface for a session titled "Inquiry into healthy eating (Nquire)".

- Session Name:** Inquiry into healthy eating (Nquire) Session type: Block (More than one session type)
- Class OMA:** Using Nquire
- Acquisition:** Using Nquire for data collection
- Discussion:** Discussion
- Inquiry:** Inquiry
- Practice:** Practice
- Production:** Production
- Timeline:** A horizontal timeline from Hour 1 to Hour 5, with colored bars indicating the duration of each activity.
- Properties Panel (Right):**
 - My TLAs: Tutor Supported Class, Tutor Supported Group Work, Tutor Supported Individual W..., Independent Group Work, Independent Individual Work, Resource Based Individual Activity, Individual Practical Activity, Individual Project, T E L resource Based Individual Act, Adaptive T E L Individual Activity, T E L based Formative Assignment, Summative Assessment.
 - TLA Properties: Name: Individual..., Session Type: Independent..., Learning experi One Size Fit..., Group size: 1, Acquisition (%): 10, Discussion (%): 0, Inquiry (%): 25, Practice (%): 50, Production (%): 15.
- Activity Notes:**
 - Using Nquire for data collection
 - Group size: 1
 - Number of students: 30
 - Duration (mins): 180
 - Attachments: /Users/dianalaurillard/Desktop/LDSE patt

- Human Actors
- Non-human Actors - Technological Artefacts
- ⬡ Non-human Actors – Abstract Concepts

Sociomaterial Evaluation Framework

- Six dimensions: lecturers/designers, students, institution, course, technology, and feedback.
- That was done by combining related actors and associating those actors with thirty-five questions which can be used to explore the various aspects or features of LD tools.
- For more details:
Celik, D.; Magoulas, G. D. (2019). Challenging the Alignment of Learning Design Tools with HE Lecturers' Learning Design Practice. In EC-TEL 2019.

| Dimensions | Related Actors | ILDE Tool | | | | | Learning Designer | ScenEdit |
|-------------------------|---|-----------|------------|-------------|--------|-----------|-------------------|----------|
| | | OpenGLM | WebCollege | exeLearning | CADMOS | ILDE Tool | | |
| Designers/ Lecturers | Lecturers' Time and Workload | - | - | - | - | - | + | - |
| | Design Team | - | - | - | - | - | - | - |
| | Co-designer | - | - | - | - | - | - | - |
| | Colleagues | - | - | - | - | - | - | - |
| | People from other Universities | - | - | - | - | - | - | - |
| | Teaching Assistant | - | - | - | - | - | - | - |
| | Co-teachers | - | - | - | - | - | - | - |
| Students | Time and Workload | - | - | - | - | + | + | - |
| | Capabilities | - | - | + | - | + | - | - |
| Institution | Delivery Method | + | + | + | + | + | + | - |
| | Institutional Contexts / Cultural Norms | - | - | - | - | - | - | - |
| | Resources | - | - | - | - | - | - | - |
| | IT Setups | - | - | - | - | - | - | - |
| | IT People | - | - | - | - | - | - | - |
| | Learning Technologies | - | - | - | - | - | - | - |
| | LMS | - | - | - | - | - | - | - |
| Course | Course Aims | + | + | + | + | + | + | + |
| | Learning Objectives | + | + | + | + | + | + | + |
| | Learning Outcomes | + | + | + | + | + | + | + |
| | Assessment | + | + | + | + | + | + | + |
| | Activities | + | + | + | + | + | + | + |
| | Textbooks | + | + | + | + | + | + | + |
| | Learning-Teaching Approach | - | + | + | + | + | + | + |
| | Sequencing | + | + | + | + | + | + | + |
| | Storyboarding | - | - | - | + | + | + | + |
| | Design Patterns | - | - | - | - | - | - | - |
| | Feedback | - | - | - | + | - | - | - |
| | LD Approach | - | + | + | + | + | + | + |
| | LD from Past | + | + | + | + | + | + | - |
| | LD Template | + | + | + | + | + | + | - |
| LD from others | + | + | + | + | + | + | - | |
| Technology | Download in Different File Format | + | + | - | - | + | + | - |
| | LD Tools | - | - | - | - | + | - | - |
| | Search Engine | - | - | - | - | + | + | - |

Alignment of LD tools with HE Lecturer's LD practice

- alignment points indicated with a “+”
- misalignment points indicated with a “-”
- Comparisons based on specific tool version- see ECTEL paper for details.

What next?

Areas of overlap and misalignment, and suggest features and functionalities for LD tools

| | Related Actors | Overlap/Misalignment with LD-P identified | Desirable tool feature/functionality |
|------------------|--------------------------------|--|--|
| Designers | Lecturers' Time and Workload | The time LD-P takes using LD tools is an important factor influencing adoption of LD tools. However, as participants highlighted, HE lecturers perceive usage of existing LD tools as time-consuming. | Ease of use and time-efficient institution of LD tasks. Good understanding of existing tasks. Customization of task model to institutional LD requirements. |
| | Design Team | Participants acknowledge that collaboration and co-design, in their various forms, are inherent features of the LD-P. Among LD tools, the Learning Designer and LAMS created a community of designers sharing their LDs and editing others' LDs. However, even in these tools, there is no advanced collaboration functionality. | Collaborative editing functionalities exploiting cloud infrastructure; communications tools, e.g. chatting, networking groups, bring designers together to talk LD ideas and develop LDs together. |
| | Co-designer | | |
| | Colleagues | | |
| | People from other Universities | | |
| | Teaching Assistant | | |
| Co-teachers | | | |
| Students | Time and Workload | Strengthening the alignment between students' workload and credits value, e.g. when designing activities or assessments, depending on the course/programme of study. | Personas based on realistic user profiles Customization to audience |
| | Capabilities | Aligning learning activities with students' skills, abilities, and competencies. | Features/functionality to create LDs that accommodate different types of students and contexts of use |

Summary

- Even though there are various human and non-human actors engaged in the LD practice, and they all have explanatory value when trying to understand the various ways technology is enacted into LD in HE, we see barely overlap of these actors with existing LD frameworks and LD tools.
- All these actors connect to each other in a complex manner and engage into bounding practices. However, although participants acknowledged the existence and influence of all these actors, some of these actors seems to disappear when participants practise learning design in their own institutions. Moreover, most of the fifty-four actors identified are currently not considered by the various LD tools and LD approaches.
- Although human actors, e.g. lecturers/designers, are at the core of the LD networks and bounding practices and perceived to be the most important ones in educational technology systems, this view can be problematic when other actors involved in LD practice are ignored or are given little value.

Concluding remarks

- Understanding the LD practice requires considering all of the human and non-human actors, including knowledge of the context of teaching, students' skills and abilities, institutional environment, subject matter and standards, staff competencies, and conceptions of lectures and educational software designers about LD approaches.
- Identifying issues of misrepresentation of LD practice and misalignment of lecturers' LD practice with LD methods and LD tools can inform the development of new conceptual models, LD tools, and technologies with larger potential to be adopted by practitioners and educational organisations more broadly.

To explore it further

- **[LDer]** Charlton P., Magoulas G. and Laurillard D., Enabling Creative Learning Design through Semantic Technologies, **Technology, Pedagogy and Education**, 21(2), 231-253, 2012.
- **[LDer]** Laurillard, D., Charlton, P., Craft, B., Dimakopoulos, D., Ljubojevic, D., Magoulas, G., Masterman, E., Pujadas, R., Whitley, E.A., Whittlestone, K., A constructionist learning environment for teachers to model learning designs, **Journal of Computer Assisted Learning**, 29(1), 15–30, 2013.
- **[LDTools]** Celik, D.; Magoulas, G. D. (2016). Approaches to Design for Learning. In ICWL Conference. Rome, Italy.
- **[LDTools]** Celik, D.; Magoulas, G. D. (2016). A Review, Timeline, and Categorization of Learning Design Tools. In ICWL Conference. Rome, Italy.
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