Universitat Pompeu Fabra Barcelona

TIDE Research Group on Interactive and Distributed Technologies for Education

EUTOPIA European University

Learning design technologies: supporting collective and inclusive approaches

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Seminar series on "**Dispositions for training teachers in Europe**", Eutopia Connected Research Community (CRC) "Research for inclusive education", CY Cergy Paris University, 6 March 2023

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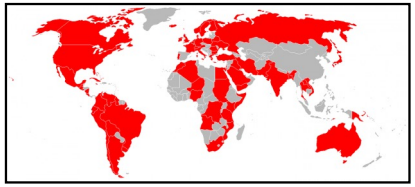
UPF, ICT Department

https://www.youtube.com/watch?v=8dgvWkICCr8

Public, Young, Urban, International



https://www.youtube.com/watch?v=FjAuggflTVE

TIDE research group

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Inclusive education is multifaceted.

From a perspective of designing learning activities, what do we mean by *inclusive education*?

http://tiny.cc/eutopia-inclusive

Inclusion, multiple perspectives, in this presentation:

- Equal opportunities for participation
- Guidance in designing for learning
- Collective efforts in designing and sharing designs for learning
- Co-design, involving students
- Regulation of learning processes


Learning Design

Learning Design

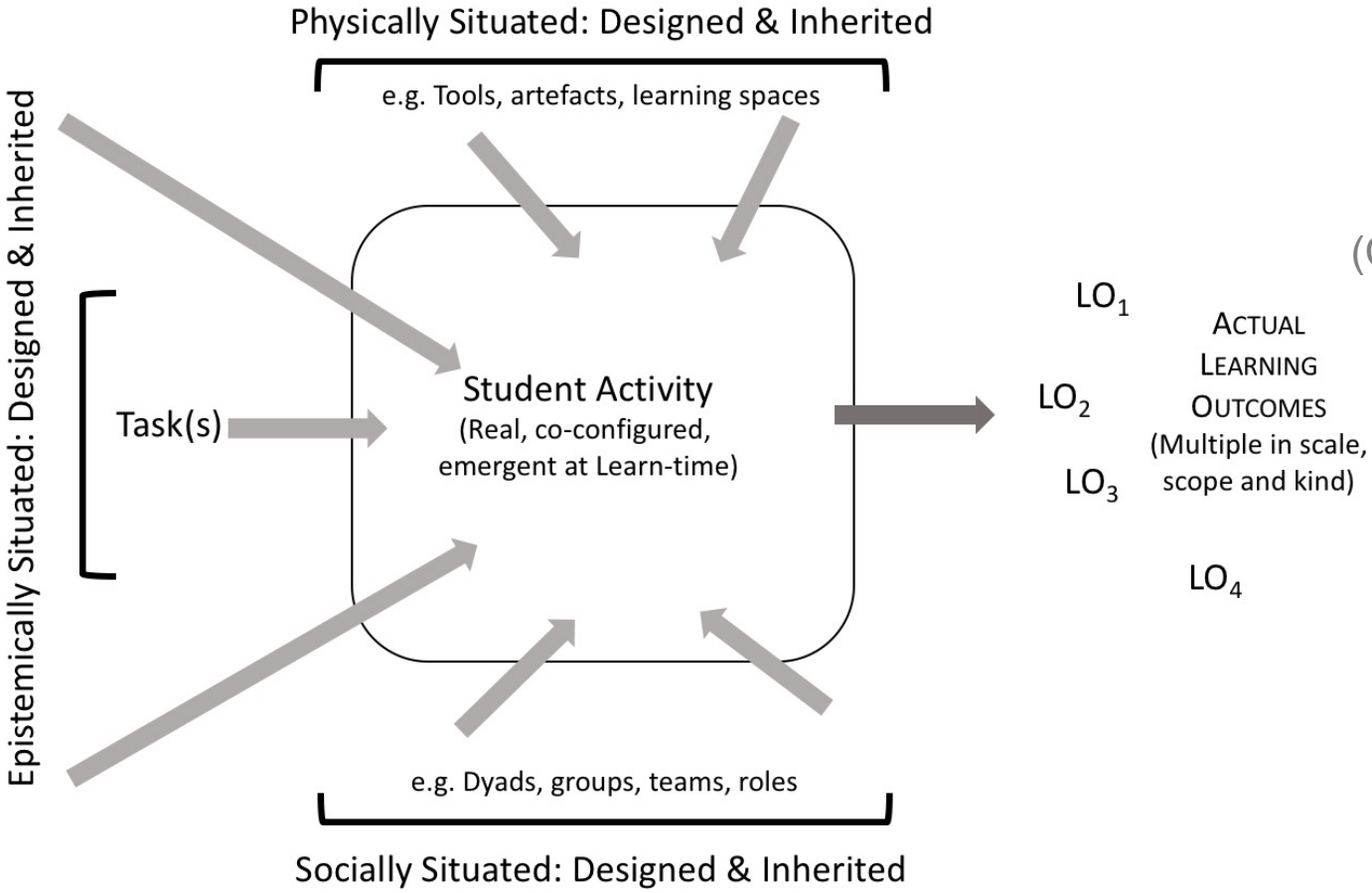
Support teachers in designing the “best possible” conditions for their students to learn, documenting them, making their design ideas explicit and sharable.

(Agostinho, 2011; Conole, 2012; Koper et al., 2004; Laurillard, 2013; Mor, Craft & Hernández-Leo, 2013; Wasson & Kirschner 2020; …)

Learning Design

What can be designed?

Learning Design



ACAD framework

(Carvahlo & Goodyear, 2015)

Learning Design, the case of designing for Collaborative Learning

And about equal opportunities for participation

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Collaborative Learning

Computer-Supported Collaborative Learning

Collaborative Learning

social interactions triggering learning mechanics

Computer-Supported Collaborative Learning

networked computers (software, multiple devices) can facilitate these interactions

Productive collaborative Learning

- Genuine collaboration requires systematic efforts to learn together:
  - free collaboration does not necessarily lead to fruitful learning (Dillenbourg, 2002)
  - learners should be engaged in processes involving social knowledge-intensive interactions (Roschelle & Teasley, 1995; Johnson & Johnson, 1999; Barron, 2003)
  - design science: designing for collaborative learning

Collaborative Learning scripts

An approach to enhance effective collaboration:

Guide / structure collaboration in a way that the probability of reaching successful learning situations increases

(Dillenbourg, 1999)

Collaborative Learning scripts

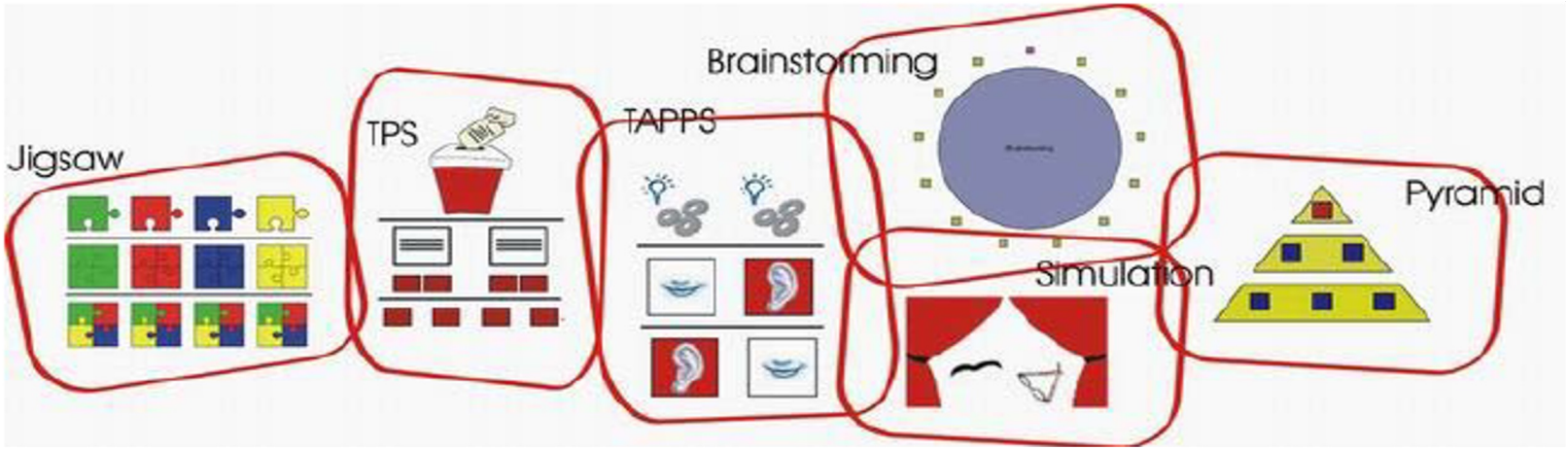
Macro-scripting

Macro-scripts structure the collaborative learning flow (aspects of their learning design: activity sequence, roles, group formation, resource allocation) to trigger potentially effective social interactions.

(Dillenbourg & Tchounikine, 2007; Kobbe et al., 2007)

Patterns for the design of Collaborative Learning

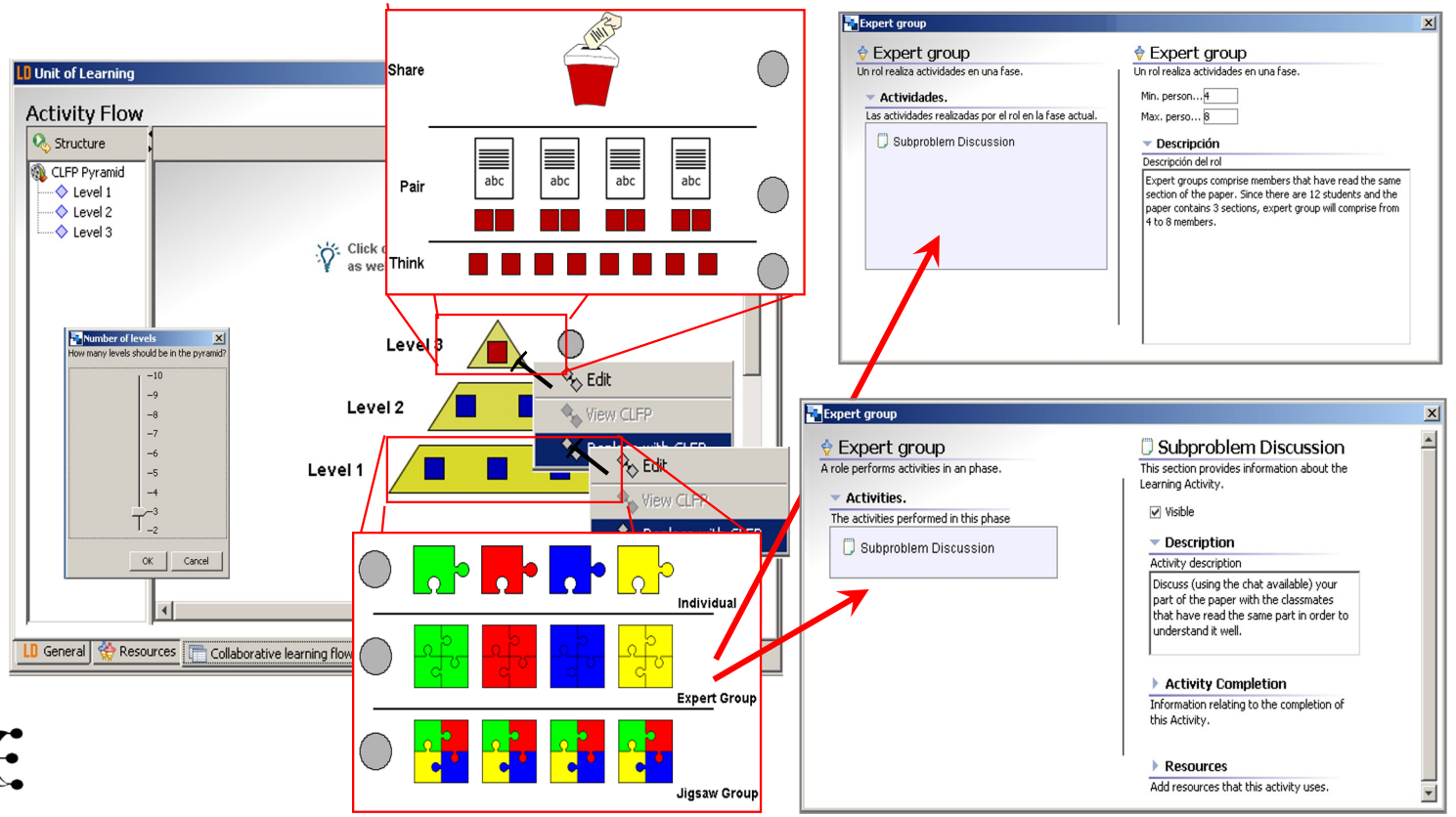
Collaborative learning flow patterns



(Hernández-Leo et al., 2007)

Promote: participation – interaction, possitive interdepence, individual accountability, knowledge building

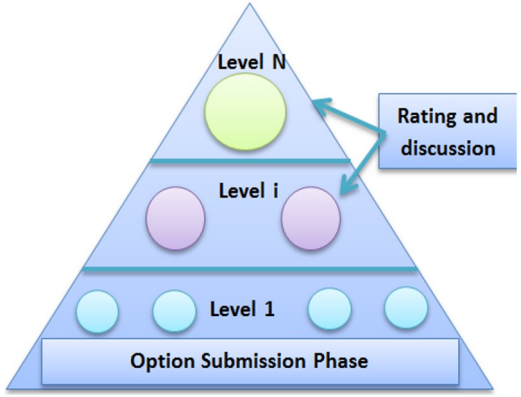
Authoring tools

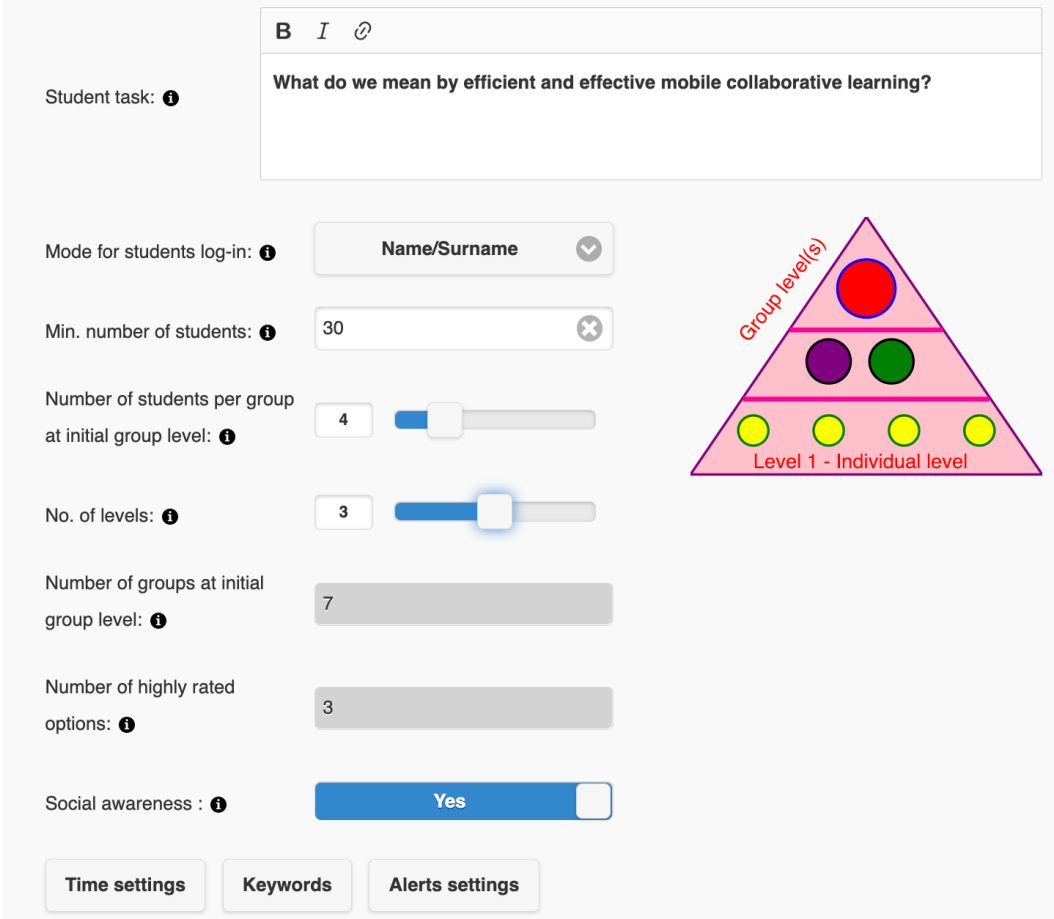


(Hernández-Leo et al., 2006; Villasclaras & Hernández-Leo et al., 2013)

Authoring tools

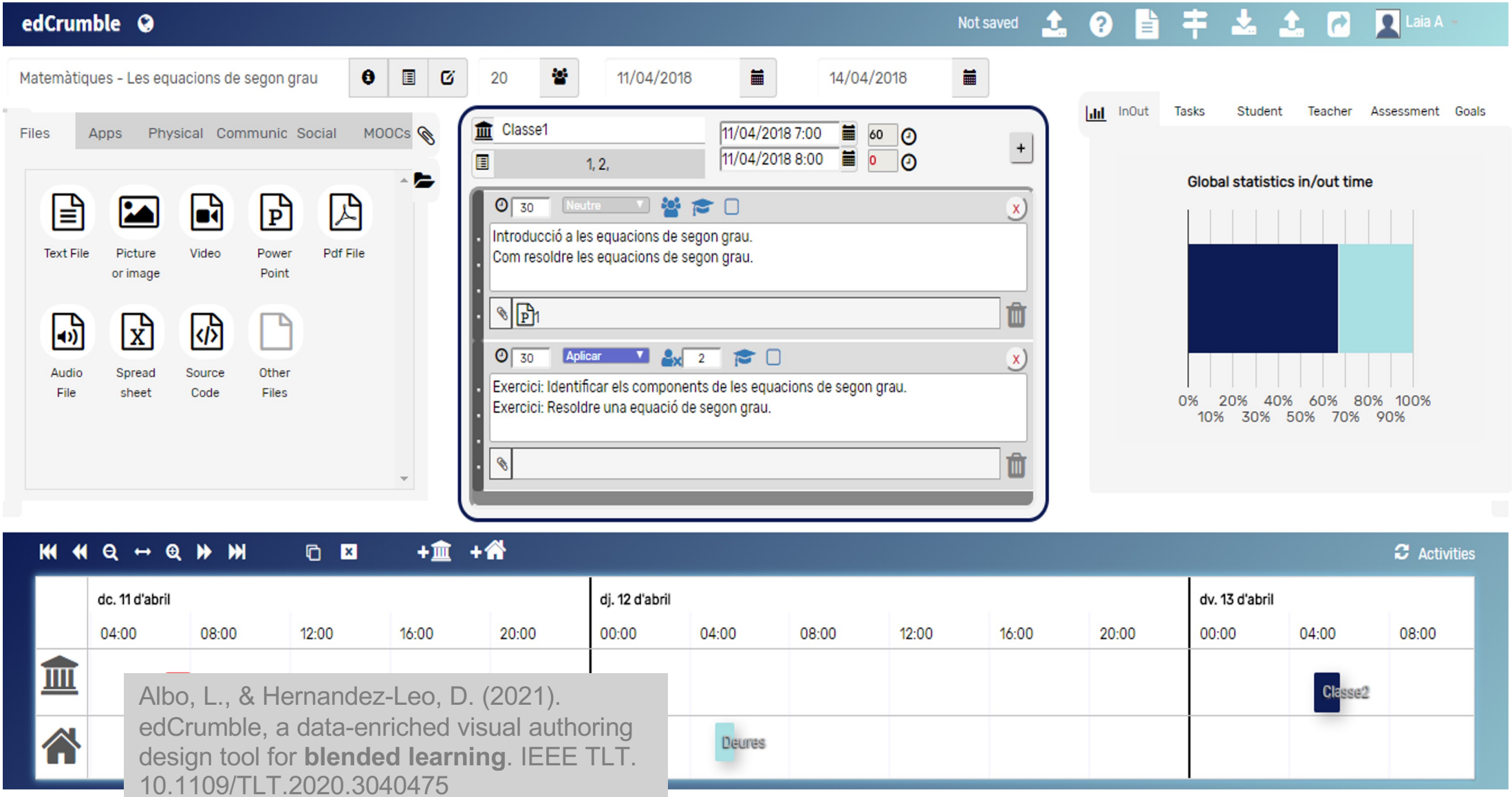
- PyramidApp





https://www.upf.edu/web/tide/tools

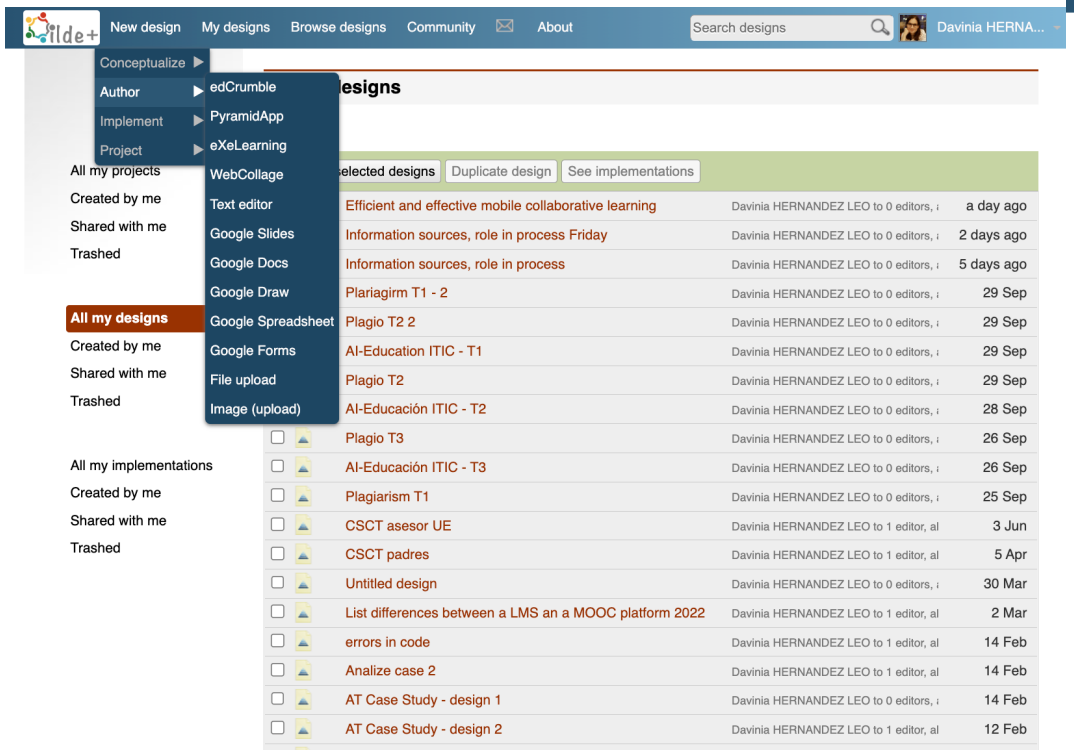
Manathunga, K., & Hernández-Leo, D. (2018). Authoring and enactment of mobile pyramid-based collaborative learning activities. *British Journal of Educational Technology*, 49(2), 262-275.

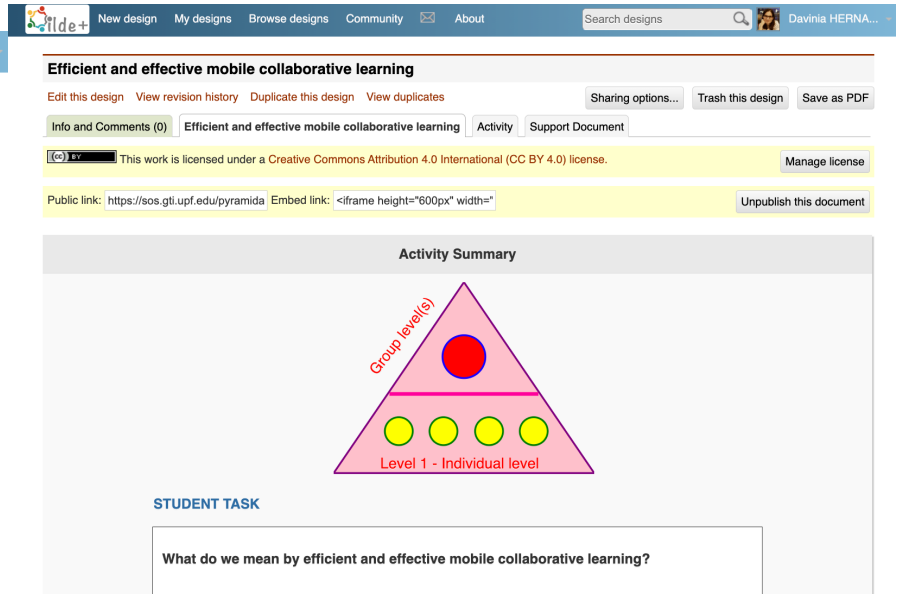


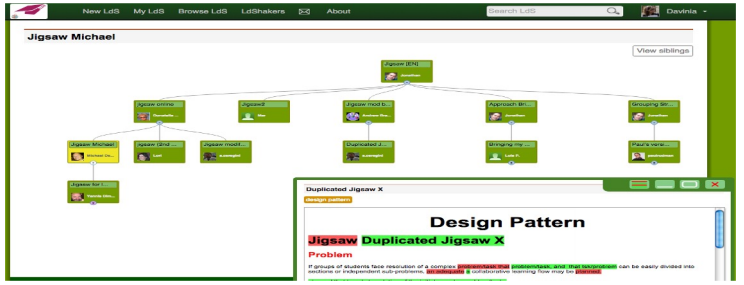
Albo, L., & Hernandez-Leo, D. (2021). edCrumble, a data-enriched visual authoring design tool for **blended learning**. IEEE TLT. 10.1109/TLT.2020.3040475

https://www.upf.edu/web/tide/tools/

LdShake (Hernández-Leo et al., 2011), ILDE (Hernández-Leo et al., 2018), community environments for learning design







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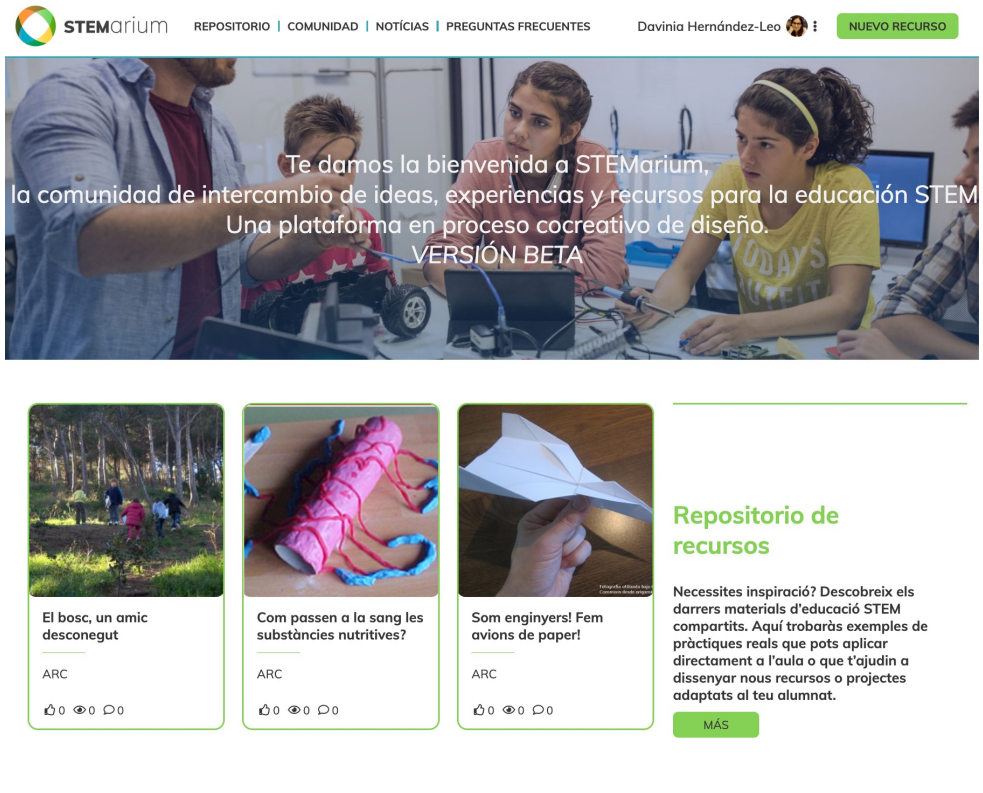
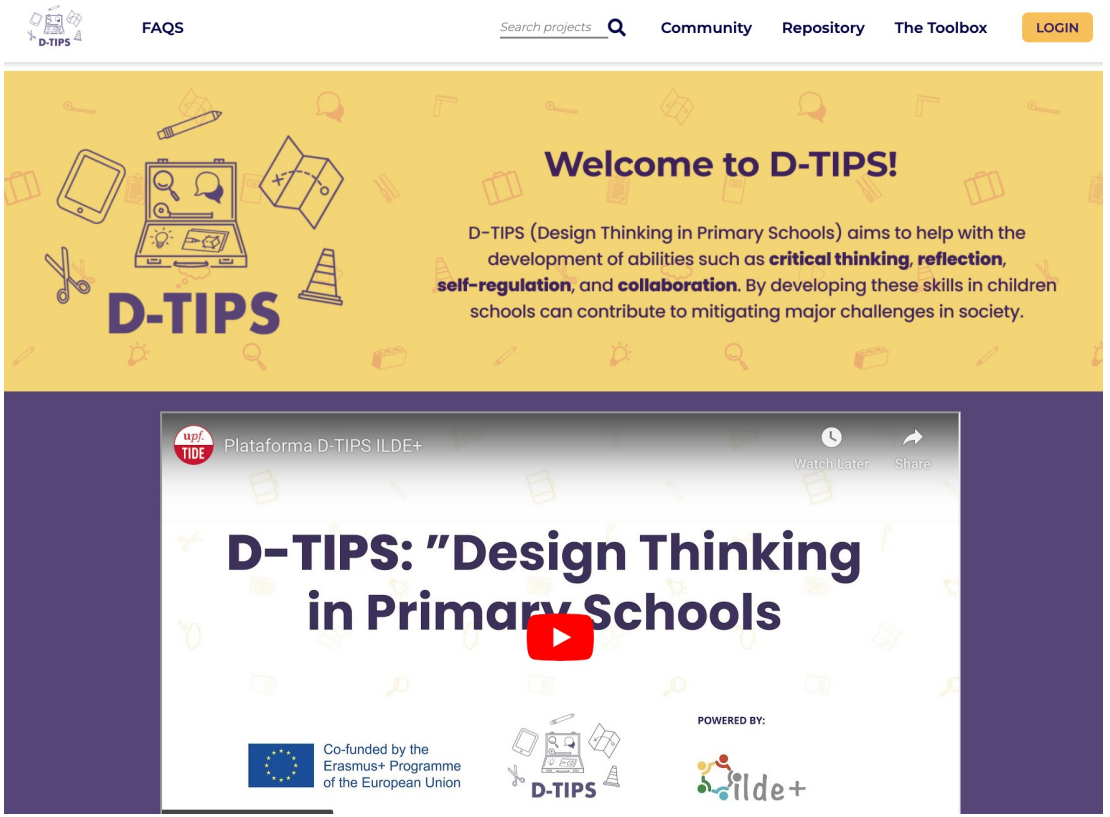




https://ildeplus.upf.edu/teaspils/

ACTIVITIES | COMMUNITY

Activity search

Davinia HERNANDEZ LEO

NEW ACTIVITY

Teaspils

Explore, find, and share learning activities teaching environmental awareness

Includes activities using smart IoT planters in learning spaces

The Garden of Happiness

Christos Rodosthenous

4 13 0

Automated caring for indoor plants

Konstantinos Charonis

2 10 0

Journaling experience: Learning the basics of...

ARIEL ORTIZ BELTRAN

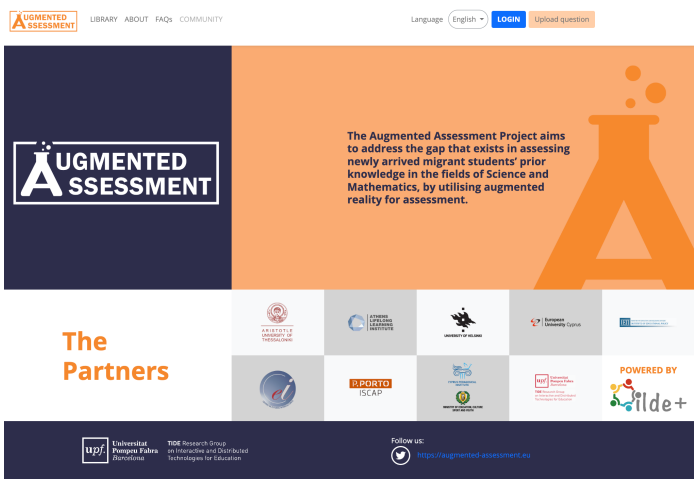
1 13 1

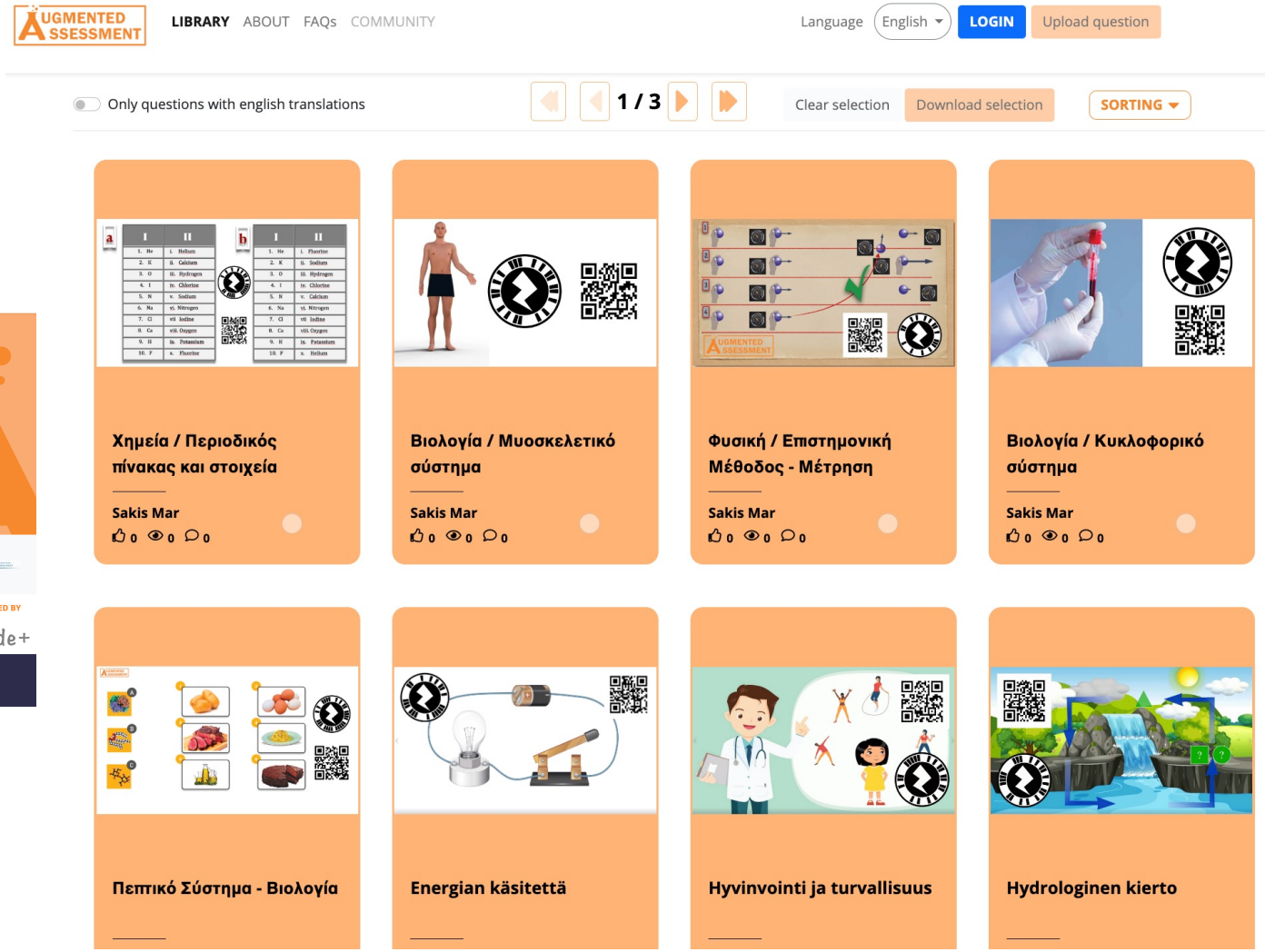
Taking care of plants along the semester: competition

Bernardo Tabuenca

0 4 0

https://ildeplus.upf.edu/augmented_assessment/





https://ildeplus.upf.edu/BLENDI/

BLENDI
BLENDED LEARNING FOR INCLUSION

EN

TOOLS & TIPS COLLABORATIVE LESSON PLANS FEEDBACK APP ABOUT BLENDI

BLENDI PLATFORM

Tools & Tips

Tools & tips for using blended learning in schools attending students' diverse needs

Collaborative lesson plans

Use BLENDI platform for creating collaborative lesson plans

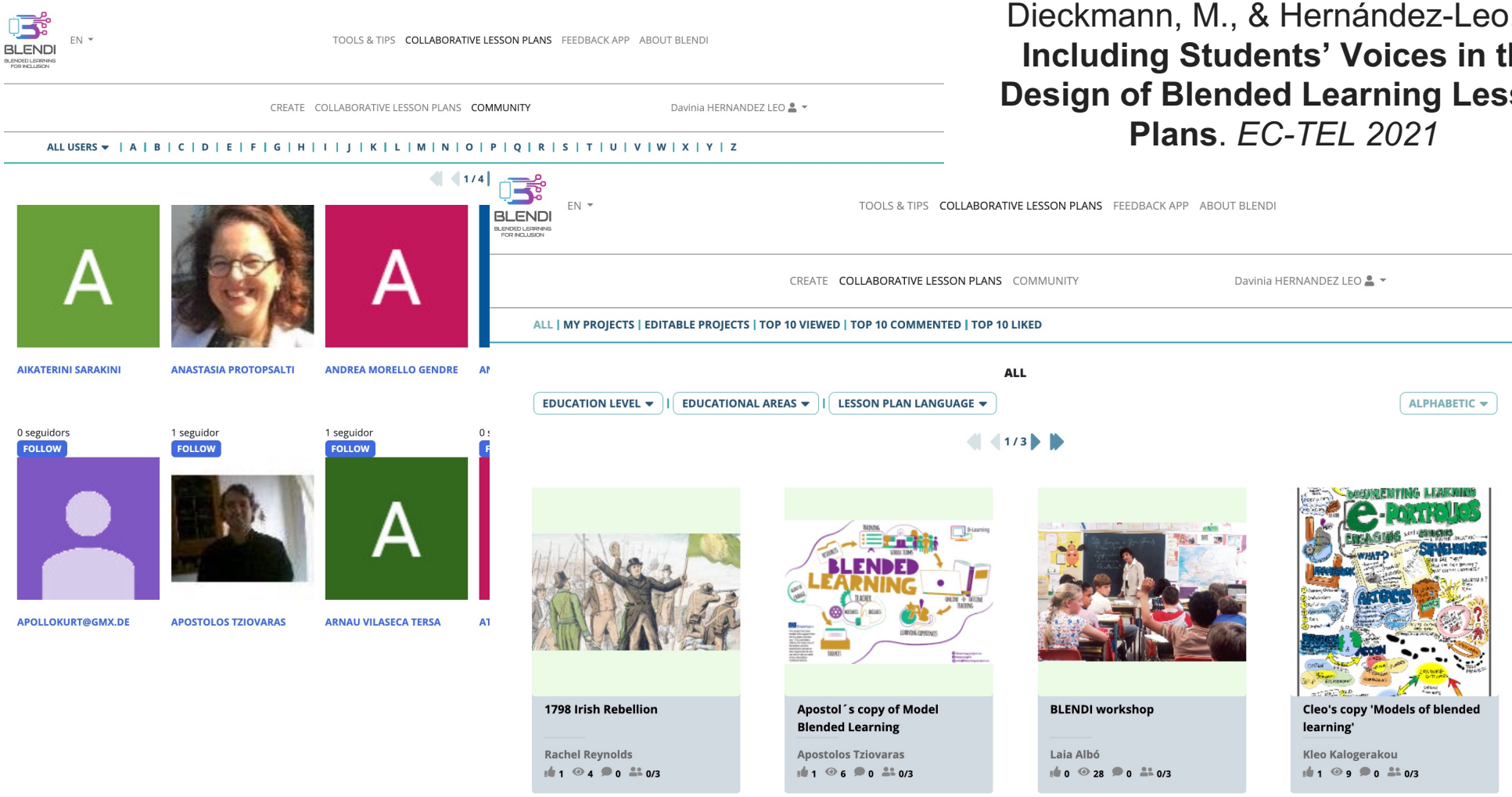
Students' feedback App

Get students' feedback regarding lessons using the BLENDI App

BLENDI Erasmus+ ATHENS LIFELONG LEARNING INSTITUTE I&F Instruction & Formation upf. Universitat Pompeu Fabra Barcelona European University Cyprus

https://ildeplus.upf.edu/BLENDI/

Albó, L., Stylianidou, N., Chalatsis, X., Dieckmann, M., & Hernández-Leo, D. **Including Students' Voices in the Design of Blended Learning Lesson Plans**. *EC-TEL 2021*



https://ildeplus.upf.edu/BLENDI/

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BLENDI
BLENDED LEARNING FOR INCLUSION

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TOOLS & TIPS COLLABORATIVE LESSON PLANS FEEDBACK APP ABOUT BLENDI

CREATE COLLABORATIVE LESSON PLANS COMMUNITY

Davinia HERNANDEZ LEO

We R all Refugees

The first global theme in the Greek syllabus for English as a Foreign Language at senior high-school is 'Refugees'. This learning design covers 12 lessons in a class of 20 pupils from various ethnic and cultural backgrounds.

STAVRIANASOU

Teacher of English as a Foreign Language at High School

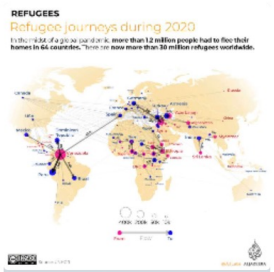
3rd Upper Secondary School of Nea Philadelphia, Athens, Greece

Foreign Languages

Secretary of LITTA (Lozanov's International Teacher Trainers Association)

2 followers

FOLLOW



We R all Refugees

EDUCATION LEVEL:
Upper secondary education

EDUCATIONAL AREAS:
Linguistic

DIGITAL COMPETENCE:
Interacting through digital technologies
Engaging in citizenship through digital technologies
Integrating and re-elaborating digital content
Creatively using digital technologies

LESSON PLAN LANGUAGE:

1 - LEARNING OBJECTIVES:

Knowledge: getting-to-know each other; facts about refugees across time
Comprehension: spoken English in face-to-face communication and videos as well as written English in factual texts
Analysis: Identifying the causes and effects of an issue
Synthesis: Design collaborative local action plans for refugees
Evaluation: Define the criteria for evaluating action plans
Language: vocabulary about Refugees, Present and Past tenses
Affective learning outcomes: empathy for refugees, awareness of refugee problems, solidarity
Psychomotor skills: Create short videos about refugees

DISCUSS LEARNING OBJECTIVES

2 - ACTIVITIES AND TOOLS:

1. **Video assignment** (flipped classroom activity) - individual / online / asynchronous **EdPuzzle**
2. **Introduction** (experiential presentation of the theme) - whole class / face to face / synchronous **Youtube**
3. **Brainstorming** (who?, when?, where?, why? how?) - whole class / face to face / synchronous **Stormboard**

DISCUSS ACTIVITIES AND TOOLS

Teachers - wellbeing

Hakami, E., & Hernandez-Leo, D. (2021). Investigating the **Well-being Impacts of Educational Technologies** Supported by Learning Analytics: An application of the initial phase of IEEE P7010 recommended practice to a set of cases. LAK

Hakami, E., & Hernandez-Leo, D. (2021). **Teachers' views about the impact of Learning Design Community platforms on Well-being**. SIIE

A role for Learning Analytics to support learning design

Data Analytics in teaching & learning

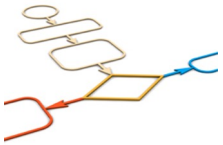
- **Learning Analytics** (**LA**): “the measurement, collection, analysis, reporting of data about learners and their contexts, for porpuses of understanding and optimizing learning and the environments in which it occurs” SoLAR (Ferguson, 2012)

- **Social Learning Analytics** (Buckingham-Shum & Ferguson 2012) & **Community analytics and visualizations** (Klamma, 2013; Vasileva and Sun, 2007), including Social Network Analysis (SNA) (de Laat & Schreurs, 2013)

Understanding and supporting learning design with analytics

ANALYTICS LAYERS FOR LEARNING DESIGN FRAMEWORK (AL4LD)

Community of practitioners and related stakeholders



Learning Design (LD) tools

Learners experiencing learning designs

Community Analytics
metrics and patterns of design activity

Design Analytics
metrics of pedagogical decisions

Learning Analytics
metrics of learners' engagement, achievement... aligned with design intent

Hernández-Leo, D., et al. (2019) Analytics for learning design: A layered framework and tools, *British Journal of Educational Technology.* https://doi.org/10.1111/bjet.12645

Understanding and supporting learning design with analytics

AL4LD Framework

Interactions between layers

Functions:

Design Analytics can offer a framework for interpreting Learning Analytics.

Learning Analytics aligned with the design intent support further design iterations (redesign).

Design Analytics can contribute to Community Analytics, with details of the properties of the learning designs created within a community.

Community Analytics aligned with design properties can offer pointers for inspiration during the design process and opportunities for community inquiry.

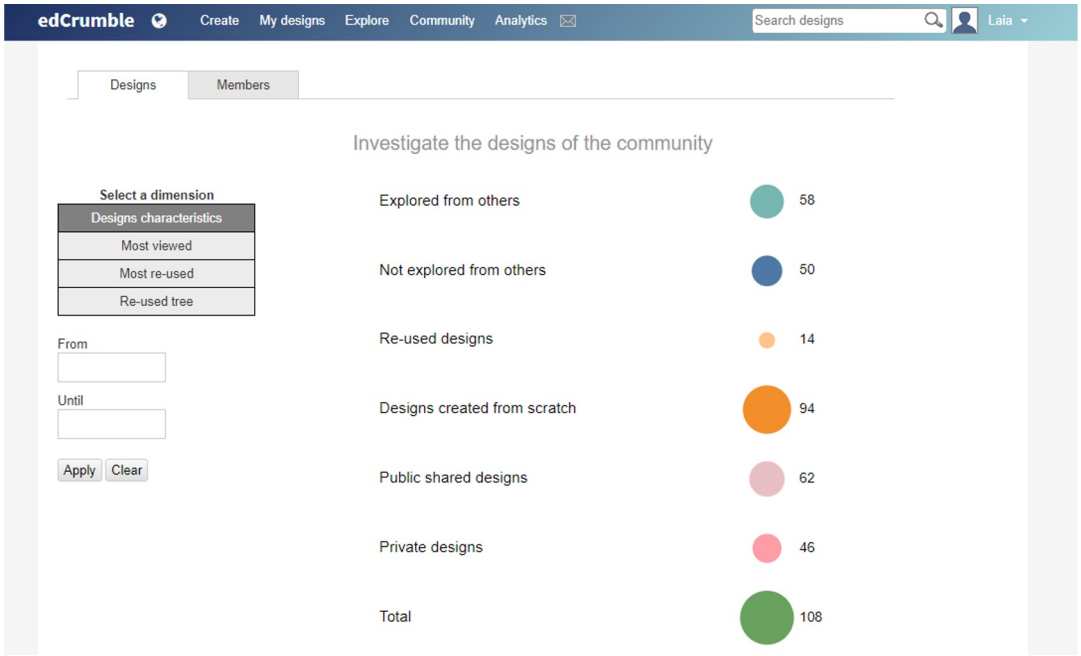
Learning Analytics can contribute to Community Analytics, with details of the impact in learning settings of the designs created within a community.

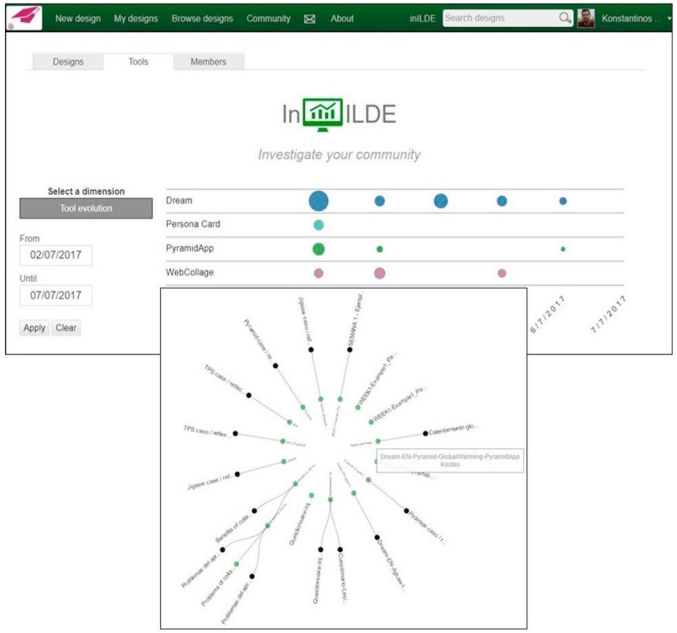
Community Analytics linked with Learning Analytics can offer opportunities for community inquiry.

Analytics for learning design

- Understanding community behaviour
- Triggering orientation and inspiration

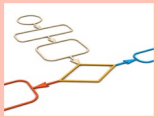
Community Analytics
metrics and patterns of design activity





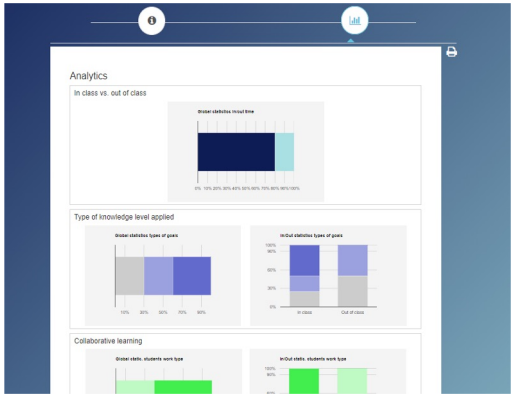
Michos, K., Hernández-Leo, D., (2018) Supporting awareness in communities of learning design practice, *Computers in Human Behavior*, 85, 255-270.

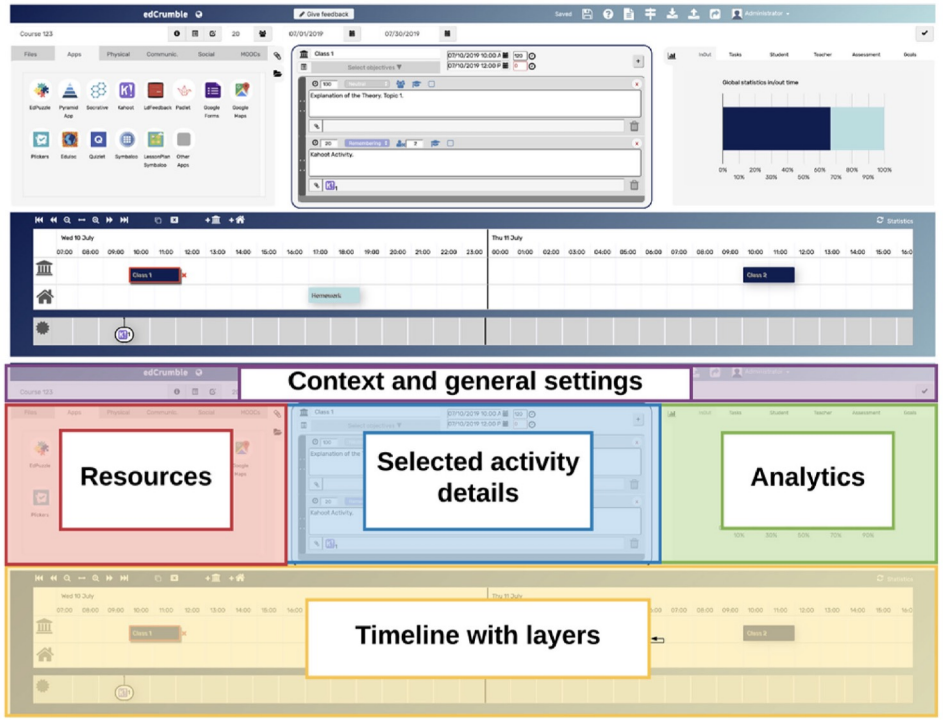
Analytics for learning design



Design Analytics
metrics of pedagogical decisions

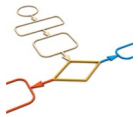
- Categorise learning designs
- Support awareness and reflection about design decisions during the learning design process





Albo L, Hernández-Leo D. edCrumble: designing for learning with data analytics. EC-TEL 2018. *Best Demo Award.*

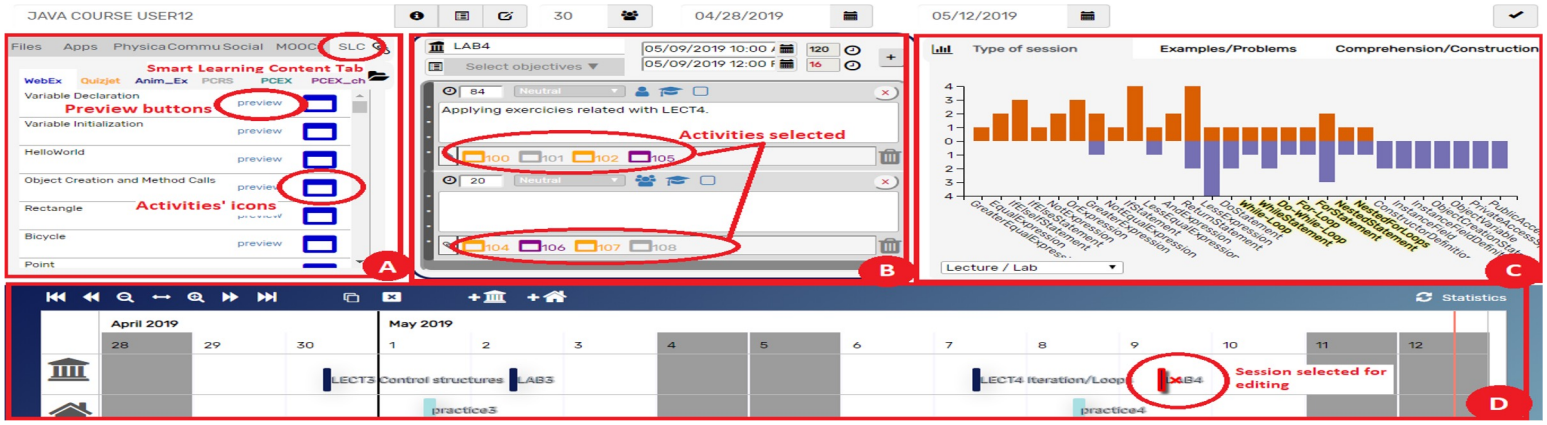
Analytics for learning design



Learning Design (LD) tools

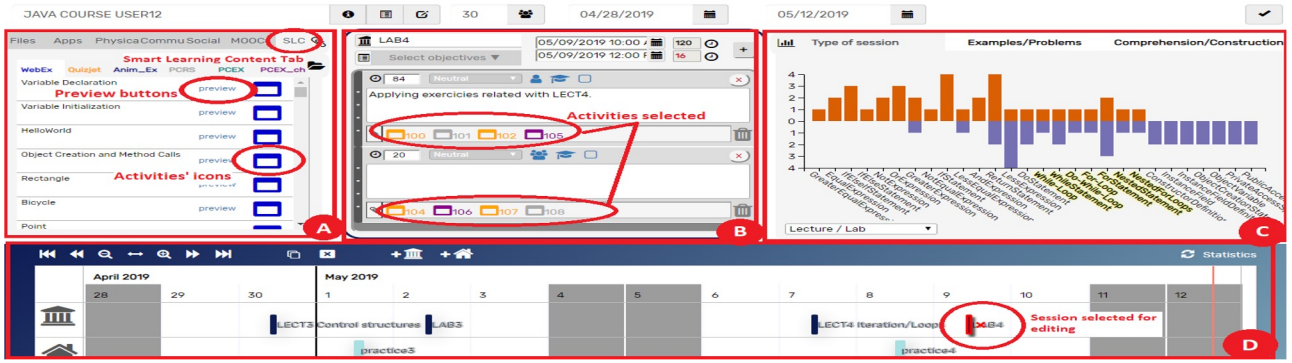
Design Analytics
metrics of pedagogical decisions

- Concept-level design analytics
- Visualizations uncovering facets of learning activities being authored
- Smart learning content, programming activities, edCrumble



Analytics for learning design

Albó, L., Barria-Pineda, J., Brusilovsky, P. & Hernández-Leo, D. (2021) **Knowledge-Based Design Analytics for Authoring Courses with Smart Learning Content**. Int J Artif Intell Educ.



Design analytics:

allows the teachers to reduce the cognitive load (especially in terms of mental demand)

facilitates the choice of the most appropriate activities without affecting the overall design time

improves the overall learning design quality and helps teachers avoid committing design errors

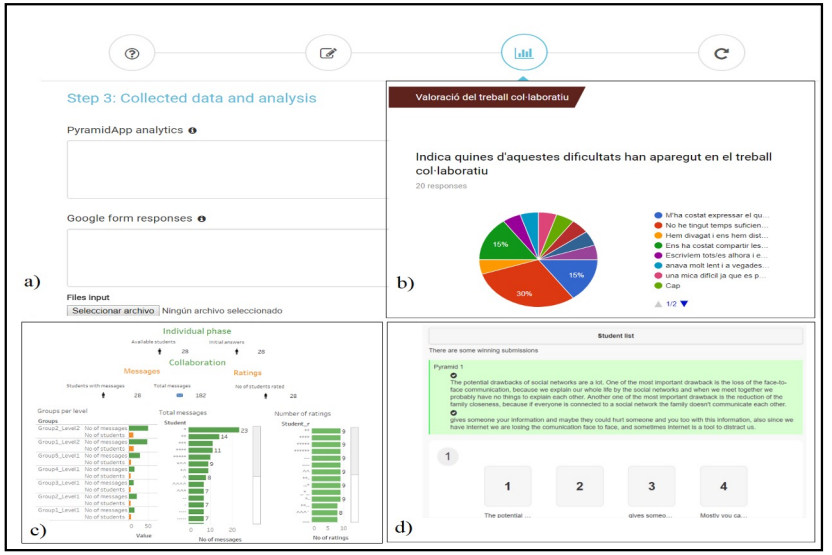
Analytics for learning design

Learning Analytics
metrics of learners' engagement,
achievement... aligned with design intent

- Accumulated evidence of design's impact
- Support awareness and reflection about effects of designs, redesign
- Teacher-led inquiry, collective inquiry

Michos, K., Hernández-Leo, D., & Albó, L. (2018). **Teacher-led inquiry in technology-supported school communities**. *BJET*

Michos, K., & Hernández-Leo, D. (2020). **CIDA: A collective inquiry framework to study and support teachers as designers in technological environments.** *CAE*



Michos, K., Lang, C., Hernández-Leo, D., Price-Dennis, D., (2020) **Involving teachers in learning analytics design: lessons learned from two case studies.** LAK

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Orchestration of learning designs

Orchestration

- *(Classroom) orchestration*: **real-time coordination** of collaborative learning processes at **different social levels** (individual, small groups, whole class), using **a variety of resources and tools** (both ICT and non-ICT) in a synergic way to maintain progress towards the learning outcomes
  (Moor, 2001; Dillenbourg, Järvela & Fischer, 2009; Prieto et al., 2018)

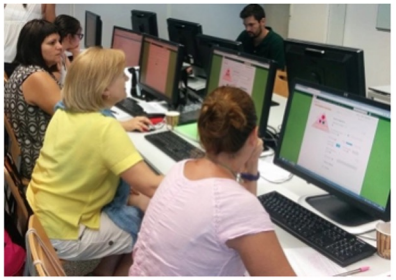
- Usually by teachers

Orchestration: monitoring & regulation when needed (e.g. facilitating inclusion)

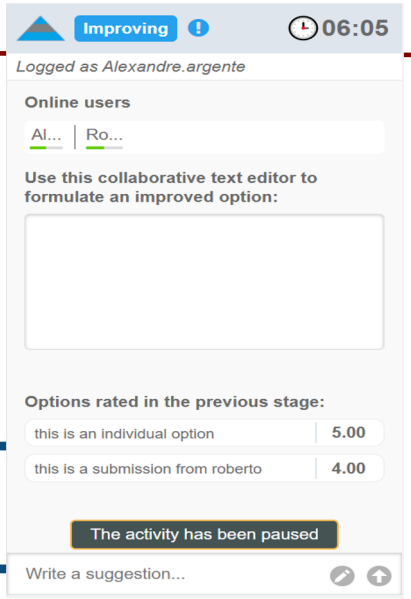
Can technology support?

Orchestration technology: the case of PyramidApp

PyramidApp

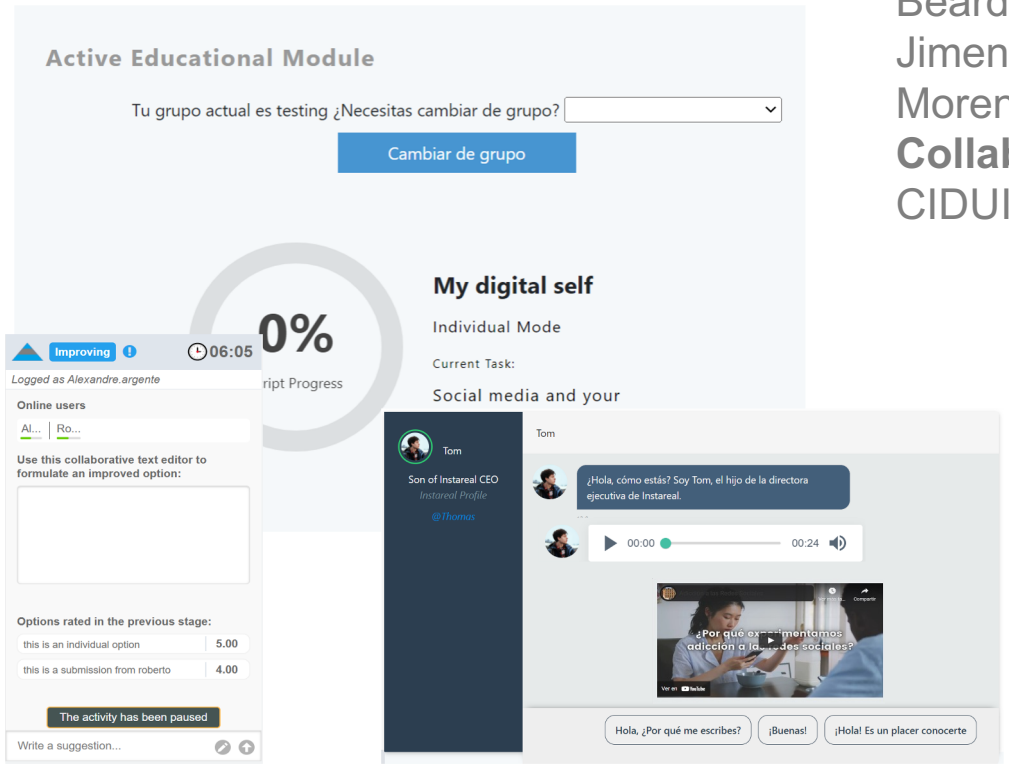


Design → Enactment → Orchestration



PyramidApp

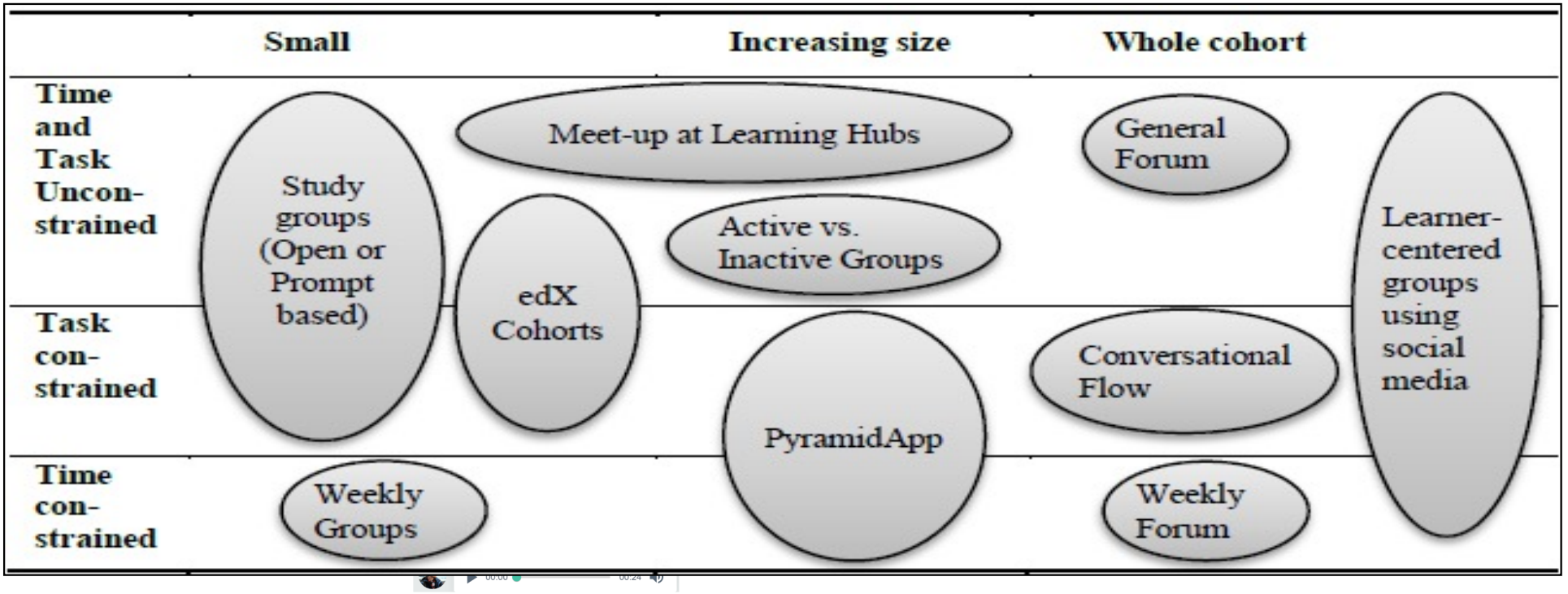
From Classroom activities to uses embedded in other educational systems (social media), to MOOCs



Amarasinghe, I., Hernández-Leo, D., Manatunga, K., Beardsley, M., Bosch, J., Carrió, M., Chacón-Pérez, J., Jimenez-Morales, M., Llanos, D., Lope, S., Martinez-Moreno, J., Santos, P., Vujovic, M. (2021). **Collaborative Learning Designs using Pyramid App**. CIDUI

Hernandez-Leo, D., Theophilou, E., Lobo, R., Sánchez-Reina, R., Ognibene, D., (2021) **Narrative scripts embedded in social media towards empowering digital and self-protection skills**, ECTEL.

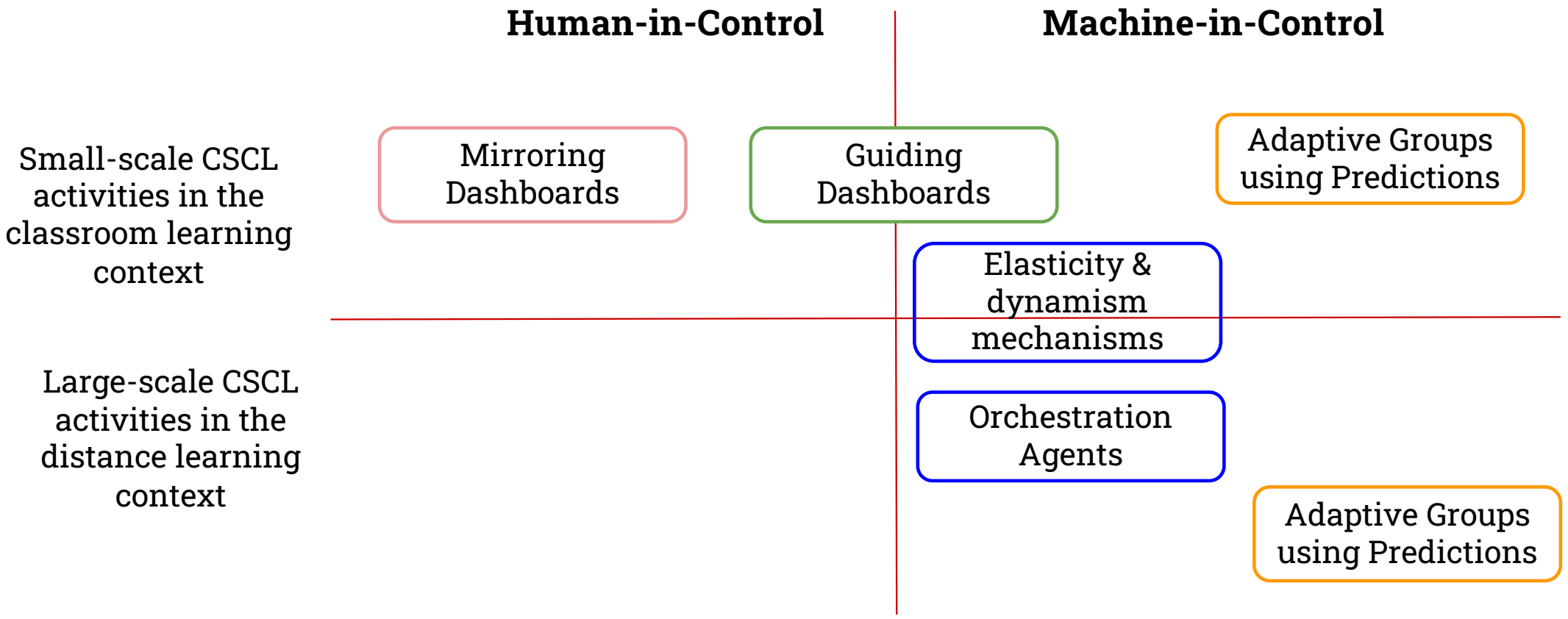
Social Learning Space grid, examples (MOOCs)



Manatunga, K., Hernández-Leo, D., Sharples, M., (2017) A Social Learning Grid for MOOCs: Exploring a FutureLearn Case, *eMOOCs*

Orchestration technology in PyramidApp

(Amarasinghe & Hernández-Leo, 2021)
Synergies Between Humans and Machines to Support the Orchestration of CSCL Scripts at Different Scales



Positioning of different LA interventions to support orchestration at different scales

Orchestration technology in Pyramid App

Some examples where the machine can help…

Flexible CSCL Orchestration Technology: Mechanisms for Elasticity and Dynamism in Pyramid Script Flows

Kalpani Manathunga and Davinia Hernández-Leo
kalpi.nisansala@gmail.com, davinia.hernandez-leo@upf.edu
ICT Department, Universitat Pompeu Fabra, Barcelona

Research Article
JUCS - Journal of Universal Computer Science 24(8): 1034-1051
https://doi.org/10.3217/jucs-024-08-1034 (28 Aug 2018)

Sustaining Continuous Collaborative Learning Flows in MOOCs: Orchestration Agent Approach

Ishari Amarasinghe, Davinia Hernández-Leo, Kalpani Manathunga, Anders Jonsson

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Orchestration technology in Pyramid App

Some examples where the machine can help…

Data-informed design parameters for adaptive collaborative scripting in across-spaces learning situations

Ishari Amarasinghe, Davinia Hernández-Leo & Anders Jonsson

User Modeling and User-Adapted Interaction **29**, 869–892 (2019) | Cite this article

Journals & Magazines > IEEE Transactions on Learning... > Volume: 13 Issue: 4

An Actionable Orchestration Dashboard to Enhance Collaboration in the Classroom

Publisher: IEEE Cite This PDF

Ishari Amarasinghe ; Davinia Hernández-Leo ; Konstantinos… **All Authors**

Orchestration dashboards

LA Dashboards: Single displays that aggregate different indicators about learner(s), learning process(es) and/or learning context(s) into one or multiple visualisations (Schwendimann et al., 2016)

Guiding support (Sollar et al., 2005)

Mirroring	Alerting	Advising (van Leeuwen et al., 2019)
Present information Interpretation is upto the teacher	Present information & alerts Alerts highlight critical moments	Present information & alerts Alerts highlight critical moments Provide further advice to take actions e.g., different ways to support students

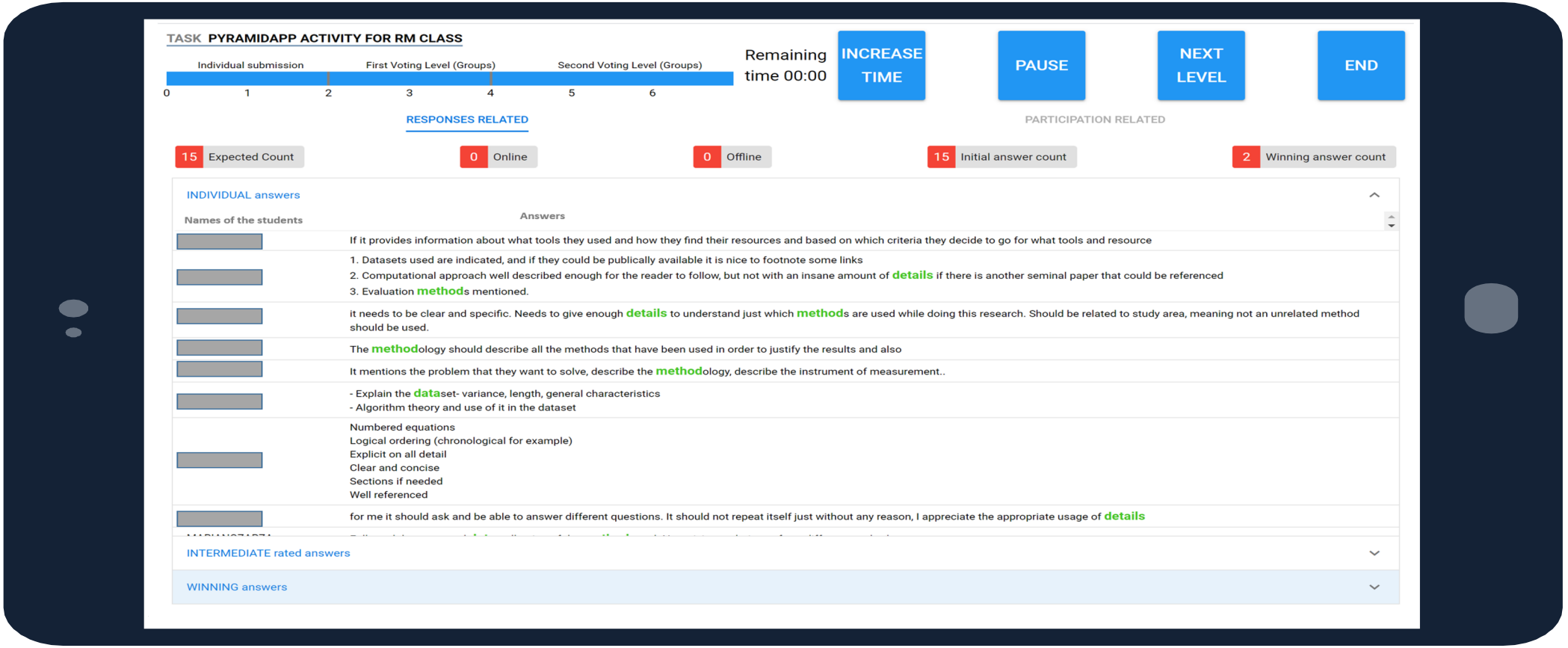
Orchestration dashboards: study

Teachers **ability to act** given **different amounts of interpretational aids** in teacher-facing dashboards in **authentic CSCL situations** have not been fully explored yet (van Leeuwen *et al.*, 2019, Martinez-Maldonado, 2019)

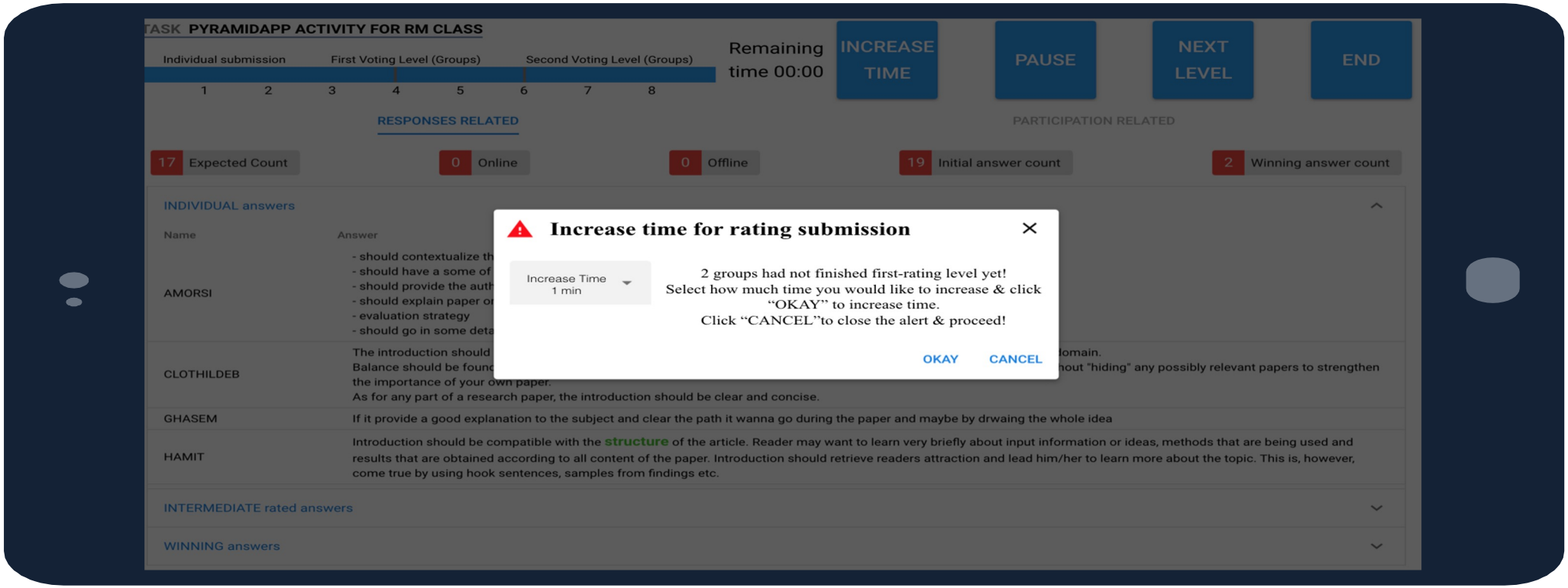
Essential to understand how teachers make dashboard information actionable (Wise and Jung, 2019)

How do mirroring and guiding supports influence the orchestration actions of the teachers?

Orchestration dashboard: PyramidApp



Orchestration dashboard: PyramidApp



Orchestration dashboard: PyramidApp

Amarasinghe, I., Hernández-Leo, D. & Ulrich Hoppe, H. (2021) **Deconstructing orchestration load: comparing teacher support through mirroring and guiding**. Intern. J. Comput.-Support. Collab. Learn

Guiding Condition

- More targeted interventions at the individual & group level
- More interventions (to address needs and optimize time)
- Alerts helped to upfront critical moments reducing the orchestration load (assist sense-making – diagnosis of the situation)
- Receiving alerts about known information did not add value

Orchestration load: multimodal LA

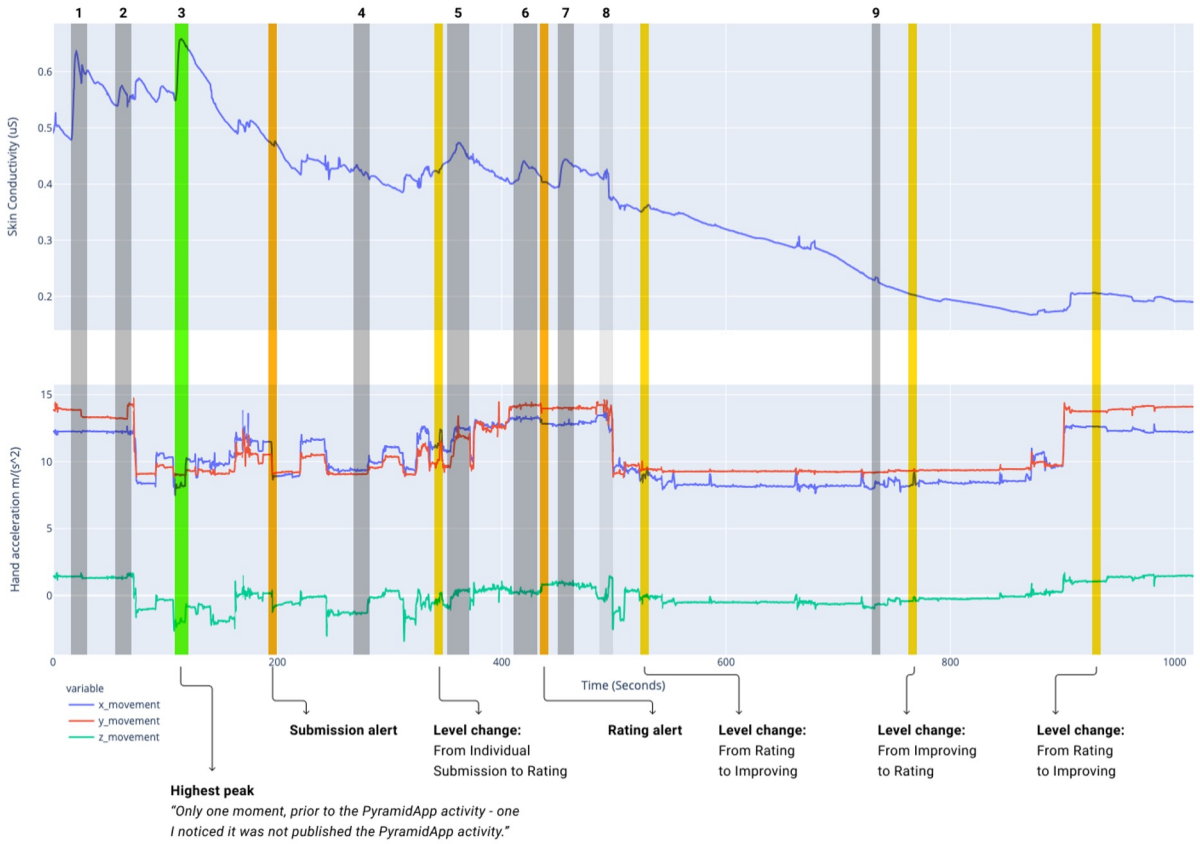
Crespi, F., Amarasinghe, I., Vujovic, M., & Hernández-Leo, D. (2022). **Estimating Orchestration Load in CSCL Situations Using EDA**. ICALT

Over 90% of SCRs concurred with teacher actions related to orchestration.

There were a **higher count of self-reported stressful moments in the mirroring condition.**

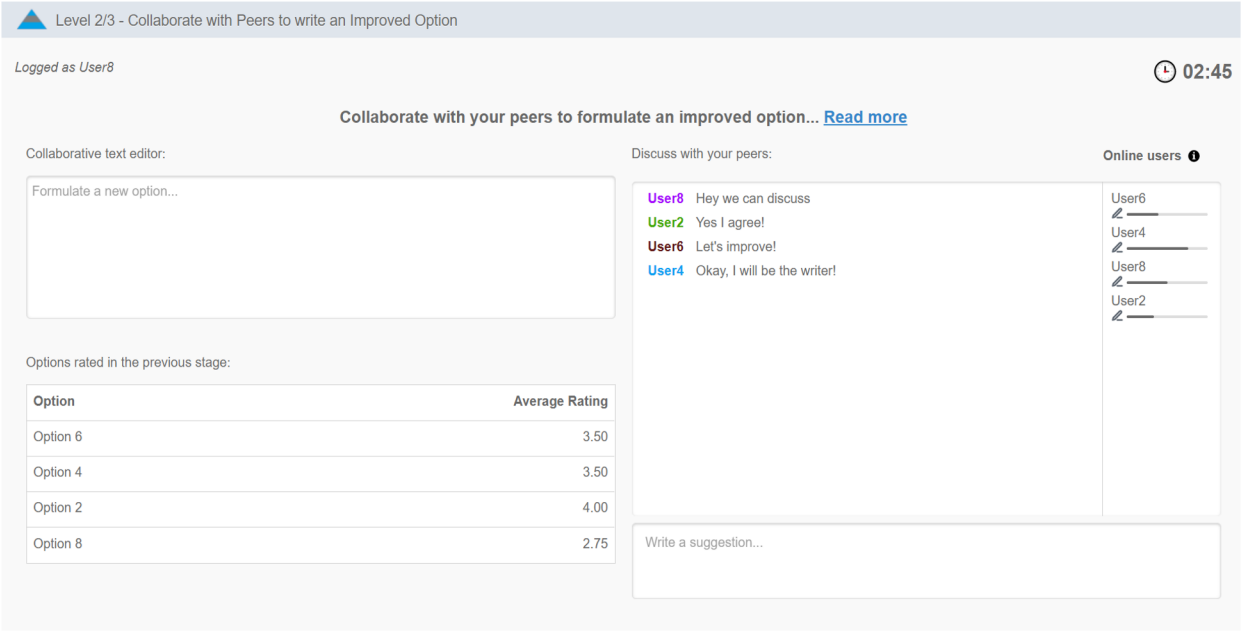
Occurrences related to orchestration:

- Instructing Students
- Time Management
- Technical problems
- Assessing students progress



PyramidApp: about engagement

- Anonymous vs. identified mode (student preferences and behaviour, Valemazan et al., 2022)
- Social awareness (mirroring group participation, Theophilou et al. 2021)
- Playfulness (game mechanics in Pyramid CLFP, Lobo et al, 2021)
- Wellbeing (Hakami, El Aadmi, et al. 2021, 2022)



PyramidApp: about engagement

- Anonymous vs. identified mode
- Your opinion: **Does anonymous mode facilitate inclusion?**

http://tiny.cc/eutopia-inclusive2

PyramidApp: about learning

- The pedagogical envelope (prior activities), type of task, pyramid design elements, engagement, (epistemic) orchestration

Amarasinghe, I., Hernández-Leo, D., Theophilou, E., Sanchez-Reina, R., Lobo, R., (2021) **Learning gains in Pyramid computer-supported collaboration scripts: factors and implications for desig**n, CollabTech.

Albó, L., Beardsley, M., Amarasinghe, I., Hernández-Leo, D., (2020) **Individual versus computer-supported collaborative self-explanations: how do their writing analytics differ?** ICALT

- Teacher-led debriefing

Amarasinghe, I., Hernández-Leo, D., Manathunga, K., Chacón Pérez, J., & Dimitriadis, Y. (2022). **Teacher-Led Debriefing in Computer-Supported Collaborative Learning Pyramid Scripts**. CSCL

Dieckmann, M., Hernández-Leo, D., & Amarasinghe I., (2022) **Flagging** in teacher-facing orchestration dashboards: factors affecting its use in Pyramid CSCL **debriefing**, ICALT.

Learning design technologies: supporting collective and inclusive approaches

Inclusion, multiple perspectives, in this presentation:

- Equal opportunities for participation
- Guidance in designing for learning
- Collective efforts in designing and sharing designs for learning
- Co-design, involving students
- Regulation of learning processes

Design for collaborative learning

- Learning design:
  - Case of designing for effective collaborative learning, favoring equal participation
  - CSCL scripts and patterns, authoring tools
- Community platforms, co-design (also with learners)
- Analytics layers for learning design: community, design and learning analytics
- Design & redesign

Orchestration of collaborative learning

- Need for adaptations in real-time, automatic vs. human-in-control and combinations
- Mirroring vs. guiding dashboards
- Orchestration load
- Factors affecting engagement and learning gains
  - In terms of equal participation: social awareness, socially-shared self-regulation, identification mode

Current/future work includes…

European Conference on Technology Enhanced Learning

↳ EC-TEL 2022: **Educating for a New Future: Making Sense of Technology-Enhanced Learning Adoption** pp 521–527 | Cite as

Exploring Teacher's Orchestration Actions in Online and In-Class Computer-Supported Collaborative Learning

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SPECIAL ISSUE ARTICLE

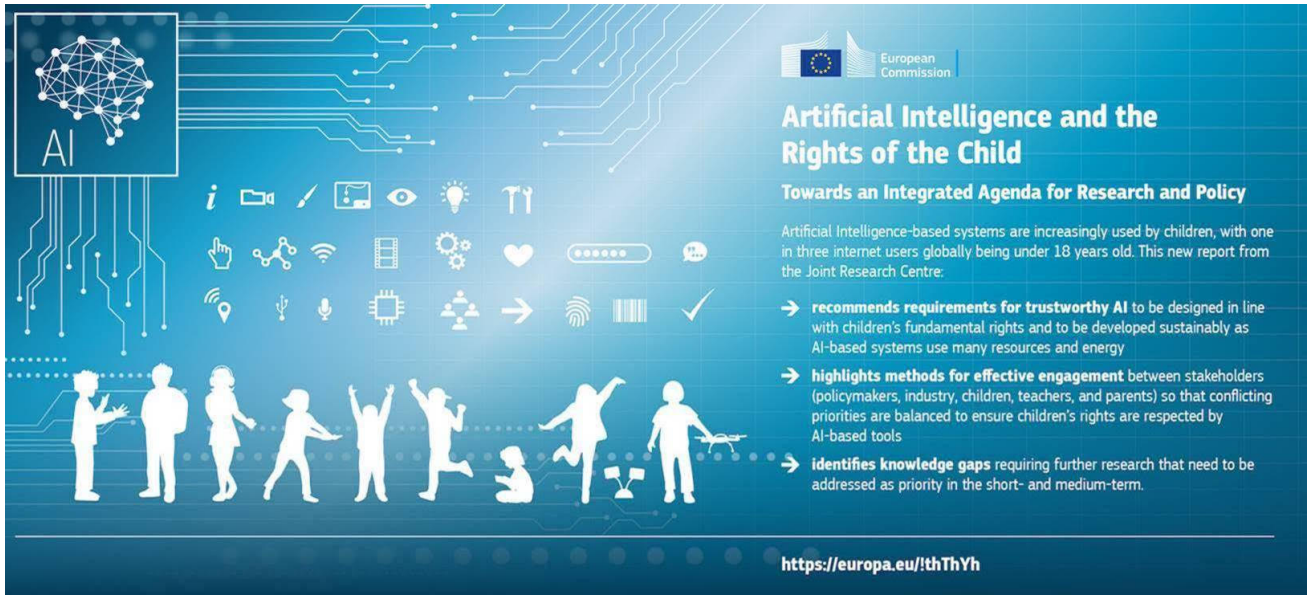
Journal of Computer Assisted Learning

Learning analytics support to teachers' design and orchestrating tasks

Ishari Amarasinghe[1] | Konstantinos Michos[1,2] | Francisco Crespi[1] | Davinia Hernández-Leo[1]

Current/future work includes…

Hernández-Leo, D., (2022) **Directions for the responsible design and use of AI by children and their communities: Examples in the field of Education**, In Charisi, V., Chaudron, S., Di Gioia, R., Vuorikari, R., Escobar Planas, M., Sanchez Martin, J.I. and Gomez Gutierrez, E., **Artificial Intelligence and the Rights of the Child : Towards an Integrated Agenda for Research and Policy**, EUR 31048 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-51837-2, doi:10.2760/012329, JRC127564, pp. 73-74.



Thank you!

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