# Workshop Report: Hybrid Learning Spaces – Data, Design, Didactics

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**Abstract.** This report presents the results of a workshop on Hybrid Learning Spaces (HLS), held in Delft in the Netherlands as part of the EC-TEL conference. A group of experts gathered to exchange their work on various aspects of hybrid learning spaces. During the first half of the workshop we used the format of a writers' workshop for discussing each contribution in detail and providing feedback to the authors. In the second half of the workshop, we started with identifying and sharing our values and visions as a group. Based on these values and visions, we defined design principles and epistemic principles that support these principles. As the last part of the workshop, we worked collaboratively on good practices which were described as educational design patterns. This volume of the workshop proceedings contains this summary paper and nine contributions on aspects regarding pedagogy, technology support and case studies of hybrid learning spaces.

**Keywords:** Design Patterns, Hybrid Learning Spaces, Technology-Enhanced Learning

## 1 Introduction

Technology is permeating physical spaces, augmenting and enhancing learning experiences. At the same time, mobile and pervasive Internet-connected technology (IoT) creates interfaces between virtual spaces and real-world phenomena in which big data is collected. These dynamics give rise to a growing presence of hybridity: the blurring of boundaries between distinct contexts of learning and activity, and the unexpected interleaved experiences they engender (Ellis & Goodyear, 2016; Trentin, 2016). Hybridity is not a technical issue. As Stommel (2012) notes: "The word 'hybrid' has deeper resonances, suggesting not just that the place of learning is changed but that a hybrid pedagogy fundamentally rethinks our conception of place".

Cook et al. (2016) identify two dimensions of hybridity: the interleaving of formal and informal social structures in an activity system, and the combination of physical and digital tools mediating an individual's interaction with the world and society. They argue: "people connect and interact through a hybrid network of physical and technology-mediated encounters to co-construct knowledge and effectively engage in positioning practices necessary for their work" (Cook et al., 2016, pp. 125). Higher education (but not only) recognises the potential of hybrid learning spaces in promoting significant changes in learning, and hybrid pedagogical models are gaining prominence (do Mejía Gallegos et al., 2017). Recent work has begun exploring the nature of hybridity from an educational design perspective (Köppe, Nørgård, & Pedersen, 2017). The COVID19 pandemic has forced institutions to explore new models of educational provision, such as the HyFlex model (Abdelmalak & Parra, 2016), where students can choose between participating in class or online.

Hybrid learning spaces open opportunities and pose challenges to designers of learning experiences. Apart from the complexity of combining multiple modalities to achieve effective synergies, these spaces have a novel quality: activities within them generate data, which can be used to monitor individual and social learning processes, and potentially feed back into them, to enable "double loop learning": awareness and control of the process of learning and teaching itself (Blaschke, 2012). Recent years have witnessed a growing interest in the promise of educational data science (EDS), a term coalescing learning analytics (Ferguson, 2012), artificial intelligence and educational data mining (Cohen, 2017; du Boulay et al., 2018; Levi Gamlieli, Cohen, & Nachmias, 2015; Lim, 2016). In particular, there is an emerging recognition of the valuable intersection between data and educational design (Hernández-Leo et al., 2017; Mor et al., 2015; Toetenel, & Rienties, 2016). While the tradition of EDS originated in the study of virtual learning environments, recently we see first advances into its use in physical environments (Cukurova et al., 2017; Prieto et al., 2018). However, although the correlation between physical space design and educational effect is well established (Tanner, 2000), learning space research is a relatively new field of study that seeks to inform the design, evaluation and management of learning spaces (Ellis & Goodyear, 2016) and EDS has not yet ventured into this domain.

Along with the opportunities that arise from these hybrid learning spaces, there are issues that require an in-depth discussion among the community of researchers, developers, and practitioners in the field. While some of these issues are well understood, others are only beginning to be explored. For example:

- *Personalisation and collaboration*: hybrid learning spaces bring together learners with different constraints, agendas, assumptions, and expectations. Some might be co-located, some might be remote in time and place. How do we cater to such diverse and ill-defined cohorts? How do we leverage this diversity to create effective and powerful learning experiences?
- *Ownership and empowerment*: when we mix learning contexts, e.g. a curricular course and a MOOC, who sets the learning objectives? Who is responsible for monitoring achievement? Who "owns" the space, the curriculum, the content and the data?
- *Representation and interpretation*: How do we map the data we collect to complex learning dynamics? How do we avoid the "streetlight effect", of valuing what we

can measure rather than measuring what we value? How do we derive insights from data, and present them in such a way that will inform and assist learners, teachers, and administrators?

● *Ethics*: what are the risks and consequences of collecting and manipulating data about learners and learning environments? How do we draw the line between assessment, evaluation and surveillance? What are the appropriate modes of behaviour in hybrid learning spaces? Moreover, what is the purpose of education in hybrid learning spaces, where learners come from divergent backgrounds and with different aims?

In September 2019 a unique trans-disciplinary workshop brought together leading researchers and practitioners in this emerging field, to explore the promises and dilemmas it raises from ethical, methodological, ontological, epistemic, pedagogic, and technological perspectives. We received contributions that contribute to a design discourse: design as a practical approach to shaping the future and design as a scientific paradigm, drawing on the traditions of educational design research (Mor & Winters, 2007) and utilising canonical design representations such as design principles and design patterns (Dimitriadis et al., 2009; Falconer et al., 2011; Mor, 2013; Retalis et al., 2006; Warburton & Mor, 2015).

## 2     Workshop Structure

The workshop was structured in itself as a hybrid event. Our collaborative work started in July with a shepherding process for accepted papers after a rigorous peer review process. In early September, all the papers were shared online for peer feedback and discussion. On Sept. 16th we met at the EC TEL conference in Delft. Some of the participants could not attend physically, and joined us by video conference. The day was divided into several sections: plenary talks, a writers' workshop and a pattern storming session.

### 2.1     Writers' Workshop

Following the opening plenary, the first half of the workshop was structured as an agile writers' workshop. Participants broke into three workshop groups and discussed each other's contributions. These discussions did not include presentations of the papers themselves: instead, participants are expected to read those beforehand and prepare comments and suggestions for improvement.

### 2.2     Pattern Storming

The second half of the day built on the insights from the morning to sketch a Signature Pedagogy (Shulman, 2005) for Hybrid learning spaces. Shulman notes that a signature pedagogy has three layers:

● The Surface structure – "concrete, operational acts of teaching and learning, of showing and demonstrating, of questioning and answering, of interacting and withholding, of approaching and withdrawing"

- The Deep structure – "a set of assumptions about how best to impart a certain body of knowledge and know-how", and –
- The Implicit structure – "a moral dimension that comprises a set of beliefs about the professional attitudes, values, and dispositions"

We considered these three layers, and used the following constructs to describe them:

- Value and Vision statements – to describe the implicit structure
- Design Principles and Epistemic Principles – to describe the deep structure
- Design Patterns – to describe the surface structure

## 3 Workshop Results

### 3.1 Writers' Workshops

All papers got feedback and all authors were encouraged to submit their work to the special section of BJET journal on Hybrid Learning Spaces. The accepted papers for BJET are included in the workshop proceedings as extended abstracts. The other revised papers are included as full papers in the workshop proceedings.

### 3.2 Values and Visions

In the first round of the pattern storming session, all participants started to identify their core values  and shared these with the group. The goal was to make the underlying implicit values of the group's practices explicit and to use them for aligning the visions, principles and patterns identified in the next steps.

After a brainstorm phase, all identified values were clustered (see Figure 1) and some common themes emerged.

**Fig. 1.** Clustered values
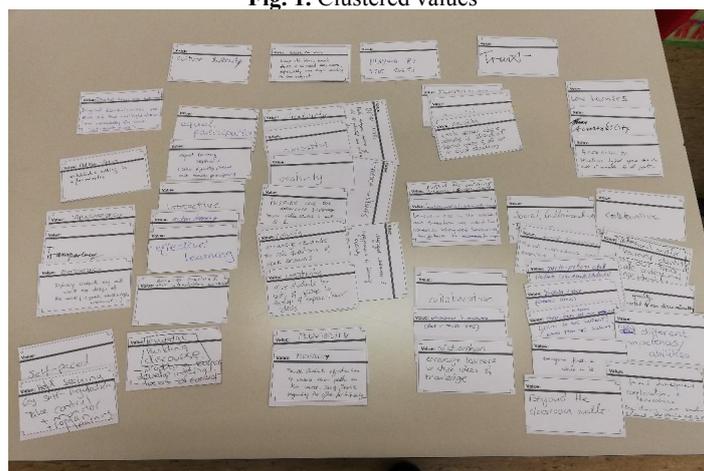
The main themes of the values were:

- Collaboration
- Creativity/curiosity
- Transparency
- Accessibility
- Social diversity
- Equality
- Flexibility

As the next step, the participants identified visions for hybrid learning spaces which activate the previously identified values. These visions comprised both what students and educators will do or express. Visions regarding other stakeholders were also welcome. The participants also linked these visions to specific embodied values. Figures 2-4 show some examples.

**Fig. 2.** Visions from student's perspective
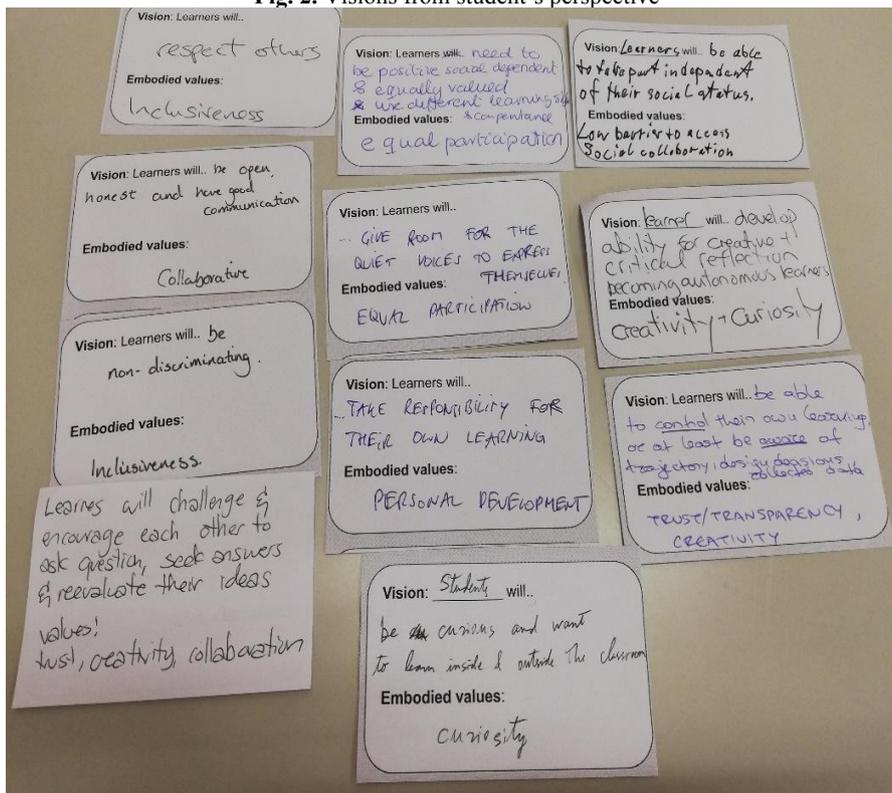
**Fig. 3.** Visions from educator's perspective
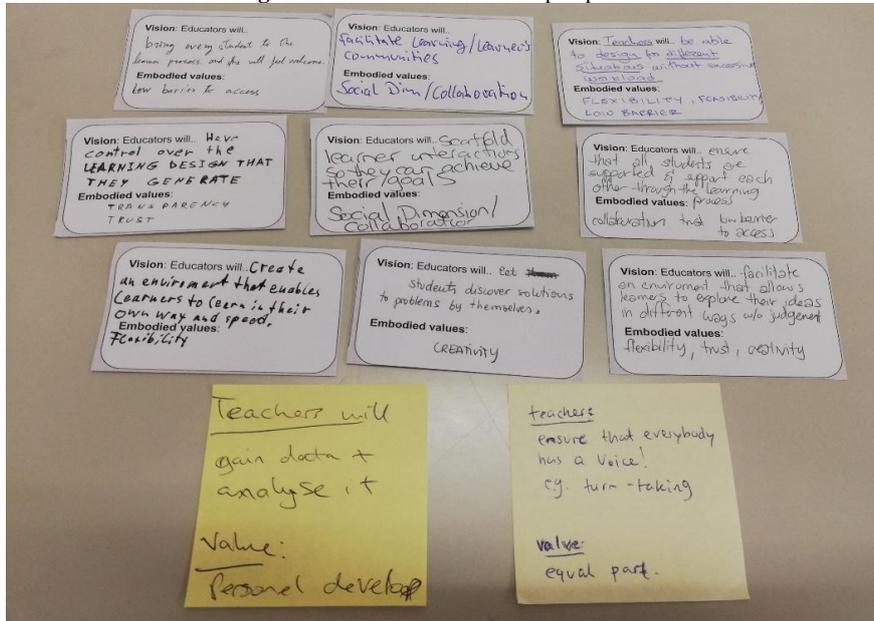


**Fig. 4.** Visions statements for other stakeholders
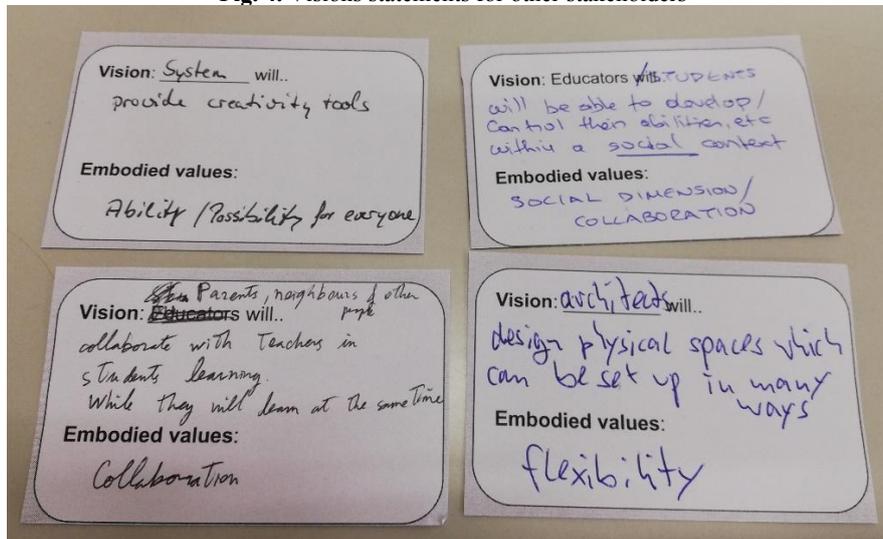


### 3.3 Design Principles

Moving to the deep structure layer of signature pedagogy, the participants worked on potential design principles including consequences of and causes for applying them.

Figure 5 shows a few examples.

**Fig. 5.** Examples of design principles
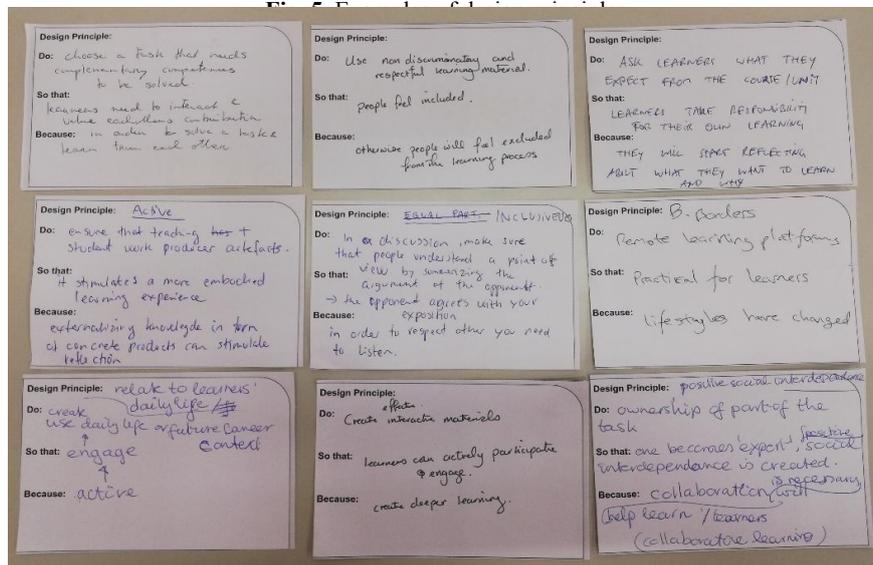
### 3.4 Design Patterns

After values and visions have been identified, the participants collected concrete examples of hybrid education from the group's own development and teaching practice. This resulted in numerous post-its with concrete activities, practices and formats for hybrid education. Some (summarized) examples are:

- Make your own rubric (students make rubrics themselves)
- One avatar for each student and both online platform and physical interactions
- Translate digital activities/concepts into the physical world (as e.g. done in computer science unplugged[1])
- Trash exhibition – using found materials to create artworks and inviting the local community reflecting on topics of interest (a specialization of the design pattern RE-MEDIATION (Köppe et al., 2019))
- Moderating online forums in face-to-face activities/classroom
- Teachers customize the level of control over the activity, guided vs unguided
- Use an app which tracks your location and reacts to it
- Teacher/student gets immediate feedback of the software/hybrid technology used by the students
- Have a plan B without technology
- Remote buddies/body double
- Students receive guidance on demand

There were also some practices collected which already have been described as design patterns, which confirms the validity of these patterns. Some examples are:

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[1] https://csunplugged.org/en/

- Students have control over the seminar activity – part of both CO-CONSTRUCTED CURRICULUM and STUDENTS AS CO-CREATORS OF COURSE MATERIAL
- Create artifacts that can easily move and get referenced through spaces – INTERACTIVE TANGIBLE OBJECTS
- Have an external employer help young graduates to gain practical knowledge – ENGAGING WITH EXPERTS
- Collaborative annotation, using google doc and hyperlinks – COLLECTIVE ANNOTATION
- Provide opportunities for anonymous participation – part of RAPID DISCUSSION
- Giving students digital space to unite participants & discuss each other's ideas – part of STUDENT PROJECT WEBSITE, HYBRID GROUP SHARE and HYBRID CLASSROOM DISCUSSION
- Allow individual learning paths – MULTIPLE LEARNING PATHS

As final activity, four pattern candidates were chosen by the participants and refined towards a full design pattern using the Pattern Writing Sheet from (Iba, 2014). The details of each pattern – context, forces, problem, solution, actions and consequences – were discussed and documented. Figure 6 shows one example of these patterns.

**Fig. 6.** Example pattern

## 4 Papers in this Volume

Besides this summary report, this volume contains nine manuscripts, out of 11 research works presented in the workshop. Four of them correspond to extended abstracts, while the rest of them are full papers.

FULL PAPERS

Estíbaliz Fraca, Maria Kambouri, Nicole Yuen, Rozina Bakirtzoglou, Gavin Mair, Ashley Highmore, Carys Hubbard, and Manolis Mavrikis, "A Hybrid Learning Space for Physically-Active Mathematics: the case of Numberfit" -

*This paper presents the case study of an intervention called Numberfit that aims at capturing primarily students' interest in mathematics by combining team games and physical activity. The authors describe the hybrid learning space that includes an online platform. The changing role of the teacher is examined and some methodological insights are provided for conducting research in relation to student's affect, motivation and behaviour in this context.*

Marianna Ioannou, Andri Ioannou, Yiannis Georgiou and Michael Boloudakis, "Orchestrating the Technology-Enhanced Embodied Learning Classroom via Learning Stations Rotation: A case study"

*This case study presents researchers' and teachers' efforts in orchestrating a technology-enhanced embodied learning classroom in elementary education demonstrating the strategies and methods adopted. The authors contribute to advancing our knowledge of how to improve practice with respect to planning and orchestrating the classroom environment, as new technologies (e.g., motion-based technologies, natural user interfaces) and emerging pedagogies (e.g., embodied learning) find their way into the classroom.*

Christian Köppe and Rody Middelkoop, "On Using Hybrid Pedagogy as Guideline for Improving Assessment Design"

*The authors address phenomena which can be present in assessments of larger assignments and identify dichotomy-thinking as a possible reason. They discuss how Hybrid Pedagogy as a design guideline can help with finding appropriate solutions and provide concrete examples of how it was applied for the design of assessment strategies in a course on software engineering.*

Ellen Rusman and Barbara van den Broek, "'Bridging' social contexts to learn from everyday life (mis)communication incidents: theoretical framing of the design of a digital reflection tool for primary school children with language impairments"

*This work describes a design-based research project where a digital reflection tool was designed to support children with capturing (both positive and negative) (mis)communication incidents they experience during their everyday life, which can become 'artefacts' facilitating reflection with others. Additionally, they report on theoretical concepts that informed the design of the digital reflection tool.*

Sergio Serrano-Iglesias, Eduardo Gómez-Sánchez, Miguel L. Bote-Lorenzo, Juan I. Asensio-Pérez, Adolfo Ruiz Calleja, Guillermo Vega-Gorgojo and Yannis Dimitriadis, "Personalizing the connection between formal and informal learning in Smart Learning Environments"

*This paper focuses on Smart Learning Environments which are aiming at automatically adapting the learning experiences based on the learner's context. The authors explore the information flow needed to model the current context and state of the learner to eventually trigger informal learning interventions.*

EXTENDED ABSTRACTS (the full papers are published in the special issue of the BJET journal)

Laia Albó and Davinia Hernández-Leo, "How Educators Value Design Analytics for Blended Learning"

*In their paper, the authors explore the opinions of teachers regarding the use of design analytics, probably the least explored type of data in educational technology together with community analytics. Specifically, they analyse the value that design analytics can offer in authoring experiences using the edCrumble learning design tool.*

John Cook, Yishay Mor and Patricia Santos, "Three cases of hybridity in learning spaces: towards a design for a Zone of Possibility"

*This work contributes to design discourse by drawing on Educational Design Research (EDR) that has been conducted into what we call a Zone of Possibility (ZoP) over the past seven years. The authors present 3 cases (Confer, ZoP Stokes Croft and Google Lens in HE) that have provided insights to explore the concept of the ZoP and its implications for EDR.*

Liat Eyal and Einat Gil, "Design patterns for teaching in academic settings in future learning spaces (FLS)"

*This work uses a design pattern theoretical approach and looks at the interplay between the space and activity design in future learning spaces. The authors focus on the process of extracting practices as a basis for design patterns: an analysis of narratives, generalization of elements, definition of the patterns and design principles resulting from them on a theoretical level. Four concrete activity design-patterns for teaching and learning in FLS are included.*

Alex Young Pedersen, "Towards a Conceptualization of Hybrid Educational Spaces (HES)"

*The paper introduces the concept of Hybrid Educational Spaces (HES). These spaces are emergent within a specific institutional setting and are the structures that enable the field of Hybrid Education. They involve educational patterns supporting hybrid pedagogy and new concepts of citizenship. The paper argues that HES be distinguished from the Hybrid Learning Spaces in at least two ways which refer to theoretical and practical differences between 'education' and 'learning'.*

Alice Veldkamp, Joke Daemen, Stijn Teekens, Stefan Koelewijn, Marie-Christine P.J. Knippels, and Wouter R. van Joolingen, "Escape boxes: bringing escape room experience into the classroom"

*The authors explore the implementation of escape rooms in education in the form of escape boxes. They describe the design process and provide concrete examples of escape box implementations.*

## 5    Summary and Future Work

The Hybrid Learning Spaces workshop at EC TEL opened a timely and important conversation. The echoes of this conversation have already reverbated in a special issue of a learning sciences journal, and will be further developed in an upcoming book. In particular, we see an acute need for a cross-disciplinary exploration and articulation of a design language for hybrid learning spaces. This design language should include a signature pedagogy, encompassing the values, beliefs, principles and patterns of educational practices within these spaces, and the corresponding guiding frameworks for designing the physical and virtual spaces which host these educational practices. We hope that this collection of papers, along with the BJET special issue and the upcoming book, will contribute towards this end.

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