Development of an Instrument for Evaluating Learning Experiences in a Hybrid Learning Environment

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Abstract: An interest in hybrid teaching environment (HLEs) has emerged, particularly since 2020. A previous study on HLE during the Covid-19 period identified several evaluation challenges. These challenges stem from the composite nature of the environments (combining human, technical, and pedagogical elements) and their hybridity (varying degrees of support, openness, and presence-distance interaction). The literature also highlights methodological shortcomings. The learning experience in a blended context is poorly defined, and data collection often prevents comprehensive analysis. This paper specifically addresses the following research question: how can we measure the learning experience in a blended learning context? The state-of-the-art review identifies key dimensions for consideration, emphasizing the need for multidimensional approaches to gain a deeper understanding of the learning experience. We aim to apply the designed instrument in research in three different contexts. Ultimately, this paper seeks to enrich our understanding of the complexities surrounding the learning experience in blended learning and to provide recommendations that support teachers' pedagogical practices.

1 INTRODUCTION

The recent interest in hybrid learning environments (HLEs) is partially fuelled by the COVID-19 pandemic. Our previous research, studying and assessing HLEs during forced distance learning (Costa et al., 2022) lockdown, revealed two key challenges in evaluating these learning environments. (1) Existing evaluations often focus on either the technical aspects (tool usability or utility for instance) or participant (learners, teachers or academic staff) feelings, neglecting the *environment*'s holistic nature that encompasses both technology and social interactions. (2) Teachers in our study reported implementing innovative, student-centred practices, while students felt disoriented by the lack of a familiar lecture structure. This aligns with Carreras and Couturier (2023), who observed universities focusing on content provision and highlighting the need for teacher development on instructional design to optimize the learning experience. Additionally, Peltier (2023) echoes our findings regarding differing perceptions of presence and distance between learners and teachers.

A review by Raes *et al.* (2020) highlights the potential of hybrid learning environments. Such HLEs offer both organizational benefits (e.g. efficient teaching practices) and pedagogical advantages (e.g. improved learning quality). However, the technical foundation of these environments requires adjustments for both teachers and learners. For example, both groups often report diminished social presence due to reduced or absent visual and auditory cues compared to traditional classrooms. Addressing these challenges, Raes *et al.* (2020) propose key research recommendations for HLEs:

- Expand and diversify data collection;
- Prioritize empirical and longitudinal studies

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- Employ multimodal analysis to capture the complex nature of engagement, social presence, and belonging
- Evaluate the effectiveness of specific teaching scenarios within HLEs
- Consider the unique possibilities and limitations of each learning environment within its institutional context.

Our paper tackles this research question: *what aspects should we consider when evaluating the learning experience in a hybrid learning environment to support continuous improvement?* Identifying these crucial dimensions helps pinpoint where data collection is necessary to assess the effectiveness of the hybrid approach. Ultimately, these insights can inform targeted training and support for teachers in instructional design within hybrid settings.

This proposal focuses on evaluating HLEs within higher education, encompassing diverse academic fields yet sharing a common need for assessment. We consider three specific cases:

1. The START european project supports teachers who support students transition from high school to university. It utilizes online resources in various formats, complementing face-to-face courses and introducing elements of hybridization. For instance, it facilitates the integration of students' personal experiences into the academic sphere, prompting teachers to acknowledge the transitional process. To enhance the effectiveness of these resources, analyzing the combined impact of disciplinary and personal aspects is crucial.

2. The projects supported by CAPSULE include some initiatives led by the faculty of Science and Engineering at Sorbonne University that aim to transform existing bachelor's degree courses from purely face-to-face delivery to HLEs formats. This initiative adresses the question: how should we evaluate these ongoing transformations, which respond to the needs expressed by both teachers and instructional designers?

3. The Learners Portal project arose from concerns about low student engagement with the resources provided for hybrid learning courses. An alumni survey's preliminary results confirmed this, also revealing a lack of dedicated learning communities for these cohorts, potentially hindering the development of crucial autonomous and self-regulated learning competencies.

The next section will present the review of the current literature on learning experience evaluation and then we introduce the foundation of our proposed evaluation tool.

2 STATE OF THE ART

2.1 Challenges in Measuring the Learning Experience of Hybrid Learning Environments

The study of learner experience within HLEs reveals a diversity of approaches. This variety stems from differing theoretical frameworks and the absence of a single, universally accepted definition for "blended learning" (BL). As Eggers *et al*. (2021, p. 175) rightly stated in their systematic review, "the definition of BL has long been confusing." Notably, French-speaking researchers and practitioners (Eggers *et al*., 2021; Peltier & Séguin, 2021), have widely adopted the term "dispositif hybride de formation" (hybrid learning environment) since its introduction by the Hy-Sup collective (Deschryver & Charlier, 2012).

The evaluation of HLEs raises the issue of the evaluation concept's polysemy, highlighting the need to clarify which elements are being measured. Lachaux (2023, p. 6) defines its multifaceted nature as focusing on continuous improvement, acting as "an intermediate diagnosis (...) on the lookout for anything that is not working, or working well enough, with a view to improvement". However, two systematic reviews (Buhl-Wiggers *et al.*, 2023; Raes *et al.*, 2020) reveal the limitations in existing research. Most studies rely on qualitative methods and case studies, limiting generalizability (Raes *et al.*, 2020). Additionally, longitudinal studies and assessments of long-term effects are scarce (Buhl-Wiggers *et al.*, 2023).

Further, Lajoie *et al*. (2021) highlight a critical issue in distance learning research: inconsistent descriptions of the learning environments themselves hinder accurate assessment of their impact on student learning. They also pinpoint the lack of attention to pedagogical design, proposing a model incorporating students' socio-demographic characteristics and course pedagogy to predict potential dropouts.

Defining the learning experience in HLEs remains too a subject under discussion. Many studies equate it with satisfaction or performance, often linked to learner engagement. For instance, Wu *et al.* (2010), cited by Bouilheres *et al.* (2020), emphasize how perceived success and learning environment impact overall satisfaction. Similarly, Xiao *et al.* (2020) directly link satisfaction and learning experience to students' ability to explore resources and engage cognitively. However, alternative perspectives shift the focus from satisfaction to student perception and agency. Molinari and Shneider (2020) define it as "the way learners perceive and give

meaning to the learning situation and the emotions they feel" (p. 3). Authors favoring a learner-centered approach (Boud & Prosser, 2002; Charlier *et al.*, 2021; Molinari & Schneider, 2020; Peraya & Charlier, 2022) stress the importance of designing HLEs around the students' perspective. In this perspective, teaching and learning processes as inseparable and learning occurs within a specific context, shaped by diverse student perceptions. Therefore, "students perceive the same learning context in different ways, and this variation fundamentally impacts their approach to learning and the quality of their outcomes" (Boud & Prosser, 2002, p. 238).

2.2 Key Dimensions for Assessing the HLEs Learning Experience

A comprehensive review by Schneider & Preckel (Schneider & Preckel, 2017) analysed 38 meta-analyses encompassing over 2 million students in face-to-face courses to explore factors contributing to academic success. Their findings identified 105 relevant variables, highlighting the strong correlation between "social interaction," "course design," and "performance." The study emphasizes that students' performance aligns with stimulating learning environments characterized by clear information presentation, active student interaction, and cognitively engaging activities. Additionally, students with high performance often display positive self-efficacy, strong prior academic achievement, and a strategic use of learning strategies. Building upon these findings, authors like Bonfils & Peraya (2011), Charlier *et al.* (2021), De Clercq (2020), and Tricot (2021) underscore the importance of considering students' characteristics to design learning scenarios that effectively meet their diverse needs.

The variables involved in the learning experience are diverse in nature. While designing a *good* course is crucial, effective learning experiences go beyond mere planning. As highlighted by several researchers (Amadieu & Tricot, 2014; Deschryver, 2008; Entwistle & McCune, 2013; Viau *et al.*, 2005), the real challenge lies in encouraging student engagement with activities that require active participation. This reluctance often stems from a lack of developed skills, including digital competencies, self-regulation, autonomy, and collaboration (Kaldmäe *et al.*, 2022). This underlines the inherent complexity of the issue, requiring a systemic understanding of the diverse and dynamic variables involved.

Schneider & Preckel (2017) emphasize the crucial role of effective implementation in maximizing the impact of different teaching methods on student performance. Their analysis of numerous studies revealed moderating effects for almost all teaching methods, implying that their effectiveness hinges on how they are delivered. Notably, teachers of high-performing students invested heavily in designing well-structured courses with clear learning objectives and frequent, targeted feedback. This aligns with other research highlighting the importance of continual professional development for higher education instructors (Romainville & Michaut, 2012). Such training equips teachers with the skills and knowledge needed to effectively implement diverse teaching methods, ultimately fostering student success.

Building on the concept of learner-centred environments, Boud & Prosser (2002) identify four key areas to enhance the student experience in technology-rich settings. Two of these areas directly address learner engagement and consideration of individual learning contexts.

2.2.1 Involving Students

Building upon the foundation laid by the Hy-Sup collective (Deschryver & Charlier, 2012), recent research emphasizes a learner-centred perspective to understand how HLEs impact students (Charlier *et al.*, 2021; Peraya & Charlier, 2022). This necessitates understanding students' expectations, prior knowledge, and sense of self-efficacy (Bandura, 2003; Follenfant & Meyer, 2003; Jackson, 2002; Lécluse-Cousyn & Jézégou, 2023). Furthermore, Viau *et al.* (2005) advocate for designing meaningful learning activities that students perceive as valuable. This means highlighting their usefulness, interest, perceived cost, and importance, ultimately fostering student motivation (De Clercq, 2020; Entwistle & McCune, 2013; Viau *et al.*, 2005).

Beyond learner characteristics, several design aspects of HLEs influence student engagement. One key factor is the degree of course openness, which Jézégou (2021, 2022) links to students' perception of organizational and relational proximity (Brassard & Teutsch, 2014; Moore, 2003). To assess this, Jézégou's GEODE evaluation system (2021) proposes three dimensions:

- Spatio-temporal openness; flexibility in accessing learning materials and engaging in activities (time, place, pace).
- Pedagogical openness; freedom in learning objectives, sequence, methods, formats, content, and evaluation.

- Openness in mediated communication; choice of media, communication tools, and resource interaction.

Research on factors influencing student success in HLEs has explored various elements. Studies have examined how engaged and motivated students are in the learning process (Ames, 1992; Elliot, 1999; Houart *et al.*, 2019). Others dive into the different ways students approach learning and how it impacts their success (Biggs, 1987; Entwistle & McCune, 2013). Research (Pirot & De Ketele, 2002) highlight the importance of pre-existing knowledge and skills developed in earlier education, including time management, organization, and cognitive skills. This aligns with research emphasizing the connection between learning strategies, self-regulation, and academic success (Cosnefroy, 2010; Cosnefroy *et al.*, 2018; Eggers *et al.*, 2021; Zimmerman, 2000).

2.2.2 Recognising and Integrating Students' Learning Context

Hybrid learning environments (HLEs) exist within a complex ecosystem. Recognizing this, evaluation must consider not only the pedagogical implementation but also the material and human contexts of the students involved. For example, does the activity align with students' current circumstances, considering task demands and resource availability? Do assessment activities accurately reflect learning outcomes and allow for the demonstration of high-level achievement? As Peraya & Charlier inquire, how does the "current diversity of learning spaces transform the student experience"? (Peraya & Charlier, 2022, p. 38). While research highlights these crucial perspectives and challenges, methodological guidance on data collection remains scarce.

Building on the previous points, Boud & Prosser (2002) advocate for two additional design features: challenging activities and opportunities for active practice. These elements aim to enhance student learning by promoting deeper cognitive engagement (Chi & Wylie, 2014; De Clercq, 2020; Vellut, 2019). This approach encompasses tasks that allow students to demonstrate their learning, receive feedback, reflect on their progress, and gain confidence through hands-on practice.

2.3 Instruments Used to Assess the Learning Experience in an HLE

Two main approaches exist for collecting data on students' learning experiences in HLEs.

1. Observed data: This mainly involves analysing traces left by students in Learning Management Systems to assess online participation in learning activities (Bennacer, 2022). Understanding the meaning behind these traces is crucial, but interpreting these traces requires careful consideration of ethical and interpretive dimensions (Pierrot, 2019). Additionally, the Hy-Sup collective (2012) proposes a typology based on observing both learners and teachers, using 14 items to categorize 6 types of HLEs. This helps guide improvement in course design, but different perceptions can arise from its sole use (Pierrot et al., 2023).
2. Self-reported data: This involves collecting student data through questionnaires or qualitative methods like interviews (individual or group). For example, evaluating learning strategies often relies on questionnaires with statements and Likert scales to express agreement or disagreement (Cosnefroy, 2010; Cosnefroy *et al.*, 2018; Eggers *et al.*, 2021; Zimmerman, 2000). However, limitations include the declarative nature of the data and potential respondent drop-off due to lengthy questionnaires, which can compromise generalizability.

Our review of the current research allows us to identify major dimensions for evaluating the learning experience in HLEs, along with potential pitfalls to avoid. We define the learning experience as students' perception, understanding, and interaction within an HLEs, leading to varying levels of engagement with their learning.

For characterizing the instructional design, we adopt the Hy-Sup collective's (Deschryver *et al.*, 2012) theoretical framework. The 14-question self-assessment tool previously mentioned distinguishes between 3 teaching-centred and 3 learning-centred types, also highlighting nuanced differences in five dimensions (presence-distance articulation, mediation, mediatization, support, and openness).

We propose enriching this framework by incorporating the learners' perspective, specifically focusing on variables that enhance their engagement within a given HLE context. Additionally, we suggest complementing perceived data with observed data to strengthen the evaluation process, as defined by Lachaux (2023).

3 METHODOLOGY AND FUTURE WORK

Designing our HLEs learning experience evaluation tool involved leveraging the iterative strengths of design-based research (Amiel & Reeves, 2008). This

means merging research insights with practitioner input through a cyclical process. As suggested by vom Brocke *et al*. (2020), the process is cyclical as it adapts through use.

Figure 1: DBR method used in the study (adapted from Sanchez, 2022).

A core element of this approach is our theoretical model built around the key dimensions of the HLE learning experience. This model served four key purposes: (1) identifying main considerations for evaluating the learning experience, (2) guiding the pedagogical design of the HLE itself, (3) integrating mechanisms for observing the learning experience during implementation, (4) enabling a multidimensional analysis of the collected data (see Figure 1).

We first took up the dimensions identified by the Hy-Sup collective (Charlier et al., 2021; Deschryver & Charlier, 2012; Peraya & Charlier, 2022) to develop our theoretical framework. To enhance our understanding of students' perspectives in HLEs, several new dimensions beyond those already explored seem crucial, aligning with Boud & Prosser's (2002) recommendations. These include individual characteristics, skills and feelings of self-efficacy concerning the proposed activities (skills relating to the nature of the task and techniques for the tools that instrument them), considering their expectations in terms of learning, or even their learning context.

Figure 2 shows an extract from our evaluation model designed to capture different aspects of the learner experience in HLEs. The model's snippet focuses on measuring learner involvement and the dimensions of the meaning of the activity, the feeling of self-efficacy, the openness of the course and in-depth learning. The model thus combines dimensions relating to learners and others relating to the technical environment on which the HLE is based. In addition, the sub-dimensions identified are based on observable elements (e.g. explicitness of target skills) and other perceived elements (usefulness of the activity).

Building on the research reviewed earlier, our approach emphasizes using a mixed-method approach with data triangulation. This combines multiple data collection methods, allowing us to compare analyses of the same element from different perspectives. This supports the objectivity and richness of our findings while capturing the complexity of the HLEs learning experience (Bobillier Chaumon, 2016).

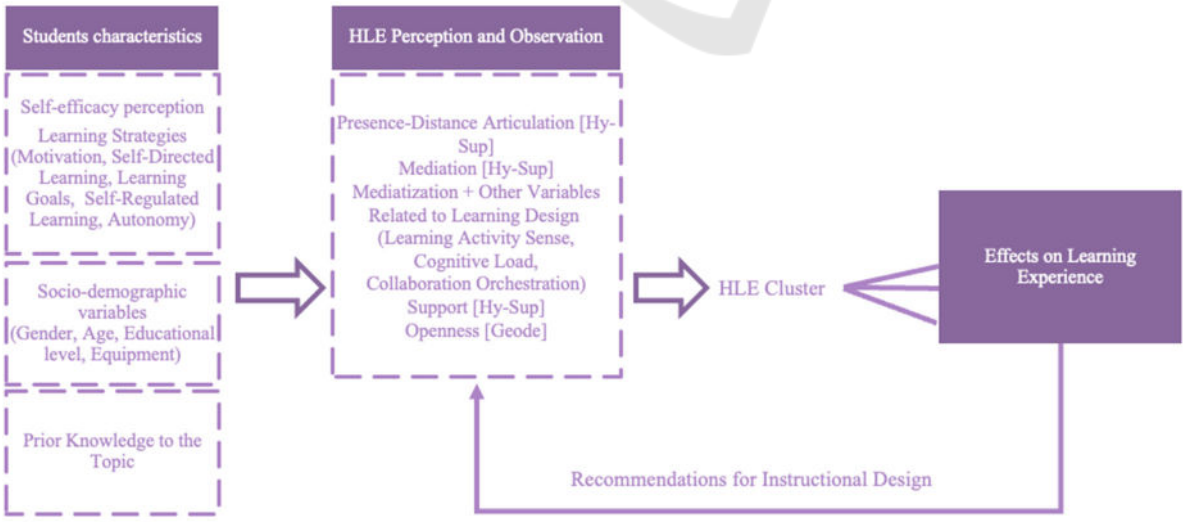

Figure 2: Extract from the theoretical model of the learning experience in an HLE.

The rest of the work will consist of defining, the specific data collection methods for each dimension of the proposed model. Finally, we will implement the designed tool in our own educational contexts to test its effectiveness in real-world settings.

This paper delves into the existing literature to identify the main dimensions for a multidimensional evaluation of the HLEs learning experience. This exploration produced a framework encompassing various dimensions and sub-dimensions that influence and inform how students learn and engage in HLEs settings. In answer to our research question (namely what aspects to consider when evaluating the learning experience in a hybrid learning environment for continuous improvement?), our research suggests focusing on several dimensions: (1) consider individual learner characteristics, (2) investigate learner involvement and engagement, (3) assess course potentialities in terms of in-depth learning, (4) evaluate technical environment features and (5) combine subjective with objective data for a richer understanding of the learning experience. Based on these guidelines, our framework serves as the foundation for a tool we are developing to measure the learning experience. This tool aims to surpass the methodological limitations of commonly used data collection methods in the field. In the next stages, we will apply, refine, test and validate this tool. Ultimately, our work seeks to deepen our understanding of the multifaceted HLEs learning experience. This will allow us to provide valuable recommendations for pedagogical engineering and empower teachers with self-reflection tools to enhance their teaching practices.

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