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The lesson learned:  
What we have learned  
from the pandemic  
and how to innovate  
schools and universities  
in order to overcome it

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# Index

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## *Editorial*

- The lesson learned: What we have learned from the pandemic and how to innovate schools and universities to go further* 5  
Graziano Cecchinato, Juan González-Martínez

## **ARTICLES**

- Teaching and learning during the Covid-19 pandemic: University students' perspective on phase 3* 10  
Cristina Zucchermaglio, Francesca Alby, Filomena Marino
- Distance learning in Higher Education during the first pandemic lockdown: The point of view of students with special educational needs* 30  
Fabiola Silletti, Giuseppe Ritella, Barbara Iacobellis, Cristina Semeraro, Erica Episcopo, Rosalinda Cassibba, Gabrielle Coppola
- Performing arts as a tool for university education during a pandemic: Moving from an in vivo to an in vitro modality* 47  
Laure Kloetzer, Ramiro Tau, Joelle Valterio, Simon Henein
- Online learning in kindergarten during Covid-19: Teachers' experience and perception in Italy* 69  
Sabrina Panesi, Chiara Fante, Lucia Ferlino



<i>Italian parents' perception about learning practices and educational effectiveness of remote schooling during the first lockdown</i>	87
Manuel Gentile, Vincenza Benigno, Giovanni Caruso, Antonella Chifari, Lucia Ferlino, Giovanni Fulantelli, Mario Allegra	
<i>Children's digitally mediated perezhivanie/enchantment in backyard excursions to "nature"</i>	109
Peter Renshaw, Kirsty Jackson, Harriet Mortlock, Ron Tooth	



# Performing arts as a tool for university education during a pandemic: Moving from an *in vivo* to an *in vitro* modality

Laure Kloetzer\*, Ramiro Tau\*, Joelle Valterio\*\*, Simon Henein\*\*

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## Abstract

This paper analyses how a course on improvisation and collective creation in engineering addressed to master's students in Switzerland moved online. The course offers an experience in the field of performing arts, through embodied and situated activities, and the opportunity to reflect on the process of collective creation, a fundamental aspect of engineering practice often neglected in engineering training. The restrictions imposed by the 2020 pandemic forced its migration to an online format. We explore whether it is possible to maintain online a pedagogical proposal centered on embodied and face-to-face interaction, and what such a course might bring to the students. Using data collected during Spring 2020 (especially a focus group, video-recorded feedbacks and reflective diaries written by the students), we analyze the continuities and discontinuities between the two modalities. We show how the socio-material transformations implied by the online interactions altered the interactions taking place, discuss the resultant opportunities and novelties offered by the on-

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line modality. We highlight that the apparent success of this migration to an online format overshadows the strong collective efforts needed from both students and teachers to maintain the key features of the course (playful experimentation, being inspired by others, horizontality of relations, trust, collective practice, improvisation).

**Keywords:** Higher Education; Online Education; Improvisation; Performing Arts

*L'important ce n'est pas ce qu'on a fait de nous,  
mais ce que nous-mêmes nous faisons de ce qu'on a fait de nous.*

J. P. Sartre

## Introduction

Arts-based approaches to teaching make use of artistic methods in education, including drama, poetry, photography, puppetry, film-making, collage, drawing, painting, music improvisation, dance, etc. Although these approaches have been familiar for long in some areas of education (see for example Heathcote, 1991) they are still unusual in Higher Education outside the field of arts (Joegschies et al., 2018). Some notable examples include using drama to teach history (Taylor, 2008), archeology (Trimmis & Kalogirou, 2018), psychology (Kloetzer et al., 2020) or social science theory (Gravey et al., 2017); poetry to teach social workers (Parker, 2020); dance to teach engineers (Baudin, 2016) and nurses (Winther, 2015); performing arts in medicine education (Hooker & Dalton, 2019) or language teaching (Mentz & Fleiner, 2019).

This article examines a university course on improvisation and collective creation, addressed to master's students of the *École polytechnique fédérale de Lausanne* (EPFL), in Switzerland (Feraud et al., 2020; Kloetzer et al., 2020). This elective annual course, titled "*Collective Creation: Improvised Arts and Engineering (Improgineering)*", is open to all first-year master's students, with classes held once a week throughout the academic year. It is part of the EPFL's Social and Hu-

man Sciences Program dedicated to all Masters students. The course is supported and hosted by a theatre located in Lausanne named *Centre d'art scénique contemporain* (Arsenic), a well-known incubator of contemporary performing arts. The number of participants is limited to 25 (in 2020: 7 women and 18 men), in order to be compatible with the size of the studios and to allow for the creation of a “tight” group of students.

During the first semester, the workshops explore improvisation in dance, theatre, and music. Additional lectures cover the dramaturgy and sociology of improvisation, the role of improvisation in engineering design, and creativity in science. During the second semester, students work in fixed groups of three to five, towards an improvised performance based on physical artifacts they have created. The task is to create a collective 12-minute performance, in which “all performers are physically present on stage during most of this duration; actions performed on stage are improvised; an artifact designed and realized by the students is present on stage; and the installation and removal of the artifact from the stage lasts less than 2 minutes to allow for the continuous presentation of all performances in a row” (Kloetzer et al., 2020).

This pedagogical proposal partially subverts university logics and traditional teaching strategies. Usual academic norms are suspended: instead of the classroom, the course takes place in a theatre studio; instead of lectures, there are workshops in which students and teachers are equally involved; instead of fixed curricular contents, the course offers the opportunity to participate in a performative experience; instead of traditional evaluations, students are required to write a diary based on their reflections about the process and to participate in a final public improvisation on stage. Within this framework, the main goal is to offer the experience of collective creation and improvisation, but also the opportunity to reflect on this practice in order to highlight aspects of the collective creation process in engineering, which are often neglected in training and professional work (Hofstein & Lunetta, 1982; Nersessian, 2010). In other words, the course is conceived “as a tool to discuss the collective process of creating something in engineering” (Feraud et al., 2020, p. 28).

The course tries to bring together two worlds that are usually presented as antithetical: that of improvisation, with its dimensions of spontaneity, fugacity, and relationality, and that of rational and mediated planning, which leads to knowledge construction and concrete products that transcend the sphere of their creation (Cunha et al., 2002). The complementarity between improvisation and planning has been shown previously (Leone, 2010; Sawyer, 2004), although it is not always clear how these two forms of organizing actions can be fruitfully coordinated in the field of education (Holdhus et al., 2016).

This pedagogical proposal implies spatio-temporal transformations. Firstly, it supposes a displacement of space, both physical and symbolic. In contrast to regular classes, these course activities take place in a theater, outside the university. The material configuration of this different environment—its location, ground, kind of movements that the spaces allow, type of objects and their disposition—constrains and enables certain behaviors and attitudes, because of its materiality and because of the social meanings it supports. The choice of a theater was based on this general principle: interactions are modulated by the environment in which they occur. In other words, “the space in which the students deploy their actions intervenes in the definition of the limits of possible actions. The logic and the norms attributed to space define, as a continent with its limits, the possible actions... consequently, one way in which university logic can be subverted seems to be, in our cases, the migration towards spaces conceived for other types of interactions” (Tau et al., 2021). In addition, this decentration acquires a less concrete form: space imposes orientations to action not only through its materiality, but also through the meanings and values that it represents. The subjects’ assumptions regarding the significance and meaning of the space they inhabit will orient their potential interactions, promoting or restricting certain uses, languages, behaviors, attitudes, and social traditions. These constraints, imposed to action by the symbolic dimension of the available space, seem as relevant as the restrictions imposed by its physical materiality.

Secondly, regarding time, the course implies a synchronization of the participants’ activities: it requires that a large segment of the interactions take place *in vivo*. The course configures a relational space,

in which participants' simultaneous interaction plays a critical role. On one hand, the proposed activities implicate teamwork. Creation as a collective process means that participants negotiate their perspectives and build from others' actions. Decisions are responses to what is offered by others and by the context. On the other hand, improvisation requires the capacity to enter an instant relationship with one's own body and the bodies of others, a process conceptualized as "sense-ability" (Martin, 2021).

In March 2020, the restrictions imposed by the Covid-19 pandemic forced the migration of the course to an online format. The teachers rapidly devised a strategy to continue the course using different communicational tools. Thus, a course deeply engaged with synchronic embodied activities had to be redesigned for virtual channels. The issue is whether it is possible to maintain an online a pedagogical proposal originally centered on face-to-face interaction. Considering this problem, we will discuss the socio-material transformations of the online course, focusing on the dimensions of *space* and *time*, and the perspective of the students on these transformations. To do so, we will analyze in particular students' diaries, focus group and video-recorded feedbacks of the course, paying special attention to continuities and discontinuities between the two course formats—in-theater vs. online—, and to the novelties appearing in this online migration. Finally, we discuss what made this online move possible in this specific context, and whether the online use of performing arts could be extended to purely virtual courses. This research is part of the ASCOPET research project (Les Arts de la Scène comme Outil Pédagogique dans l'Éducation Tertiaire [Performing Arts as Pedagogical Tools in Higher Education], EPFL and University of Neuchâtel, 2018-2021).

## From "in vivo" to "in vitro"

The general health measures taken by Swiss universities during 2020 in response to the coronavirus pandemic led to the cancellation of all face-to-face university courses. Classrooms were closed and all courses had to be adapted to a new form of education, mainly mediated

and supported by distance communication devices. The restriction of meetings required the migration of courses to a “virtual” format (Schlemmer et al., 2015).

Of course, many of the tools widely used for e-learning are asynchronous: recorded classes, films, course reading materials, virtual forums, among others. In these cases, teachers and students access the platforms at different moments. For videoconferences or live streaming, the connection time is synchronized. However, in this modality of temporal coexistence there is obviously still a spatial separation and a time lag. Each participant accesses from a different material and symbolic context: from the intimacy of their homes, public offices, libraries, etc. In some instances, mobile devices such as telephones or tablets allow a connection from open spaces, such as parks or public squares. Regardless of whether communication is synchronous or asynchronous, interactions are mediated or buffered by the remote communication devices. This movement from in-presence interaction to online mediated interaction obviously modifies didactic conditions. It represents not just a simple variation in communication channels, but a serious obstacle to develop the pedagogical proposal of the course. In fact, it threatens the main premise on which the course is based.

Interestingly, the Improengineering course was first completely cancelled by the EPFL authorities (March 15, 2021). However, at this point, Simon, the teacher in charge of the course, communicated with the students of the course through a videorecording: he acknowledged this decision, calling it “a contingency” (in French, “un imprévu”) but wished “to bring this semester to an achievement rather than an interruption”. He suggested three ideas to build on the work done so far despite the end of the course: preparing a publication of existing segments of students’ diaries (to be done by the teachers); keep writing the ongoing diaries, on a free basis (to be done by the students); and engaging together in the production of “a collective art product this semester” (to be done together). Ten days later (March 25, 2021), the teachers learnt that the course would finally be authorized in an online format, with no physical contact nor presence on the campus. Simon addressed the students again to resume the course: he

called this “a resurrection” and “a second contingency”. He presented the new format mostly as a continuity: the groups would stay the same, as well as the goal of the course, i.e. the production in groups of a public performance with all team members, based on improvised action. He commented: “We will fully respect the social distancing rules but exploit these new constraints as we have learnt to do”. He turned the new rules as an opportunity to explore the importance of physical presence and bodily communication, which had been central in the course so far, through their suppression: the students were encouraged to analyse in their diaries the contrast between the first in-theatre part of the course, and the second online part of the course. The outcome of the course was transformed into a videorecording, which would be made publicly available at the end of the semester. The teachers, Joëlle and Simon, formed a 7th group that also produced weekly videos.

Concretely, each group transmitted to Joëlle and Simon, every Tuesday before midnight a video of 3-4 minutes, presenting their work in progress. Every Wednesday between 4.30pm-6pm, each group had a 20-minutes Zoom appointment with the teachers to discuss the work in progress, based on the video delivered the day before. The weekly videos were shared with the class on Vimeo (with password) to feed collective inspiration. The partners of each group exchanged improvised filmed sequences with each other, to which everyone responded by editing the received material or creating a new clip, in order to recreate the improvisational dynamics of live interactions. Eventually, the six groups of 3 to 5 students published a 7-minutes video displaying improvised actions<sup>1</sup>.

We will use the term *in vitro* to characterize the new format. The Latin expression *in vitro*—from *vitrum*, literally “in glass”—allows us to highlight the metaphor of the screen as a mediation of interactions. We will now present our analysis of the transformations of the course, analyzing the aspects that were preserved or lost with the transition to the new modality.

<sup>1</sup> These videos were published online and are visible here: <https://vimeo.com/showcase/7150319>

## **Exploring the in vitro transformations of the course and their consequences**

### **Methodology**

Our research project is grounded in a sociocultural approach (Vygotski, 1997; Valsiner, 2007) to learning. With the explicit agreement and written consent of the teachers and students, we collected and analyzed different types of data produced during the course: (a) curriculum of the course, (b) three video-recordings of Simon's interventions to the students on March 25, April 25 and May 25 2020, (c) 42 video recordings of the weekly improvisations of the seven groups, (c) a one-hour interview with Joëlle and Simon at the end of the course; (d) students' final productions, i.e. six 7-minute public videos and their written evaluation by the teachers and the jury; (e) a 45 minutes focus group – conducted online – with 5 volunteer students at the end of the course (two women, three men); (f) 25 individual reflective diaries written during the course by the students; and (g) 29 2-minute video-recorded feedbacks provided by some students at the end of the course (in French or English- some students made one in French and one in English).

The favoured analytical strategy was the definition of minimum units of textual content (Krippendorff, 1980; Mayring, 2004), based on the transcripts of the focus group, fragments of the “reflexive diaries” and students' videorecorded feedbacks. These units were defined through a series of categories that allowed us to systematically compare the new course modality with the analyses conducted in its face-to-face version (Tau et al., 2021). Categories were distributed within the following 7 dimensions: a) Knowledge production logics; b) Students' Perspectives; c) Teachers' perspectives; d) Collective work; e) Embodied Activities and Body Role; f) Meta-reflection and grasp of consciousness; g) Modes of communication. All the transcribed data were coded thanks to the MAXQDA software (see summary of the codebook at the following link <https://doi.org/10.5281/zenodo.5548169>).

Based on the coding of the textual segments, we will discuss three emerging aspects resulting from the comparison with our

previous analysis of the in-person format of the course. Firstly, we will refer to the spatial and temporal modulations. Secondly, to the continuities and discontinuities between the two formats. Finally, to the identified novelties under the new conditions of online interaction.

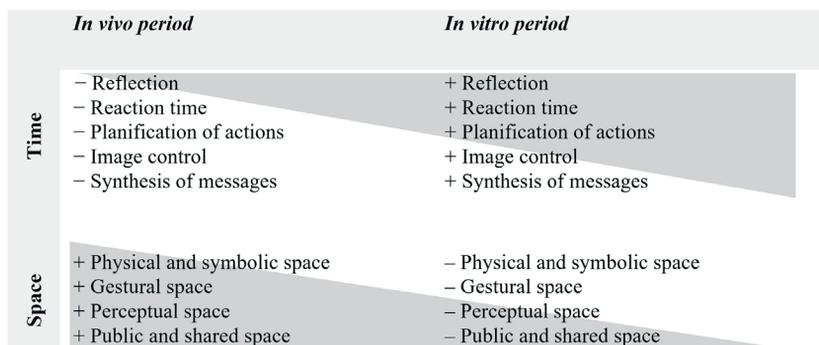
### **Spatio-temporal expansions and contractions**

Regarding temporality, the online format implies that interactions expand from simultaneous to asynchronous actions. Indeed, the *in vitro* modality is not only characterized by audiovisual mediation, but also by latency in interactions among the students. The increased time between an improvised action and the responses expands the overall temporality of the process. As evidenced in various statements made by the students, the gap that opens up in these interstices consequently expands: (a) the time for reflection, (b) the time for action planning and re-doing, if necessary, (c) the time for control of the visual image offered, and (d) the focus on the meaning of the messages. For example, in this student's quote: "*when I imagine just our performances, what I felt when I was performing, it's that instant thing. You don't even feel like your brain is thinking, it's just a bit of an instant reaction, and that's missing, because the video we have time to prepare a bit more*" (focus group, May 2020). In other words, there is a shift from a concentrated and simultaneous temporality to an expanded and asynchronous one, which enables reflection processes that otherwise would not have the opportunity to appear.

Conversely, online space gets contracted. In the *in vivo* modality, students have a large physical space to interact. Body movements have few physical constraints, and they share symbolic resources because they are performed in a public space socially dedicated to art. Perceptual space is also expanded in the case of a total sensory immersion experience. In contrast, the *in vitro* modality introduces a contraction of physical space, and intrusion into the private space. The theatrical space is replaced by a room in some private area, with the physical and symbolic consequences that this entails. More drastically, the im-

mersive space is replaced by the frame of the screen and the camera angle; movements must be circumscribed to these visual limits. On several instances students refer to the “window” of interactions, which contrasts with the references to the total immersive experience of the in vivo setting.

Briefly, in the transition from an in vivo to an in vitro modality, there is an expansion of time and a contraction of space. This symmetrical movement, schematized in Figure 1, seems to show how the change of modality represents a process of inversions in the spatio-temporal valences of the course.



**Fig 1.** Contraction and expansion of time and space in which the course actions occur.

## Continuities and discontinuities

### *a. A feeling of loss: reconstructing social and creative dynamics online*

The online transition of the course happened in a very special moment, in which some basic routines and certainties of everyday life had been disrupted. The campus was closed, and social relations highly regulated:

*“All of a sudden we didn’t have to touch each other, we didn’t have to breathe - in short, the other had become enemy number one. So, the workshop was aborted and a farewell to the bodies loomed in the distance. But more than a*

*contamination of the body, it is a contamination of thought that we are undergoing” (Reflexive Diary, March 2020)*

*“Sometimes we have to play our lives out in the world and without reference points” (Reflexive Diary, March 2020).*

The initial feelings remembered by the students regarding the course were feelings of sadness and loss:

*“Wednesday night was a bit of a time when you let your body speak, you take a contingency, and you make it into something completely crazy and it’s no big deal. No one is there to tell us “No, this is not the right thing to do, this is the right thing to do, et cetera”. And I found that super emancipatory. And when I didn’t have that anymore, I was super sad. And I said to myself “but how am I going to find that again?”, especially as there was also all the confinement, the EPFL closing, all that, you find yourself alone at home, a bit of an apocalypse really...”. (Focus group, May 2020)*

*“We lost that group component, that dynamic that we had. It took time to rebuild it, but it’s something that has been reinstated in a different way. I had the impression that I had lost, as the others have mentioned, this simply humanising aspect of the course, this break with the rest. The fact of being together for something we cared about. And finally, making videos alone at home and rediscovering these ordinary places and doing extraordinary things with them, it re-humanises my days a little too”. (Focus group, May 2020)*

*b. Keeping on improvising together: connecting the course and the world*

The students then engaged in a reconstruction of the social and creative dynamics that they had experienced in the first part of the course. Despite the change in modality, from in-theatre to online, it was possible to maintain certain processes initiated in the first face-to-face period. According to the students’ testimonies, the possibility of “being inspired by others” was a constant aspect. The confidence previously established, and the agreements, were maintained. The existence of a human bond in the work groups was not attributed to shared careers or general interests, but to the trust developed during the performing work in the first face-to-face encounters. A certain horizontality in roles crossed both formats of the course (in-theatre and online), with

non-hierarchical relations in the work group. The participation of all, including the teachers, to improvised actions online (the teachers created a 7<sup>th</sup> group, recorded and shared their own improvisations with the students) promoted this horizontality.

The lack of the others became a topic of investigation:

*“How can we use this downtime to continue to study the collective and its meaning in our society? Physical presence and its importance in our private and public environment can be explored through its suppression. One could, by analogy, compare this to reasoning by the absurd in mathematics. Indeed, the contrast produced by the total absence of the collective makes us realise how important it is and what subtle ways it governs our daily lives”. (Reflexive Diary, March 2020)*

And simultaneously, improvisation became a grid to read the world around:

*“And rather than a perfect and immaculate quarantine, we improvise, to survive. Because we have no choice. Improvising means scratching at reality, so as not to be impaled on it. This is a dark moral”. (Reflexive Diary, March 2020)*

*“Our workshop leaves the Arsenic to spread throughout the world. A generalised improvisation that spreads almost as fast as the virus. It seems so surreal. Everything aborted abruptly, as Simon said. The script has been removed. No more metro-busy-sleep. No more coffee breaks, no more after-work parties. How are all these people going to make it? With our fast-paced daily routine. Well, now we say stop. No more. No more of this routine. Now you have carte blanche. Now you improvise. You’re the one with the keys.” (Reflexive Diary, March 2020)*

As various testimonies and observations of the activities show, the capacity for collective improvisation in the course remained, despite the spatiotemporal modulations. The online format was not an obstacle for improvisation, defined as a creative reaction to the unpredictable acts of the others. This changed the quality of everyday confined life:

*“I too paid infinitely more attention to the little things, and I started to film everything I saw that I found interesting or intriguing. Afterwards, there was*

*also the sharing of ideas, which is done in the end, even if it is a bit out of time, we still manage to be inspired by others” (focus group, May 2020).*

*“What I personally find pleasing is to be able to link the extraordinary and the ordinary, to be in these rooms that, for me, I have lived in all my life in any case, and suddenly to create something, to do something in there that we have never done before. To finally realise that this awakening, this attention of the mind, perhaps just being attentive to the aesthetics that surround us, and perhaps at every moment” (Focus groups, May 2020)*

Improvisation became a keyword both to try and understand what was going on at the social, political level, and a strategy to deal with one’s personal life and isolation through reconnection with the others.

### *c. Lost bodies*

Nevertheless, the virtual format of the course was associated with a series of disadvantages. Some of these were evident for all interviewed students and refer to the most immediate perceptive register. Firstly, the “bodily register of the other” was lost. The range of sensorimotor perceptions of the *in vivo* experience was narrowed down to the audiovisual phenomenon, to the image displayed on the screen and the framing of a generally still camera. At the same time, the focus group reported a “loss of spontaneity, immediacy or instantaneity”. This is due to technical limitations (time lags), as well as the importance of image and self-image control online. The visual modality takes precedence over the other sensorial information. The absence of the other’s body seems to leave space for more reflection and calculation of actions, which, in the end, leads to a loss of spontaneity. One student commented that: *“The strong feeling of having to react to the corporeality of the other, without being able to reflect on it too much, was lost. It is a quick sensorimotor response and availability”*.

Individual bodily freedom is lost, too. One student in the focus group said: *“I think I lost the freedom of movement, in the use of my body, I would say. In the improvisations in class, we could make big gestures, we could dance. We always warmed up together, so the body was prepared, while at home the body is less prepared, and I take less time to do a warm-up. And there is also the constraint of the camera.*

*We have to fit into the small frame. We cannot make gestures outside the frame”.*

Most students pointed out that the lack of an audience in the virtual format modified the manner of performing. This was less so because of the absence of a live observing and censoring presence, and more so because of the gap between the offered improvisation and the gaze of the others. In addition, videos remain available, compared to lived improvisations.

As for the plot that guides the actions, students describe two opposite processes in the two modalities. In the actions improvised in the presence of an audience, there does not seem to be a search for coherence or unity. In other words, they act without seeking a fundamental logic. However, in the virtual mode, reflection about coherence seems to be imposed. In many testimonies, it is clear that the greater reflexivity that asynchronous activity allows results in a necessity of consistency in improvisation, in the search for the “red thread” that connects the improvisations of each group member. This effort to link, to seek the logic of the whole, appears as a loss of relaxation of the action in favour of an “understandable” plot. One student commented that: *“I was really more inclined to want to take control of what I was doing. Maybe even take control of what other people do, by telling them “yeah, I did that, that could be good, you see ... I inserted an imaginary a bit like that, I leave it like that, but think about it”. I quit quickly, but it’s really hard to hold back from controlling everything”.* This raises the following question: if the format restricts spontaneity, what place remains for unplanned reactions?

The issue of “privacy” deserves a special mention. The production of videos recorded at home during confinement introduced a certain perception of porosity into the private domain. Personal spaces and domestic objects could be relatively exposed. This fear—which led many students to use neutral backgrounds, hide personal belongings, or control framing to reveal as little detail of private life as possible—reveals a perceived loss of intimacy. With the new format, the public space for meetings—the theatre—was replaced by the more personal sphere, and with it, a certain intimacy was perceived to be threatened. Therefore, it does not seem random that many students preferred to

film their videos in spaces such as living rooms, which are considered to be the interface between the inside and the outside.

## Novelties

The change in modality gave rise to novelties, to certain processes that could not have occurred during the in vivo modality. These novelties included compensations, reactions, or simply the emergence of a new virtual interaction system. Increased moments of reflection and reduction of space had a positive consequence for the students: a more conscious use of the body and of the surrounding objects. In addition, the reflection and control of the image offered to others seems to have increased the aesthetic consideration of the action. Appearance and background began to be intentionally manipulated using video. A student comments: *“we start to be very careful about what to show and what not to show when we have to make the video. Personally, and in my group, a lot of thought was given to what came out of the video, and what the audience would see. And like X said, you get a lot of work on the aesthetics of the video and a lot on the clarity of what you present”*.

Improvisation resources also seem to have changed because improvisation ceased to be centered on bodily action. The search for new resources and forms for improvisation, such as sounds, objects, or editing, are the result of the new physical context and channels of communication. One student commented that: *“we also come to find other ways to try to show something, to try to find other methods to improvise than just the body, the movement or the dance. And I find that we lost a lot in going online, but we also gained in being forced to do things online”*.

With the audiovisual predominance of action, the roles of the observer and the observed also seem to have been modified, because each actor became a spectator of his own improvisations, watching the short videos on one's smart phone before sharing them with their group. Due to the online availability of the final videorecordings, the audience of the improvisation is extended and includes a generalized, unseen audience of potential unknown viewers on the Internet.

Finally, the penetration of public space into the private realm, perceived as a loss of privacy, also has a bridging function. As some students pointed out, placing the action in the private sphere allows one to “connect the ordinary with the extraordinary”, to connect the fiction and freedom of improvisation with everyday life. Improvisation enters the home and everyday life. In the context of the 2020 pandemic-related restrictions, this offered a breathing space for students who were often isolated. As quoted from the students’ focus group: *“I miss it, that we are all together, the 25 of us, because thinking together brought us closer. So, I miss it very much. However, a thing I liked is that because we did it through videos, I wondered each time I did something “maybe I can use it in a creation”. And I have been thinking, even locked in my room, at what could be artistic and what could not. And it took a weight off anyway...”* Another student added: *“I learned to incorporate improvisation into a normal day. Because looking at the WhatsApp group and saying to myself ‘ah well, that inspires me and I have to go now’, in fact it makes a real break in the working day. And that didn’t happen to me before. Before, I really put improvisation in the idea of improvising on Wednesday evenings and Thursdays, when we saw each other in small groups. Bringing that into everyday life is quite pleasant, it is a real break”*.

## Discussion

Looking at Figure 2, one might think that the online shift easily withstood the reported continuities. However, analysis of the students’ video-recorded feedback, focus group comments and reflective diaries, shows that these continuities were the fruits of hard collective work from the teachers and the students. One student said: *“I think there are indeed some things that I felt I had lost at first, that I managed to find a bit in a different form. We lost that group component, these group dynamics that we had. It took a while to rebuild it, but it was something that re-established itself in a different way. I felt like I had lost, as others have cited, this simply humanizing side of this course, this breaks with the rest. Getting together for something close to our hearts.*

	<i>In vivo</i> period	<i>In vitro</i> period
Continuities	———— Joy and playful experimentation —————	————
	———— Being inspired by the others —————	————
	———— Trusting oneself and others —————	————
	———— Horizontality, active participation —————	————
	———— Group work and collective practice —————	————
	———— Improvisation —————	————
Discontinuities	Direct interaction with teachers and peers	Mediated interaction with teachers and peers
	Multimodal and kinesthetic perceptions	Focus on the visual dimension
	Presence of the audience during the creation	Presence of the audience after the creation
	Spontaneity, immediacy, or instantaneity	Planification and control
	Unreflective reaction to the other's body	Greater awareness of the body and the context
	Teaching space extended to the theater	Teaching space extended to the private space
	Intimacy ensured by the Studio space in the theater	Intimacy ensured by image control
	Creating an exceptional space	Linking the ordinary with the extraordinary, pervasiveness of improvisation in everyday life
Novelties	Focus on physical interactions	Focus on visual interactions
		Importance of technical skills in video recording and editing
		Stronger aesthetic considerations
		Non-bodily resources for improvisation (objects)
		Spectator-actor reversibility effect on improvisation
		Generalized, unseen potential audience

**Fig 2.** Continuities, discontinuities, and novelties.

*And finally, making videos alone at home and rediscovering these so ordinary places and doing extraordinary things with them, it re-humanizes my days a bit too*". The question that arose was: "how were we going to recover or rediscover what was lost in the first part of the course?" Students said they had "to relearn how to communicate, how to bond and how to make decisions in a different way". This was not easy. Another student says: "For me, the social aspect is very important. Working from home, doing improvisation from home, was very difficult, but as time went on I sometimes found touches in which I felt at ease: when we wrote a text together, when we replied to each other by video, it was an interesting listening dynamic". In these comments, we can see that the cognitive and affective experience of loss, grounded in the previous shared experience of trust and collective performance, triggered a collective attempt, in the whole class and in each group, to recover some of the previous dynamics.

Students repeatedly refer to the experience of what worked previously, and what was threatened or lost in the move online, to try and recreate a similar online experience based on their shared memories of the previous dynamics. The success of this online move was allowed by an explicit, collective attempt, shared by students and teachers, to retrieve the quality of the previous in-person experience of the course. So, in this sense, the previous "in vivo" experience appears to be a necessary condition for the successful online move. Meeting or interacting online allows to reactivate the memory of a situation and the according bodily state which have been experienced by the participants. The experience of the participants during the in vivo phase has been embodied and the in vitro phase reactivated it, like "phantom limbs" after an amputation. In this sense the online part of the course is fundamentally built onto the previous in vivo experiences. This shows that it is possible through online means to reactivate learnings which have been acquired in co-presence. It also shows that the online experience is a mean to reveal to the students themselves and to the teacher what has been acquired during the in vivo experience, both by identifying what remains and what is lost. In this sense the in vivo and in vitro phases of the course appear as complementary.

To recreate the quality of the in vivo improvisations in the in vitro modality, the students made creative uses of the material resources around them, incorporating everyday objects, usual furniture like beds, chairs, tables, lamps, light and sound, and sometimes external surroundings of their students' rooms. Smartphones, as tools to produce, view and share videorecordings, played a critical role in this process. All this was supported by social dynamics, a collective process of co-creation and mutual inspiration, in which the design of the course decided by the teachers played a key initial role, but was soon completed, transformed, or diverted by the experimentations of the students.

## **Conclusion**

The pedagogical dynamics show that, as a whole, modification of one dimension of the course inevitably impacts on the others. What becomes evident is the systemic character of the teaching approach, even in a course that is extremely open in terms of content. In other words, contrary to some orientations in the field of e-learning, it is not possible to think of the mediation imposed by the computer technology simply as a change in the communication channel or interface. Our case shows how this change impacts on the whole educational process, redefining it in a radical way. The outcome of the course, in which many of the originally intended objectives were achieved overshadows the substantial transformation that takes place at the process level.

Secondly, we can highlight the potentiality of an online course in which the body and the interactions between participants play a central role. These preliminary findings need to be verified in other situations and using other methodological strategies, but they suggest a fruitful use of virtual devices which, until very recently, would have been dismissed without further examination. A limitation of this case is that the students were all studying engineering and, therefore, were supposedly confident and skilled with the technology.

An issue which cannot be answered based on our data remains open: Would it have been possible to start such virtual course without

a previous phase of face-to-face meetings? This problem refers to the establishment of the necessary rapport for cooperative work: Is a first in-presence stage required to develop an in vitro dynamic within a course on improvisation in higher education?

In our case, the success of this online move results from a conscious, structured, and collective effort by teachers and students to retain some of the critical teaching and learning dynamics of the course. As one student said: “*It’s a process that works because it comes from each of us. It moves forward because we all individually want them to move forward, we all move forward collectively*”. The work involved in constructing the online course, distributed among teachers and students, and actively carried out by all participants, is rooted in the strong memories of encounters with the others, as individuals and human beings, and not just as engineers, teachers, or co-students, during the first presential part of the course. To conclude with one student’s words: “*It is the authenticity of every human being that we have discovered*”.

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