Edition Scenario Volume VII

This book delves into essential, yet often overlooked, aspects of educational and scientific practices: the involvement of the body in knowledge acquisition and production, the collective nature of creativity, and the potent role of improvisation in all living actions. It is the culmination of a 4-year research endeavour on Performing Arts as a Pedagogical Tool in Higher Education, conducted in collaboration between the School of Engineering at the Ecole Polytechnique Fédérale de Lausanne (EPFL) and the Institute of Psychology and Education at the University of Neuchâtel (UNINE). The authors meticulously describe, analyse, and evaluate two courses – one in engineering and the other in psychology – that employ performing arts practices to enhance students' learning processes and facilitate boundary crossing from school to out-of-school contexts, as well as between theory and practice. From the diversity of perspectives and forms, inherent in the encounter between vastly different disciplines and cultures, there emerges a compelling plea for an education that integrates art and science within the same scenario.

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BAREFOOT ACADEMIC TEACHING

TAU KLOETZER HENEIN

RAMIRO TAU LAURE KLOETZER SIMON HENEIN

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PERFORMING ARTS AS A PEDAGOGICAL TOOL IN HIGHER EDUCATION

Ramiro Tau Laure Kloetzer Simon Henein

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Performing Arts as a Pedagogical Tool in Higher Education

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Danielle Chaperon

FOREWORD

All teachers, regardless of their discipline, intuitively know that they are "performers". The COVID-19 pandemic has undoubtedly brought awareness of this to the most ascetic amongst them. At a time when the world of teaching is inclined, mainly for economic reasons, to adopt virtualisation as the main means of transferring knowledge, the book by Ramiro Tau, Laure Kloetzer and Simon Henein proves to be particularly valuable and useful: now we have at our disposal a map and a sextant that enable us to venture into teaching territories that are yet to be explored.

On the cusp of the journey, it appears important to highlight how the authors relate university teaching to the performing arts. Contrary to what one might assume, the distribution of seats is not determined by a frontal configuration, texts do not constitute an authority that must be communicated in the best possible way, and it is not a hierarchy in which a group of persons is submitted to a more or less charismatic leader. All these characteristics (frontality, authority and hierarchy) are indeed linked to a concept of theatre that is now outdated. The authors of Barefoot academic teaching draw from the roots of a theatre modernised through its redefinition as a "living art" – in the hope of enabling "living knowledge".

The three authors of the book propose not to impose a traditional theatrical model on teaching acts, but rather to draw inspiration from the processes that enabled theatre to come out of its numbness in the 20th century: collective creation, participation and improvisation. There is thus no need to appeal to some "magic of art" to assume that practices that have revolutionised theatre can be as effective in university academics. Nevertheless, it is a daring challenge; the authors hypothesize that the modernisation of university teaching cannot be achieved without the development of pedagogical approaches that take into account the interrelationship between embodiment, appropriation, and engagement.

The research presented in Barefoot academic teaching does not merely define teaching and learning as real actions. It does not just emphasize on the web of relations established between the different actors of the education

stage, it vests these actions and actors with a kind of exemplariness that must be extended to our understanding of the research profession as well as any other form of professional activity. In this way, students may discover that the production, the appropriation and the application of knowledge are adventures that lie within the scope of biographical, social and political histories. The two examples of performative teaching on which the book focuses include a presentation phase in which students share their findings with an audience.

Entering into a fictional pact, which is proper to theatre, makes it easier to commit to an adventure that is potentially life changing. The present book goes far beyond offering suggestions, attempts or convictions: it is based on a wide spectrum state of the issue, on a clearly designed theoretical framework, and on the analysis of data collected during two practical experiments conducted according to rigorous protocols.

As we are equipped with a map, a compass and logbooks, we can forget about portolan charts and set sail to the open sea – as is well known, maritime metaphors are common in theatre professions.

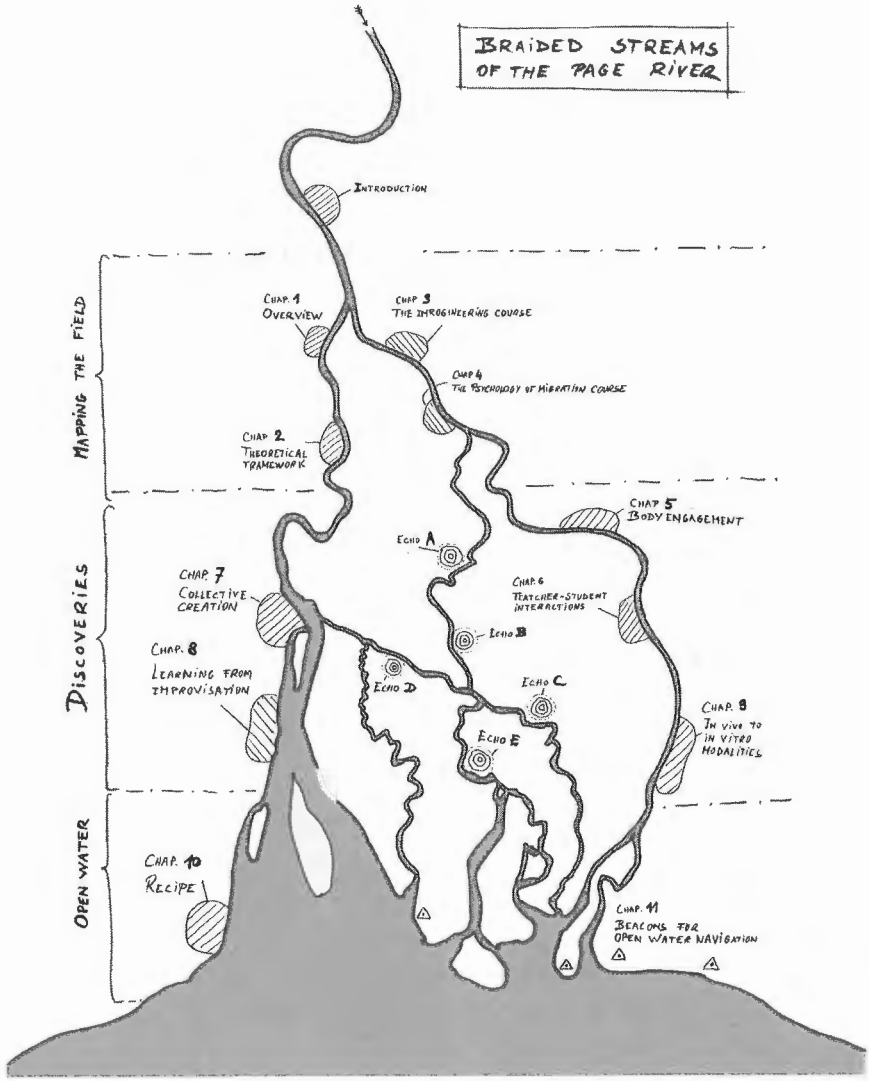
Navigation map

The navigation through the chapters of this book can follow numerous circuits, as the streams of a braided river, weaving education and performing arts.

Mapping the field (Chap. 1–4)
The first section has two streams: the first flows through the arenas of theory, methodology, and ways of thinking about the possible connections between higher education and performing arts. The second invites into action as it flows through places where the residents have committed themselves to teaching explorations inspired by the perspective offered by their neighbours of the opposite branch. Though distinct, the two streams carry the same water.

Discoveries (Chap. 5–9)
As the navigation continues, the river branches into a multitude of narrower streams. This section of the book visits a sample of them, each offering a different view onto the same river. Some expose a scientific perspective, some others give artistic resonances. Some bring us close to teachers, some others close to students, pedagogues, or even close to mere touristic visitors.

Open water (Chap. 10–11)
The long arms, detours, meanders and water falls of the previous sections eventually lead to a delta and wider waters. This openness might feel vertiginous, but the previous navigation experience constitutes helpful beacons for open water navigation and the discovery of new lands.



Drawing: Simon Henein

Ramiro Tau, Laure Kloetzer, Simon Henein

INTRODUCTION

A brain on a stick: Half-Bodies in higher education

Let us start with an anecdote. A few years ago, in 2014, a team of social scientists at the University of Neuchâtel created an event called Théâtre de la *Connaissance*, or Theatre of Knowledge[1], using the evocative and catalytic power of theatre to share and discuss scientific findings with a large audience inside and outside the university. For the 2017 edition of this event, called *Territoire*, the creative process included co-creation workshops with scientists and comedians, in which the comedians asked the researchers to demonstrate for them some typical teaching sessions, so that they could grasp something of our activity in order to interpret us on stage. Looking at the scientists' body and movements in this simulated teaching situation, the comedians joked that we were "half-bodies", "talking busts", sitting or standing, using our face, mouth, and hands, but making the rest of our bodies invisible. It gave us a lot to think about.

Introducing the performing arts into our academic teaching opened up a real opportunity to explore these feelings and reflections further. The atypical experience of moving barefoot in the context of their university studies allowed our students to express their feelings about the usual experience of studying at university: they told us that they often felt like "brains on a stick" in the classroom. They began to reflect on the absence or even silencing of the body in higher education.

Indeed, all too often higher education sidelines the body in the teaching-learning process. Institutionally, academic teaching has been and often still is reduced to the "banking model" (to follow Freire, 1968) of transmitting abstract, decontextualised knowledge in a purely cognitive process, ignoring critical aspects of learning – especially its sensitive, affective, social,

1 https://www.unine.ch/theatre-connaissance/home.html

material, historical and political dimensions, all of which are present in the bodies of students and teachers.

This banking model, combined with the neoliberal pressures that make productivity requirements, constant assessment and endless competition part of the usual academic experience, can lead to a sense of alienation in the learning process. Students can feel dissociated both from their own selves (including their bodies) and from the personal meaning of studying, as they are taking exams in a rather automatic way. Indeed, student mental health is a growing concern in universities, with alarming statistics showing that a large number of students suffer from a range of symptoms, such as anxiety and depression[2].

The frequent avoidance of physical action in the university teaching and learning processes is regularly mentioned in our students' reports, and seems to be the result of reinforcing and exacerbating a verbal system of argumentative communication. Teaching and assessment as predominantly verbal practices reinforce two fictions. The first is the assumption that the body is absent or minimally present in these interactions, as a kind of obstacle or nuisance to be minimised. The second fiction is that communication consists of a controlled flow of transmission and reception of discursive information. However, as systemic theorists showed more than half a century ago, "you cannot not communicate" (Keller, 2007; Watzlawick, Beavin-Bavelas & Jackson, 1967), even when interactions between people do not involve oral language. Even in the process of verbal or language-mediated interaction, gestures, use of space, prosody and many other dimensions involved in the argumentative process are often invisible to the subjects. This book, therefore, stems from our desire as teachers to bring the body back to the centre of the academic teaching-learning experiences. This is a small step towards promoting the university as an inclusive space of freedom of thought, joy of learning and sharing, collective knowledge creation and engagement for the future of our societies for all its participants.

2 As reported by APA in the USA, for example, following for example the Healthy Minds Study showing that in 2020–2021, more than 60 % of college students met the criteria for at least one mental health problem (Lipson et al., 2022).

Performing arts in higher education: Structure of the book

With this in mind, the aim of this book is to share and explore two teaching-learning experiences involving the performing arts as a way of re-situating learning within the bodies of our university students. The performing arts have a long tradition of physical engagement and collective creation that we are transferring to the academic context. Our endeavours continue a diverse, multifaceted and active tradition that is well represented, for example, in the *Scenario* network[3].

Section 1, *Mapping the Field*, introduces our research project and its context. Chapter 1 doesn't provide a full literature review of the flourishing field of performing arts in education, but it does sketch the landscape and offer some pointers for navigating these exciting waters. Chapter 2 introduces the research project called ASCOPET (les *Arts de la Scène comme Outils Pédagogiques dans l'Enseignement Supérieur*): it stems from the authors' pedagogical commitment and their successful experiences using performing arts in their teaching, which we wanted to study and compare. Chapters 3 and 4 present our two pedagogical experiences, their contexts, objectives and concrete modalities.

Section 2, *Discoveries*, gives a taste of our findings regarding the place of the body in teaching-learning processes (Chapter 5), the transformation of relationships between peers and between learners and teachers (Chapter 6), the process of collective creation (Chapter 7), and the scope and uses of improvisation in the classroom (Chapter 8). Finally, we explore and discuss our experiences of delivering performing arts-based courses digitally, following our experiences during the COVID-19 pandemic (Chapter 9).

Section 3, *Towards open water*, aims to generalise our experiences and support the reflections of our colleagues who wish to use the performing arts in their academic teaching. Chapter 10 is a paradoxical text, highlighting the simultaneous necessity and inadequacy of recipes for implementing university courses that use the performing arts at their core. Chapter 11 offers beacons

3 International Network of Scholars, Teachers, Artists and Practitioners: https://www.ucc.ie/en/scenario/scenarioforum/

for open navigation; it is a discussion of the implications of our analyses for the present and future of teaching and learning in the university.

This book is a collective effort based on interdisciplinary contributions from academic researchers working in two different institutions (University of Neuchâtel, UniNe, and École polytechnique fédérale de Lausanne, EPFL) and artists, bringing together different disciplines (education, engineering, psychology, theatre studies) and arts (contemporary dance, theatre). The structure of the book reflects our multiple perspectives and ongoing interdisciplinary dialogues. The reader will notice that in Section 2 each of our main themes is presented in two parts. We have adopted a structure for this book in which the main scholarly findings presented in one chapter are echoed, revised or complemented by an artistic, subjective or reflective approach in the following pages. We hope that this structure in echo opens up possibilities for readers to appropriate and critically examine our findings in order to develop their own practice.

References

Freire, P. (1968). *Pedagogía del oprimido*. Paz e Terra.

Keller, J.C. (2007). *Le Paradoxe dans la communication*. Harmattan.

Lipson, S. K., Zhou, S., Abelson, S., Heinze, J., Jirsa, M., Morigney, J., Patterson, A., Singh, M., & Eisenberg, D. (2022). Trends in college student mental health and help-seeking by race/ethnicity: Findings from the national healthy minds study, 2013–2021. *Journal of Affective Disorders*, 306, 138–147.

Watzlawick, P., Beavin-Bavelas, J., & Jackson, D. (1967). Some Tentative Axioms of Communication. In *Pragmatics of Human Communication. A Study of Interactional Patterns, Pathologies and Paradoxes*. W.W. Norton.

Mapping the field

Ramiro Tau, Laure Kloetzer

1. Performing Arts in Higher Education

> *We should celebrate as necessary and emancipatory any attempt to introduce into the educational context that aesthetic dimension of life that the very logic of an education based on intellectual and moral authority leads to eliminate or, at least, to diminish.*
> *Jean Piaget, 1954*

Arts-based learning and teaching – as well as arts-based research – are fields that are constantly expanding. However, far from being clear conceptual approaches, they are primarily a set of dispersed practices with very different histories, aims and consequences. In this chapter we argue that the encounter between education and the arts should focus on the arts as a process, using some of their processes, values and tools to offer a range of educational experiences. We show that using the arts in education lies on a continuum between using them to complement the traditional curriculum and using them to radically transform it. A variety of practices can be found between these two poles. We will also provide an initial overview of some of the transformations of the educational experience that have been brought about by the use of the performing arts in education, as documented in the academic literature.

Different works show that the act of teaching is essentially performative (Dawe, 1984; Sarason, 1999; Schewe, 2020; Whatman 1997), and teaching has sometimes been regarded as a kind of performing art (Bale, 2020). Recently, the specific use of performing arts strategies in education has given rise to a fruitful and increasingly sophisticated field of work and reflection. In fact, this arena has been expanding quickly at primary (Schonmann, 2011), secondary (Harland et al., 2000, Motos, 2009; Daniels & Downes, 2018) and higher education levels (García, 2004; Lobman, 2011, 2018). Many authors have also pointed to the relevance of the performing arts for children's development (Daykin et al., 2008; Goldstein & Winner, 2012; Hadzigeorgiou,

2016; Holochwost, Goldstein & Wolf, 2021; Jiménez, Aguirre & Pimentel, 2009) in terms of various psychological and social aspects. Pioneering work in this area has been carried out and continuous improvements have been made in the field of foreign language teaching (Blanch, 1974; Guerra, 1957; Richards & Rodgers, 1986; Rowlands, 1965; Smith, 1933; Stern, 1980; Via, 1976; Way, 1967), an approach that continues to this day (Aden & Eschenauer, 2020; Giebert, 2014; Galante & Thomson, 2017; Schewe, 2013; Schewe & Woodhouse, 2018). In parallel, theatre, music, dance, and improvisation have been used as resources for teaching subjects as diverse as history (Kornfeld & Leyden, 2005; Taylor, 2008), mathematics (Sahin, 2018; Smith, 1998), social and civic education (Pellegrino et al., 2010; Redington, 2013), ecology (Clavel, 2012) or architecture (Guérin, 2006), for example.

A. Focusing on art as a process

The possible intersections between artistic and scientific disciplines are fluid and can be adapted to different contexts and combined in highly variable ways. The discussions of possible interplays between art and science frequently refer to the boundaries between the involved disciplines. Referring to Oreck, we can recall some of the classic discussions on this subject:

> John Dewey (1934, 1958) placed the arts within the realm of experience as opposed to product. For Dewey, the sources of artistic experience were found in everyday life and were a central educational value (Jackson, 1998). According to Dewey, the nature of the experience – the process itself, and its aesthetic qualities – identifies an experience as artistic. Vygotsky (1971) agreed, writing, "art is a method of experiencing the making of a thing, but what is made is of no import in art" (p. 57). For many artists, aestheticians, and art historians, art exists, "not in objects, but in a way of seeing" (Weschler, 1982, p. 186). This broader view of art is also widely applied to teaching. Gage (1978) calls teaching a "practical art [...], a process that calls for intuition, creativity, improvisation and expressiveness" (p. 15). Dewey believed that the teacher's status as an artist is "measured by his ability to foster the attitude of the artist in those who study with him" (1933, p. 288). (Oreck, 2006, p. 3).

The discussion on what is or is not art, within or outside the educational system, becomes secondary if we focus on the processes of production rather than on the results – the artistic object – or on the artistic discipline itself. This is why we refer to arts-based educational experiences: in these practical experiences, the focus is not on a conceptual definition of the artistic disciplines, but on the transformative dimension of the performing arts on the whole educational experience. Consequently, the encounter between education and the arts should not be based on a clear-cut definition of art, its meaning and its boundaries, but rather on its tools to offer a series of experiences.

B. Course design: Transformations at the intersection of fields

The diverse approaches that fall under the labels of arts-based teaching and learning tacitly or explicitly assume a practical relation between at least three different domains: non-artistic disciplines, education and the arts. In our university context, the arts are used to enhance the learning of a non-artistic discipline: in the two cases we study in this book, the aim is to teach collective creation in engineering through improvisation, or to enable the appropriation of concepts from the psychology of migration through theatrical creation. Therefore, to promote and study the use of the performing arts in higher education is to stand at the particular intersection of three spheres: that of university teaching of non-arts disciplines, that of educational science and that of the arts. These three fields hold different premises and have different objectives, values, logics and traditions. In this association, the arts are proposed as a support or instrument for education or research. However, there is no unifying theory or general agreement on definitions of possible relationships. On the contrary, what we find in literature is a collection of scattered experiences, reports, and reflections. We will try to schematically identify some of their general aspects, so as to be able to define the perimeter of arts-based teaching and learning in higher education.

The area of arts-based teaching and learning is extremely variable, because the possible creative interactions between the three fields are virtually infinite. Moreover, these fields are complex and diverse, and it is not even easy to find clear definitions and boundaries of what an artistic or educational domain is. Non-artistic disciplines, such as scientific disciplines, do not have

very clear boundaries either, although the idea of "discipline" itself offers a pragmatic solution to the fundamental epistemological challenges. The immediate question is: which parameters or dimensions can we use to organize and reflect on this non-coherent set of practices, in order to help us design an arts-based course at the university?

Productive tensions at the intersection of three fields

The first dimension we would like to highlight is the instrumental use of arts for the course design: we consider only curriculums in which art is used as a resource for teaching and learning a non-artistic discipline (Chemi & Du, 2017; Eisner & Powell, 2002; Grilli, Laxague & Barboza, 2015; Sadovsky, 2019; VanTassel-Baska, 2021). This happens at the intersection of three major fields (Fig. 1.1, left). In this context, one of the fields (artistic practice) is used as a resource to enhance another one (a non-artistic discipline), through the educational process (Fig 1.1, right). In other words, we start from the artistic tools, passing through the educational field, with the goal of achieving the development of the non-artistic domain (Fig. 1.1, right arrow).

In the previous schema, the interaction between fields is simplified; it never happens that the arts are completely reduced to being an "instrument" for teaching and learning a non-artistic discipline. For example, if students are invited to perform theatre or music in the context of a biology course, these artistic moments will always be a way of introducing them incidentally to the

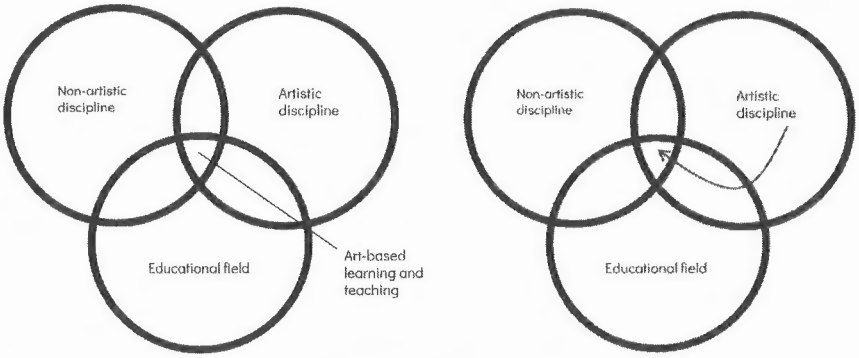


Fig. 1.1 Intersection of fields with an instrumental use of arts.

land of drama or musical performance, with its rules, objects and logics. If we take the approach seriously, both teachers and students are led to engage with the artistic discipline – at their level – and it is precisely this friction with the artistic discipline – its working methods, its repertoires of exercises, its system of values, etc. – that makes the pedagogical approach potentially transformative.

Similarly, the same could be said of proposals that make use of science for teaching arts, although there are far fewer such cases[4]. Most of the time, science is used as an inspiration rather than as a practice with its own logic and rules. The friction of different genres of activity – artistic and scientific – is one of the main sources of **productive tensions** (Kloetzer & Tau, 2022), which can trigger the emergence of new knowledge.

Additive or transformative uses of the arts in education

The arts can be used in very different ways in the context of teaching non-arts subjects (Gergen & Gergen, 2014). The arts can be used in addition to other teaching strategies, or they can be used to revolutionise the teaching strategy. History teachers can use the arts to illustrate historical processes, for example, by seeing in the Baroque movement in sculpture and architecture the orientation that religious worldviews gave to the form and content of living spaces and sculptures. In such a case, the arts are a simple illustrative resource that makes it possible to capture an idea through examples from art history. Pedagogical strategies can use the arts in ways that require a more practical involvement of students. Theatre techniques can be used to re-enact a historical event, such as the role-playing of evacuee children during the Second World War in English schools. The arts serve different purposes here: adding a playful dimension to the classroom, improving memorisation through an activity that involves the body, using alternative forms of representation that go beyond the semantic sphere of language, etc. In terms of curriculum and activity planning, however, all these approaches have one thing in common: none of them is a radical change in the structure of the course. In these cases,

4 The *Épica Foundation*, of the Spanish group *La Fura dels Baus*, is a remarkable example of the use of the humanities, science and technology for teaching, exploration and development of artistic proposals (https://fundacionepica.org).

the arts are a valuable resource that is simply added to the curriculum without changing its fundamental aspects.

At the other extreme, we can identify uses of the arts that require a radical transformation of curriculum design. In these cases, the arts are a tool that completely undermines the traditional logics of teaching and learning. Neither the interactions between peers and with teachers, nor the dynamics of the course, nor the space in its symbolic and material dimensions, nor the evaluation processes remain those traditionally used to teach the discipline in question. In other words, in these situations, the arts are not only an alternative means of representation, nor a playful participatory dimension that colours the essential activities. Here, using the arts means going through the artistic field in order to grasp its rules, its methods, its techniques, its resources, its values. Neither the history of art nor the objects already produced are relevant here, but rather the way in which art is made, i.e. an artistic practice that must be experienced in person, not as a spectator or historian.

Of course, between these two poles we can find a wide range of intermediate alternatives, always depending on the place of the arts in the course design. In the first case we will speak of an *additive use of the arts*, while at the other extreme we will speak of a *transformative use of the arts*.

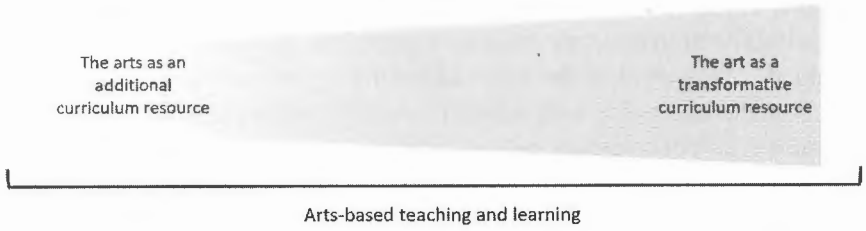


Fig. 1.2 Additive and transformative uses of the arts for curricular design.

None of these uses is per se better or worse, nor more or less suitable for non-artistic education. Obviously, the strategy chosen in each case will have to be consistent with the objectives sought. In other words, it will be the internal coherence of the course design that will legitimise the different uses.

These particular uses may be framed by different traditions in different countries, for different audiences and in different scientific disciplines. In England, for example, the idea of using children's imagination and storytelling to stimulate learning and inquiry has a long history. The *Theatre in Education* movement, which began in the 1960s, invites professional theatre companies into the classroom to perform plays created for the pupils and then to discuss them in small groups. The *Mantle of the Expert* approach (Edmiston, 2007), created by Dorothy Heathcote, encourages teachers to create sustained playworlds in their classrooms in which students interpret the role of experts: teachers design tasks that integrate the targeted learning outcomes to promote "innerstandings" (Heathcote & Herbert, 1985; Heathcote & Bolton, 1994). In one case, the use of performing arts is based on the collaboration of teachers with theatre professionals; in the other, it is based on the desire of teachers, themselves trained in theatre, to introduce playworlds into everyday school life.

Coordinating the choice of an artistic practice, the public and objectives of a course

We have to think about what kind of artistic practice we are dealing with. Apart from the generalizations that can be made about their relationship to truth, aesthetics or creation, music, theatre, dance, writing, poetry, film or other artistic practices have specific rules and traditions, that sometimes make it difficult to find their common points. The arts are as different as their products. The type of activity that each artistic practice makes possible depends on the materiality with which it works. Even if we can find comparable or transversal phenomena – we can indeed speak of improvisation in music, dance or theatre – the way in which it is carried out depends on the nature of the matter. Obviously, singing is not the same as writing, and it should be noted that improvised writing mobilises different cognitive and physical resources than those involved in improvised singing.

Moreover, it is necessary to consider that the arts have different degrees of social legitimacy. The boundaries between "artistic objects" and the so-called "crafts", as well as the systematic reduction of art to entertainment, are two phenomena that quickly remind us that art is not simply an internal system of rules for producing something, but a system of social values and corresponding social uses. This aspect cannot be naively overlooked, because the

appeal to the arts in education will ultimately trigger discussions on what is called culture and diverse aesthetic judgements. Cooking does not usually have the same prestige as literature, and within each of these practices, we also find socially instituted hierarchies and judgements. Since this system of values is relative to each social group, the course design must be defined on the basis of its social context – and must critically integrate issues related to this diversity.

The same can be said of the variety that we found in non-artistic disciplinary fields of knowledge, such as physics, sociology or linguistics. In principle, there are no scientific or philosophical disciplines that have facilitated links with particular arts, and bridges are always built according to objectives. Although some disciplines have promoted well-established pairings, such as the use of drama or singing to teach foreign languages, there are no *a priori* limits to the emergence of new proposals and creative uses, depending on the curricular content to be addressed. The choice of the artistic practice will therefore be a matter of judgement for each specific project, and there is no such thing as a one-size-fits-all approach.

Although we acknowledge the wide range of all these differences, our focus in this book is on the Performing Arts – with their emphasis on the use of the body denoted by the very notion of performativity – in the context of non-artistic higher education.

C. Course dynamics: Performing arts and the transformations of the teaching and learning processes at the university

In this section, we will offer a quick overview of some transformations of the educational experience induced by the use of the performing arts in education, as documented in the scientific literature.

Bringing movement to teaching and learning

The performative dimension, and in particular the involvement of the body in the collaborative production of new knowledge, has been studied in fields as diverse as biology, physics or mathematics education (Finn, 2015; Garrett, Dawson, Meiners & Wrench, 2018; Seitz, 2016). The possibility of acting out a solution or representing certain concepts or processes in science using

artistic means is inspired by the theory of experiential learning and learning by doing (Kolb, 1984). Of course, attending a fully expository lecture also requires a high degree of cognitive participation, i.e. activity on the part of the students. But the appeal to the arts transforms the set of bodily actions considered relevant in a university course. The logic of the use of the body in the performing arts permeates the use of the body by students in the university context, transforming the norm (Ledger & McCaffrey, 2015): it is about giving the body the productive status it acquires in the arts, but in the context of higher education.

Learning from improvisation

One key strategy of the performing arts is improvisation, as a way to create novelty with the already determined in each context. It is well documented as a research tool in Artistic Research. In Sajnani's words,

> Improvisation, with its emphasis on risk, responsiveness and relationship, is at the heart of the artistic process and of art-based research. Researchers who draw upon artistic practice as a medium of knowledge creation and representation require and often rely upon skills that are central to improvisation, such as an openness to uncertainty, an attunement to difference and the aesthetic intelligence necessary to track significance. Examining art-based research through the lens of improvisation may deepen our appreciation for the intricacies of this emerging approach to enquiry, as well as highlight critical challenges such as how to plan for and validate discoveries that arrive by way of surprise. (Sajnani, 2012, p. 79).

The production of scientific knowledge, understood as the creation of novelty, is indeed a process in which improvisation is crucial. Similarly, when improvisation is used in education (Holdhus et al., 2016), it opens a window to uncertainty and novelty (Vera & Crossan, 2005). As various studies of knowledge production in the classroom show, the ability to try out original solutions or answers is largely based on the ability to act in a non-canonical way in relation to a phenomenon. Artists have developed several strategies that make it possible to become aware of these processes, which are close to play: they always depend on the resources available, but it is the ability to use and combine them in new ways that leads to the construction of novelty

(Castorina, 2021; Inhelder, Cellérier & Ackermann, 1992; Kurt & Näumann, 2008).

Performing arts offer alternative representational means

The arts offer resources for representation, especially non-linguistic communication. In both the production of knowledge in the classroom and the production of scientific knowledge, the alternative representation of ideas, concepts and relationships is not a mere transcription but a resource for understanding (Eisner, 1997). As several studies in the history of science have shown, hapaxes, tables – such as Charles Minard's table of Napoleon's march – graphs and many other equivalent representations are not simply epiphenomena. A representation implies a way of understanding and thinking about objects, while conferring a factual status on them. There is no doubt that art constitutes a source of alternative representations. Moreover, it offers a field of metaphors that can guide exploration, as was the case with animal metaphors in the development of computers and hardware in the mid-twentieth century (see, for example, the use of metaphors in early cybernetics, in Hof, 2021).

Aesthetics and playfulness

A number of studies have begun to re-discuss educational experience in terms of its playful and aesthetic dimension (Jakobson & Wickman, 2008; Kerdeman, 2005; Kokkos, 2010; Latta & Zacharias, 2003; Wickman, 2006). The participants' rapport towards disciplinary content is significantly affected by these dimensions. Indeed, the *aesthetic experience* as a source of positive or negative emotions modulates the relationship to knowledge (Palmer, 2009). These affective dimensions are not a decorative aspect. The arts are a privileged vehicle for the introduction of an aesthetic, playful and sensory experience. Moreover, a generic aspect of the arts is that of opening up multiple – sometimes contradictory – interpretations or perspectives of the same phenomenon. This *poetic effect*, intentionally avoided in the scientific field, is a useful strategy for the creative phases of new knowledge construction (Sinclair, 2004). When this aesthetic experience is followed by an effort of oral or written communication, its ineffable or contradictory aspects are exposed and become a valuable resource for the production of knowledge.

Towards an integrative approach

Arts-based teaching and learning is an open field for all kinds of experiences, from those that leave educational practices largely unchanged to those that radically challenge them. We have identified some basic coordinates of these encounters between the arts and higher education, but always in the knowledge that they define a spectrum of infinite possibilities. Despite this dispersion of uses and combinations, there are recurring dimensions that we can identify and that we believe must be taken into account, regardless of the approach chosen. In other words, any use of the performing arts to teach a non-scientific discipline will have to deal with certain relatively constant aspects: the role of the body, the problem of representation, transposition and communication, the fostering of social interactions, collective creation and the tension between improvisation and planning, among others. The aim of this book is to address, through concrete experiences, these generic aspects that we believe cannot be neglected when defining the field of arts-based teaching and learning.

References

Aden, J. & Sandrine, E. (2020). Translanguaging: An Enactive-Performative Approach to Language Education. In E. Moore, J. Bradley & J. Simpson (eds.), *Translanguaging as transformation: The collaborative construction of new linguistic realities* (pp. 102-117). Bristol, Blue Ridge Summit: Multilingual Matters.

Bale, R. (2020). *Teaching with Confidence in Higher Education: Applying Strategies from the Performing Arts*. Routledge.

Blanch, E.J. (1974). *Dramatics in the Foreign-language Classroom*. New York: MLA/ERIC Clearinghouse on Languages and Linguistics.

Castorina, J.A. (2021). El problema del conocimiento en el estudio de la práctica educativa. *Educación Física y Ciencia, 23*(1), 166–166.

Chemi, T. & Du, X. (Eds.). (2017). *Arts-based methods and organizational learning: Higher education around the world*. Springer.

Clavel, J., Ginot, I. & Bardet, M. (Dir.) (2012). Écosomatiques: penser l'écologie depuis le geste. Éditions Deuxième époque.

Daniels, H. & Downes, E. (2018). A Vygotskian argument for teaching drama in secondary schools. In S. Burgoyne (Ed.). *Creativity in theatre: Theory and action in theatre/drama education* (pp. 153–168). Springer.

Dawe, H.A. (1984). Teaching: A performing art. *The Phi Delta Kappan*, 65(8), 548–552.

Daykin, N., Orme, J., Evans, D., Salmon, D., McEachran, M. & Brain, S. (2008). The impact of participation in performing arts on adolescent health and behaviour: A systematic review of the literature. *Journal of Health Psychology, 13*(2), 251–264.

Dewey, J. (1934). *Arts as Experience*. New York: Minton, Balch & Co.

Dewey, J. (1958). *Experience and Nature*. New York: Dover Publications.

Edmiston, B. (2007). The 'Mantle of the Expert' approach to education. [https://mantleoftheexpert.com].

Eisner, E.W. (1997). The Promise and Perils of Alternative Forms of Data Representation. *Educational Researcher*, 26(6), 4–10.

Eisner, E. & Powell, K. (2002). Art in Science? *Curriculum Inquiry*, 32(2), 131–159.

Finn, G.M. (2015). Using Body Painting and Other Art-Based Approaches to Teach Anatomy. In: Chan, L., Pawlina, W. (eds) *Teaching Anatomy*. Springer, Cham.

Gage, N.L. (1978). *The Scientific Basis of the Art of Teaching*. New York: Teachers College Press.

Galante, A. & Thomson, R.I. (2017). The effectiveness of drama as an instructional approach for the development of second language oral fluency, comprehensibility, and accentedness. *Tesol Quarterly, 51*(1), 115–142.

García, A. (2004). *Comunicación y expresión oral y escrita: la dramatización como recurso*. Raó.

Garrett, R., Dawson, K., Meiners, J. & Wrench, A. (2018). Creative and body-based learning: Redesigning pedagogies in mathematics. *Journal for Learning through the Arts, 14*(1).

Gergen, K. J. & Gergen, M. M. (2014). Mischief, mystery, and moments that matter: Vistas of performative inquiry. *Qualitative Inquiry, 20*(2), 213–221.

Giebert, S. (2014). Drama and theatre in teaching foreign languages for professional purposes. *Recherche et pratiques pédagogiques en langues de spécialité. Cahiers de l'Apliut, 33*(1), 138–150.

Goldstein, T. & Winner, E. (2012). Enhancing empathy and theory of mind. *Journal of Cognition and Development, 13*(1), 19–37.

Grilli, J., Laxague, M. & Barboza, L. (2015). Dibujo, fotografía y Biología. Construir ciencia con ya partir de la imagen. *Revista Eureka sobre Enseñanza y Divulgación de las Ciencias*, 91–108.

Guérin, P. (2006). Le corps à l'édifice: À propos d'un enseignement croisé danse-architecture. *Repères, cahier de danse, 2,* 18–18.

Guerra, M.H. (1957). The Foreign Language Children's Theatre: Methods and Techniques. *Hispania, 40*(4), 490–493.

Hadzigeorgiou, Y. (2016). 'Artistic' Science Education. In: *Imaginative Science Education* (pp. 185–215). Springer, Cham.

Harland, J., Kinder, K., Lord, P., Stott, A., Schagen, I., Haynes, J. & Paola, R. (2000). *Arts Education in Secondary Schools: Effects and Effectiveness*. Slough.

Hart, R. (2007). *Act like a teacher: Teaching as a performing art*. University of Massachusetts Amherst.

Heathcote, D. & Bolton, G. (1994). *Drama for Learning: Dorothy Heathcote's Mantle of the Expert Approach to Education. Dimensions of Drama Series*. Heinemann.

Heathcote, D. & Herbert, P. (1985). A drama of learning: Mantle of the expert. *Theory into practice, 24*(3), 173–180.

Hof, B. (2021). The turtle and the mouse: how constructivist learning theory shaped artificial intelligence and educational technology in the 1960s. *History of Education, 50*(1), 93–111.

Holdhus, K., Høisæter, S., Mæland, K., Vangsnes, V., Engelsen, K.S., Espeland, M. & Espeland, Å. (2016). Improvisation in teaching and education – roots and applications. *Cogent Education, 3*(1), 1204142.

Holochwost, S.J., Goldstein, T.R. & Wolf, D.P. (2021). Delineating the benefits of arts education for children's socioemotional development. *Frontiers in psychology, 12*, 624712.

Inhelder, B., Cellérier, G. & Ackermann, E. (1992). *Le cheminement des découvertes de l'enfant: recherche sur les microgenèses cognitives*. Delachaux & Niestlé.

Jackson, P.W. (1998). *John Dewey and the Lessons of Art*. Yale University Press.

Jakobson, B. & Wickman, P.O. (2008). The roles of aesthetic experience in elementary school science. *Research in science education, 38*, 45–65.

Jiménez, L., Aguirre, I. & Pimentel, L.G. (2009). *Educación artística, cultura y ciudadanía*. Organización de Estados Iberoamericanos para la Educación, la Ciencia y la Cultura.

Kerdeman, D. (2005). Aesthetic experience and education: Themes and questions. *Journal of Aesthetic Education, 39*(2), 88–96.

Kloetzer, L. & Tau, R. (2022). Teaching and learning online through performing arts. Puppetry as a pedagogical tool in higher education. *Scenario: A Journal for Performative Teaching, Learning, Research, 16*(2), 1–20.

Kokkos, A. (2010). Transformative learning through aesthetic experience: Towards a comprehensive method. *Journal of Transformative Education, 8*(3), 155–177.

Kornfeld, J. & Leyden, G. (2005). Acting out: Literature, drama, and connecting with history. *The Reading Teacher, 59*(3), 230–238.

Kurt, R. & Näumann, K. (2008). *Menschliches Handeln als Improvisation: sozial-und musikwissenschaftliche Perspektiven*. Transcript Verlag.

Latta, M.M. & Zacharias, M.E. (2003). The possibilities of play in the classroom: On the power of aesthetic experience in teaching, learning, and researching. *Alberta Journal of Educational Research, 49*(1).

Ledger, A. & McCaffrey, T. (2015). Performative, arts-based, or arts-informed? Reflections on the development of arts-based research in music therapy. *Journal of Music Therapy, 52*(4), 441–456.

Lobman, C. (2011). Improvising within the system: Creating new teacher performances in inner city schools. In K. Sawyer (Ed.), *Structure and improvisation in creative teaching* (pp. 73–93). Cambridge University Press.

Lobman, C. (2018). Reconnecting learning to development through performance ensembles. In S. Burgoyne (Ed.). Springer Press.

Motos, T. (2009). El teatro en la educación secundaria. *Revista Virtual: Creatividad y Sociedad, 14*, 1–35.

Oreck, B. (2006). Artistic choices: A study of teachers who use the arts in the classroom. *International Journal of Education & the Arts, 7*(8), 1–27.

Palmer, A. (2009). 'I'm not a "maths-person"!' Reconstituting mathematical subjectivities in aesthetic teaching practices. *Gender and Education, 21*(4), 387–404.

Pellegrino, A.M., Lee, C.D., Luongo III, B.J. & Zakaria, O.A. (2010). Music as a tool for 21st-century civic education. *Action in Teacher Education, 32*(4), 83–95.

Piaget, J. (1954). L'éducation artistique et la psychologie de l'enfant. Bulletin de psychologie. In E. Ziegfeld, *Art et éducation: recueil d'essais* (pp. 22–23). UNESCO.

Redington, C. (2013). *Can Theatre Teach? An Historical and Evaluative Analysis of Theatre in Education*. Pergamon.

Richards, J. & Rodgers, T. (1986). *Approaches and Methods in Language Teaching*. Cambridge University Press.

Rowlands, D. (1965). *A Puppet Theatre for Language Teaching*. Nuffield Foundation.

Sadovsky, P. (2019). La Teoría de la Transposición Didáctica como marco para pensar la vida de los saberes en las instituciones. En AA.VV., *Bitácoras de la innovación pedagógica* (pp. 101–120). FLACSO.

Sahin, B. (2018). Learning Mathematics with Creative Drama. *Journal of Inquiry Based Activities, 8*(1), 37–50.

Sarason, S.B. (1999). *Teaching as a Performing Art*. Teachers College Press.

Schewe, M. (2013). Taking stock and looking ahead: Drama pedagogy as a gateway to a performative teaching and learning culture. *Scenario: Journal for Drama and Theatre in Foreign and Second Language Education, 7*(1), 5–27.

Schewe, M. (2020). Performative in a nutshell. *Scenario: A Journal for Performative Teaching, Learning, Research, 14*(1), 103–110.

Schewe, M. & Woodhouse, F. (2018). Performative foreign language didactics in progress: about still images and the teacher as 'Formmeister'(Form Master). *The Arts in Language Teaching: International Perspectives: Performative-Aesthetic-Transversal, 8*, 21.

Schonmann, S. (Ed.). (2011). *Key Concepts in Theatre/Drama Education*. Springer Science & Business Media.

Seitz, H. (2016). Performative research. In S. Even & M. Schewe, M. (Eds.). *Performatives Lehren, Lernen, Forschen: Performative Teaching, Learning, Research* (pp. 301–321). Schibri-Verlag.

Sinclair, N. (2004). The roles of the aesthetic in mathematical inquiry. *Mathematical thinking and learning, 6*(3), 261-284.

Smith, I. (1933). Puppetry in the Classroom. *The Elementary English Review, 10*(9), 219–222.

Smith, S.S. (1998). Early childhood mathematics. Paper presented at the Forum on Early Childhood Science, Mathematics, and Technology Education.

Stern, S.L. (1980). Drama in second language learning from a psycholinguistic perspective. *Language Learning, 30*(1), 77–100.

Taylor, J.A. (2008). From the stage to the classroom: The performing arts and social studies. *The History Teacher, 41*(2), 235–248.

Ulbricht, J. (2005). Toward transdisciplinary programming in higher education. In M. Stokrocki (Ed.), *Interdisciplinary art education: Building bridges to connect disciplines and cultures* (pp. 17–30). National Art Education Association.

VanTassel-Baska, J. (2021). Introduction to the integrated curriculum model. In J. VanTassel-Baska & C.A. Little (Eds.), *Content-Based Curriculum for high-ability learners* (pp. 15–32). Routledge.

Vera, D. & Crossan, M. (2005). Improvisation and innovative performance in teams. *Organization science, 16*(3), 203–224.

Via, R.A. (1976). Participatory English: Drama. *Language Arts, 53*(2), 175–178.

Vygotsky, L.S. (1925[1971]). *The Psychology of Art*. MIT Press.

Way, B. (1967). *Development through Drama*. Humanity Books.

Weschler, L. (1982). *Seeing is Forgetting the Name of the Thing One Sees: A Life of Contemporary Artist Robert Irwin*. University of California Press.

Whatman, J. (1997). Teaching is performing: an alternative model of teacher education. *Research in Drama Education, 2*(2), 173–184.

Wickman, P.O. (2006). *Aesthetic experience in science education: Learning and meaning-making as situated talk and action*. Routledge.

Ramiro Tau, Laure Kloetzer

2. The ASCOPET project

Empirical basis, theoretical framework, research questions and methodology

Art is the social technique of emotion, a tool of society which brings the most intimate and personal aspects of our being into the circle of social life.
Vygotsky, 1925

The project Performing Arts as a Pedagogical Tool in Higher Education (ASCOPET, from its French name Les Arts de la Scène Comme Outil Pédagogique dans l'Enseignement Tertiaire) is an interdisciplinary research project investigating two courses (one in psychology for bachelor students, the other in engineering for master students) using performing arts in higher education. It is being carried out by two research laboratories at two Swiss universities (the Institute of Psychology and Education at the University of Neuchâtel and the Instant-Lab at the École polytechnique fédérale de Lausanne). From 2018 to 2022, we analysed the specific teaching and learning processes that take place in these two courses, based on the collective creation of partially improvised performances. This chapter provides an overview of this research project, presenting its theoretical framework, research questions and methodology.

2.1 ASCOPET

The Performing Arts as a Pedagogical Tool in Higher Education project (ASCOPET, from to its French name, *Les arts de la scène comme outil pédagogique dans l'enseignement tertiaire*) is an interdisciplinary research project investigating two courses (one in psychology for bachelor students, the other in engineering for master students) using performing arts in higher education. The research team brings together academic researchers (profes-

sors of psychology, education and engineering) and artistic researchers (in contemporary dance, poetry and performance).

The data on which the research project is based come from our two courses (*Improgineering and Psychology and migration*, presented in chapters 3 and 4), which have attempted to distance themselves from traditional university teaching. This distance results not only from the appeal to the performing arts as a privileged and somehow original pedagogical resource, but also from the pedagogical and social consequences that these proposals entail.

To understand the relationship between research and teaching in this project, some clarification is needed. The ASCOPET research project was launched in 2018, after the first editions of our two courses. This means that we have had a parallel development of both academic activities – teaching and research –, which has allowed for a mutual modulation. In this sense, the courses were informed by the preliminary results of our first observations and preliminary analyses. The continuous dialogue between our teaching practice and our research has allowed us to reformulate and refine the pedagogical strategies, as well as to adapt the topics and analytical categories. ASCOPET is therefore not a project aimed at observing educational experiences from the outside, but an instance of reflection that has made it possible to guide the very teaching that was the object of analysis.

2.2 The courses under analysis: Convergences between two different proposals

Detailed information about our two courses can be found in chapters 3 and 4. Here we briefly introduce their generalities and commonalities to help contextualise our research questions and methods.

Psychology of Migration (University of Neuchâtel, Prof. L. Kloetzer) introduces bachelor level students to the topic of migration from a socio-cultural perspective. The idea of using the performing arts – in this case theatre – stems from an initial ethical concern about studying such sensitive issues: it should not be purely intellectual, nor should it be too far removed from the political implications and lived realities of the participants. The aim of the course is therefore to introduce students to the psychology of migration in such a way that enables them to relate scientific theories, models and con-

cepts to their personal histories, to their everyday lives, to social discourses and to the Swiss institutions. Collective activities, with their implicit aesthetic and playful dimensions, engage the students' bodies in a representational task supported by various resources from dramaturgy and theatre.

Improgineering (École Polytechnique Fédérale de Lausanne, Prof. S. Henein) explores the creative processes of improvisation in science, engineering and the performing arts. One of the main learning objectives is to develop students' listening and expressive skills in order to strengthen their capacity for collective creation and improvisation. The approach involves students learning some of the performative techniques used in dance, music and theatre, and relating them to the creative process of engineering design.

Although the two courses have different designs, participants, learning objectives, activities and academic backgrounds, our experiences as teachers were very similar. We experienced strong student involvement, lively discussions, interesting reports, mutual learning and a deep satisfaction with the course dynamics. This shared experience guided our general exploration and suggested systematic comparisons. In what follows, we describe some relevant commonalities between the courses. All these common aspects, vaguely identified from the beginning of the research project and more precisely as it progressed, formed the basis for the definition of a set of research problems, research questions and working hypotheses. We identify ten principles that are common to both courses and that have a strong influence on their particular dynamics:

Performing arts are the leading activity of the course

Performing arts are not an isolated pedagogical strategy. The invitation to create and perform together is the backbone of the course proposal. When considering the continuum mentioned in chapter 1 on the place of performing arts in curriculum design, performance is a central feature of both courses. As you will see in the following chapters, the collective creation of a scenic performance involving improvisation is the main aim of the courses. Student engagement in the courses is enhanced by this collective creation and performance.

Performing arts transform the global pedagogical design
The performing arts are integrated into a global pedagogical design that includes theoretical elements as well as an invitation to reflect on what happens and what is experienced during the course. The use of the performing arts is motivated by teachers' careful reflection on how they can contribute to the learning of the subject in question. They are therefore a central part of a well-designed pedagogical strategy for tackling the subject under study. This also requires an adaptation of teaching methods to include co-teaching, sensitivity to building collective dynamics, openness in teaching during the course and in evaluations, change of teaching location and changes in assessment modalities, which we will now describe.

Teaching is a collective process
Students benefit from the complementary input of different teachers who are artists and/or theorists. Co-teaching in a hybrid, interdisciplinary team is the norm. Co-teaching provides students with multiple points of reference. Having artists as teachers shows that aesthetic choices are a legitimate dimension of academic doing and learning.

The teachers play a different role
The teachers reject the vertical transmission of a given set of knowledge, and instead engage in building the conditions for collective work and reflection and the co-production of experience and knowledge. Instructions are open and encourage freedom and risk-taking.

Freedom and collaboration are essential in the learning process
Multiple forms of group work are organized within the courses. Most activities involve a dimension of freedom: although the task is set by the teachers, there is freedom in how the students engage with it. The outcomes are either reflected upon individually and negotiated in groups of students.

Expansion of space supports the learning dynamics of the course
The course crosses boundaries between home and university, and theatre and university. In particular, the physical crossing of boundaries between institutions (university and theatre) allows for the hybridisation of learning and

teaching cultures within academic and artistic practices. On the other hand, in both courses, students are asked to record their experiences weekly in personal diaries produced at home. These diaries serve as supports for reflection and awareness of their experiences, but at the same time, they provide a bridge between the course activities and the sphere of daily life outside the university.

Changes of the evaluation modes are required, to ensure consistency between the teaching/learning process and the evaluation process

Consistency here refers to the convergence between the openness of the teaching and learning process (do what you want) and the openness of the evaluation (write/show what you want). Course evaluations are supported by the production of personal diaries, learners' engagement with the tasks, and the final presentation. In none of these cases is a specific content expected, but rather an effort to reflect on improvisation, collective creation, emotions, course and life events, alternative forms of representation, among other central themes.

The balance between theory and experience is crucial for learning

Theory frames the creative practice and feeds the students' reflective process. The theoretical contents function as a frame of reference for the interpretation of the activities. At the same time, the interactions and concrete activities in the classroom acquire a meaning based on the previous knowledge of each participant. Thus, activities are always offered as one of the sides of a series of theoretical meanings, and never in a vacuum. The challenge is to recognize the theoretical/practical duality of each activity.

The combination of performative experience in the course and its reflection within the diaries is crucial for learning

Continuous writing of the diaries engages the students in a reflective activity. Multimodal diaries – that is, diaries that not only use text, but also other semiotic supports, such as textures, images or references to works of art – are powerful tools for thinking, and for the resignification of the experience, including bodily experience. We have shown (Tau, Kloetzer & Henein, 2022) how diary entries reshape the bodily experience.

The production of a culturally significant creation is an essential part of the learning process

The students have the collective responsibility of producing a performance or play for a public presentation. Therefore, they show their work not only to the teachers but to their peers and to an external audience, and they are accountable to all of them. This variation of address is one tool for the development of new perspectives and knowledge (Kloetzer, Clot & Quillerou-Grivot, 2015). The dialectics of externalization and internalization are another aspect of development. Following Vygotsky's proposal that culture supports and shapes mind development (Vygotsky, 1971, 1980; Vygotski, 1997; Cole, 2015), the mind also develops when it becomes – collectively – cultured. The students' productions thus become cultural artifacts. And each of these creations becomes available, in the context of the course, for new appropriations and resignifications.

These ten common dimensions are not independent of each other. Together, they show that the use of performing arts in higher education may transform the relationships of the students to themselves (bodies and biographies), to others (peers and teachers) and to the topic of study, but also contribute to the transformations of educational institutions, renewing our representations of how teaching and learning proceed, and what they mean in higher education; they might for example transform our views on the place of the body, of the role of space, of collective creation, of aesthetics and of the students' personal experience in academic learning.

On the basis of these convergences, we can raise a number of general common questions. Not because they are identical pedagogical proposals, but because the general assumptions about the use of the performing arts are the same. The similarities and differences between the two courses allow us to use the same methodological strategy to compare them. Therefore, we define the same units of analysis and observation for both courses (Bronckart, 1999). This justifies the comparisons and, of course, the recognition of possible divergences. In other words, both courses belong to the same field of empirical phenomena and ASCOPET is the strategy we have designed for our investigation.

2.3 Conceptual framework and general assumptions

The theoretical background of this project is anchored in socio-cultural psychology (Markus & Hamedani, 2007; Valsiner, 1998, 2007; Valsiner & Rosa, 2007; Valsiner & Van der Veer, 2000) and developmental psychology (Bornstein & Lamb, 2003; Overton, 2003), in particular, critical constructivism (Becerra & Castorina, 2018; Castorina, 2003) as a privileged way to study and explain the emergence of psychological novelties and the openness of possible actions (Castorina & Baquero, 2005; Overton, 2006; Tau, 2022) in concrete educational contexts (Rogoff, 1990; Wertsch & Sohmer, 1995). Special attention is paid to the embodied processes of the learning and teaching practices (Määttänen, 2015; Shapiro, 2010), in sociomaterial and historical spaces (Carvalho et al., 2020; Carvalho & Yeoman, 2021; Woolner, 2010). Performativity (Fleming, 2016; Østern & Knudsen, 2019; Schewe, 2020), human and distributed creativity (Runco, 2007; Sawyer & DeZutter, 2009; John-Steiner, 2000), learning and development in "boundary zones" (Fenwick & Edwards, 2013; Konkola et al., 2007; Cattaruzza et al., 2019), improvisation and collective creation (Lage-Gómez, & Cremades-Andreu, 2022; Syssoyeva, 2013) are other conceptual points of reference implied in our framework.

Although it is difficult to circumscribe our perspective in a few phrases, the best explanation of the underlying assumptions will be recognised in the way in which the problems are empirically addressed and conceptually analysed, mainly because the approach involves a cross-fertilization of different theoretical traditions and domains. In addition to the above-mentioned general frameworks, some of our references come from the field of critical education (Apple, Au & Gandin, 2009). With respect to the body and interactions in educational contexts (Alerby, 2009), there is extensive literature, mainly rooted in the psychology of cognitive development, which has been concerned with the uses of the body in the classroom and in the processes of meaningful negotiation. Similarly, we often draw on relational developmental systems (Lerner, 2011) and theories about tools and mediation as part of the activity flow, avoiding the splittist views of society, culture, and mind as separable instances (Lerner, Hershberg, Hilliard, & Johnson, 2015; Overton, 2006).

Finally, we should mention the perspectives on the phenomenon of institutional transitions. Although it is rooted in classical institutional (Lourau, 1970)

and socio-cultural theoretical approaches (Castelfranchi, 2014), today it is a field of study and reflection with a great degree of autonomous development (Evans & Furlong, 2019; Heinz & Marshall, 2003; Hölscher, Wittmayer & Loorbach, 2018). Indeed, connecting formal learning with out-of-school contexts is a growing topic in educational research and practice (Tozer, Violas & Senese, 2006). The call to "break the encapsulation of school learning by a stepwise widening of the object and context of learning" (Engeström, Engeström & Kärkkäinen, 1997; Kerosuo & Engeström, 2003) has become increasingly important for today's education, with concepts like "boundary crossing", referring to ongoing reciprocal actions and interactions between contexts.

2.4 Problems and hypothesis

Our main general hypothesis is that the performing arts, and in particular partly improvised collective creation, have positive effects on the education of students from non-artistic disciplines on several levels. In turn, this perspective implies that the traditional dichotomy between sciences and the arts can be relativised, depending on the features considered, and that they are not absolutely incommensurable fields. Implicit in this general assumption is the question of the relevance of the performing arts as a teaching tool. Although our seemingly positive answer is informed by the large body of evidence on the use of the arts in education in non-arts contexts, the question is legitimate because of the specific parameters of our cases. That is, it is not possible to anticipate an answer without examining the facts in detail.

The same general question, which provides a framework for the whole research project, can be formulated with different emphases:

- What are the dynamics at play (in terms of student learning) in non-arts contexts using the performing arts in higher education?
- What are the advantages and challenges of using the performing arts to teach scientific thinking and contents?
- What are the institutional conditions for using the performing arts in non-arts courses?
- What are the possible institutional dissonances with other courses and practices within the educational programme in which a course using the performing arts is embedded?

- What are the possibilities for generalisation, transfer or cross-fertilisation between artistic and scientific disciplines?
- What activities promote disciplinary transfer or cross-fertilisation for effective innovative curriculum design?

Questions about the relevance of the use of the arts in non-arts programmes must also refer to the results achieved. Focusing not only on discourses but also on interactions, it is not easy to look at the outcomes as a whole, or to measure them through a global evaluation. The best that we can do is to identify parts of the overall experience, and ask what happens in each of them. This is why these general assumptions about the pertinence of using performative arts strategies led us to identify five sub-axes, which this book revisits in the section "Discoveries": a) learning with and in the body, exploring the material and symbolic spaces and times for learning; b) experiencing improvisation and collective creation as a learning tool; c) transforming social interactions.

Learning with and in the body, in material and symbolic spaces

Both the use of the body and the use of space in education are shaped by a set of implicit ideas about knowledge and learning: these implicit ideas affect how the physical space should be arranged in order to best teach and learn, what kind of physical postures are expected of students in the process, what movements teachers make. The cultural meanings of gestures, postures, clothing, the arrangement of furniture in the classroom, for example, mediate these material dimensions of interaction. In other words, configurations of bodies and spaces signify a range of possible readings that enable and constrain action. Something similar happens with language and other instruments of communication or representation. In their material and semiotic aspects, they enable certain activities and restrict others. A number of studies have highlighted the passivity of the body in higher education and the limitations imposed by the traditional classroom space. In the two courses under study, however, the body reappears as a fundamental mediator and site of learning. In this pedagogical movement, the traditional dimensions of the body and space in higher education are transformed in several ways. On the one hand, this transformation takes place by moving part or all of the course outside the university. On the other hand, it occurs through the establishment

of an explicit pedagogical contract that transforms students' expectations about the nature of interactions, uses of the body, and linguistic productions.

Our research questions were designed to identify actions and their effects: what kinds of bodies and educational spaces are configured when traditional variables are modified? What new uses of the body, interactions and space are enabled or constrained by these arrangements? How does this transformation systematically affect the other dimensions analysed, for example, teacher-student relationships? What happens when the course has to move online, for example due to COVID-19 circumstances? Finally, how do students make sense of all these transformations and what aspects are observable for them?

Invention and improvisation

Scientific and technical rationality are supported by a series of highly standardised methods and procedures. The replicability demanded by science, as a condition for access to the fundamental intersubjective agreements that are required for approaching the truth, needs clear methods and steps. However, science is not confined to protocols or algorithms. Indeed, the most important moments in the scientific enterprise or technological development usually involve surprise, curiosity, the creation of hypotheses, new ideas, new tools or objects. This phase requires a high degree of creative doing, i.e., the ability to improvise in the existing situation. Despite this, it is a phase that is rarely addressed in the scientific or epistemological field. There are no methodology books that teach us how to be inventive, or to formulate original hypotheses or new solutions.

In the artistic field, on the other hand, work and reflection on the phenomenon of improvisation and creation are highly developed and thematised. Through an infinity of well-established strategies, music, theatre or dance have identified ways to forge a habitus of body and mind that enables one to improvise and to create.

Considering this, our fundamental question is to know to what extent the experience of the performing arts can inform students in scientific careers. What happens when we bring the two fields together to promote cross-fertilisation?

Collective creation and social interactions

Creation, and in particular collective creation, are two phenomena that have been little discussed in the epistemological field. Although there are an enormous number of publications on the creative act in general or on creativity, the process of shared collective creation in science is less developed. It is not easy to highlight the social character of knowledge production. One of the fundamental questions of this project is how to approach this field of phenomena. The analysis focused on courses that sought to establish bridges between artistic and scientific activities. On the one hand, we ask ourselves about the conditions for bringing the social phenomenon of the production of novelties to light. On the other, we question the very conditions for collective creation to take place in a socio-material encounter, as a "material meeting of minds". What kind of interactions or resources is collective creation based upon in this context? What are the obstacles and resistances to this happening? How does engagement with collective creation transform the students' relations to themselves, to others and to the learning task?

These are examples of research questions that the reader will encounter in the next chapters of the section "Discoveries" of this book.

2.5 Research methodology

The general methodological approach is qualitative. We have adopted several data collection and analysis strategies that are typically applied in socio-cultural psychology, educational sciences, cultural anthropology, or organizational psychology.

In order to ensure the comparability of the results, the research project is based on data collected, in as similar a manner as possible, in the two courses described above. During two academic years, 2018–2019 and 2019–2020, we carried out (a) documentary analysis (course descriptions and curricula), (b) ethnographic observations (including observations during courses, observations of some volunteer student groups inside and outside the university, observations of feedback sessions and final performances), (c) observations supported by visual methods (taking pictures and making video-recordings of the courses), (d) interviews (individual and group interviews with teachers, individual interviews with volunteer students, focus groups with vol-

unteer students at the end of the course, self-confrontation interviews with teachers), (e) a systematic analysis of students' personal diaries (learning/ reflective diaries).

This enabled us to compile a corpus of data, with two main focuses: one on the perspective and experiences of the students, and the other on those of the teachers.

	Data sources
Focusing on **teacher's perspective**	Course description, course curriculum and institutional documents
	Interviews with the teachers of the course
	Intermediate feedbacks during the course (video-recorded)
	Interactions during the course (video-recorded)
	Interviews in self-confrontation (based on video-recorded course sequences)
	Final evaluations
Focusing on **student's perspective**	Self-descriptions (motivation letters/why are you here?) at the introduction of the course
	Interactions during the course (video-recorded)
	Learning Diaries/Reflective diaries
	Intermediate presentations (video-recorded)
	Interactions during the group work (video-recorded)
	Evaluation of the students
	Final presentations and *in situ* feedbacks (video-recorded)
	Final interviews (audio or video-recorded) and/or focus group

Tab. 2.1 Material collected in the ASCOPET research project.

We will refer to the *unit of analysis* as the «type of object about which information is sought in a research project» (Marradi, Archenti & Piovani, 2007, p.87). This unit has an abstract referent, that is, it does not refer to a particular case nor is it confused with the empirical referents from which the necessary data are obtained. For this reason, the units are not the participants or the interviewees (Roales Riego, 1988), in the sense in which some methodologists of sociology or anthropology characterize the "individuals". Our units of analysis are (a) the descriptions and references of the lived experience of the subjects involved in the courses under analysis (students, teachers, researchers); (b) their self-reflections on the process of learning; (c) the theoretical perspectives, opinions, preconceptions and naïve representations

about the curricular contents of the courses; (d) the interactions defined as collective constructions. Our analysis focuses on dynamics – what happens, and how what happens changes over time.

In turn, for each *analytical unit* there is a certain group of observational units: the facts in which the analytical units are recognized. In this sense, our observational units will be the materials originating from the different empirical sources. Therefore, there is no one-to-one correspondence between the unit of analysis and the observational unit, because the former may be expressed by different empirical units.

Data reduction, codes and triangulation

For the analysis of these materials, we created a set of 49 analytical categories (Mayring 2004) 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. As a first data reduction strategy, we use these 49 categories to code the data, in their various sources, using MAXQDA, a software for qualitative data analysis. The coding of the qualitative textual and visual material resulted in 1308 coded segments. From these codes, it is possible to retrieve the textual and visual segments corresponding to each code, putting them in relation with others on the basis of a tentative hypothesis. For example, it is possible to simultaneously retrieve only the codes corresponding to the emotional tones of the communication, together with those referring to discrepancies between what is expected and what is found in the courses. In this way, we can look at the data according to different proposed hypotheses.

Categorising allows us to inquire into:

a) When and in what context a phenomenon is present.
b) How many times this phenomenon emerges in the classes/documents/interactions? (Which gives a general idea of its relevance as a problem).
c) Who introduces the topic, and how it is related to other topics (co-presence).
d) How it is formulated, with what notions, concepts and semiotic resources.
e) How it is presented (if at all) in both courses.
f) Whether cliché or original arguments are offered about the topic.

g) How we can identify possible new meanings/creations/obstacles related to the phenomenon.

After mapping these segments through a labelling system, we carried out a reconstructive process, i.e. a systematic introduction of explanations, based on methodological triangulation (Vasilachis de Gialdino, 2006), a strategy aimed at identifying recurrences, associations, inconsistencies or contradictions. That is, we started with the data, reduced them through a system of labels, and from there we moved to an explanatory level to read the data back. This loop between data and explanation is supported by systematic triangulation, both theoretical and methodological (Aguilar & Barroso, 2015; Flick, 2004; 2018). To this end, we carried out a triangulation between theories. By this, we refer to the theoretical articulation between the different approaches mentioned above within our conceptual frame of reference. While this articulation is part of the assumed theoretical background, from a general methodological point of view, it is a way of validating data and categories in a convergent way in a specific case. Secondly, we carry out a methodological triangulation, which implies the search for consistency of data obtained through different strategies or sources.

2.6 Open problems and final note

Every breakthrough in answering a question is an opportunity to open up new, previously unforeseen problems. In our case, the problems raised by this research are numerous, but they can essentially be reduced to three. First, the degree of replicability of the educational experiences analysed remains to be established. The fact that a large part of their development depends on the conditions and personal interests of the teachers in charge raises the question of their transferability. Can these educational projects be scaled up to large-scale courses? Are they replicable given the institutional conditions?

Secondly, we believe it is necessary to look more closely at the phenomenon of evaluation itself: what should be evaluated in these courses and how does this decision affect the whole process? Courses have to fit into an established accreditation system and the room for manoeuvre is limited. In

any case, the way in which students are assessed generates multiple conflicts between the proposed courses and standard academic logic.

Finally, the role of the aesthetic and playful dimensions of these experiences remains to be explored. Although we find repeated references to the emotional tones provoked by the workshops, to fun or aesthetic judgements, the role of these facets in the pedagogical process is not entirely clear.

The ASCOPET research project aims to analyse and understand the specific teaching and learning processes that take place in two courses using the performing arts in higher education contexts with students from non-arts professions. It has allowed us to explore in depth several themes that will be documented in the next sections of this book: a) the use of the body in teaching and learning processes (chapter 5), b) teacher-learner relationships (chapter 6), c) collective creation (chapter 7), d) improvisation (chapter 8), e) digital courses and transformations of time and space (chapter 9). It also aims to contribute to the critical evaluation of these courses and to formalise some principles for making use of the performing arts in higher education (final section of the book).

References

Aguilar Gavira, S. & Barroso Osuna, J.M. (2015). *La triangulación de datos como estrategia en investigación educativa*. Pixel-bit.

Alerby, E. (2009). Knowledge as a 'body run': learning of writing as embodied experience in accordance with Merleau-Ponty's theory of the lived body. *Indo-Pacific Journal of Phenomenology, 9*(1), 1–8.

Apple, M.W., Au, W. & Gandin, L.A. (2009). Mapping critical education. In *The Routledge international handbook of critical education* (pp. 3–19). Routledge.

Becerra, G. & Castorina, J. (2018). Towards a dialogue among constructivist research programs. *Constructivist Foundations, 13*(2), 191–198.

Blanch, E.J. (1974). *Dramatics in the Foreign-language Classroom*. MLA/ERIC Clearinghouse on Languages and Linguistics.

Bornstein, M.H. & Lamb, M.E. (Eds.). (2010). *Developmental science: An advanced textbook*. Psychology Press.

Bronckart, J.P. (1999). La conscience comme "analyseur" des épistémologies de Vygotski et Piaget. In Yves Clot (Ed). *Avec Vygotski*, (pp. 17–43). La Dispute.

Bruner, J. (2015). *Car la culture donne forme à l'esprit: de la révolution cognitive à la psychologie culturelle*. Retz.

Carvalho, L. & Yeoman, P. (2021). Performativity of materials in learning: The learning-whole in action. *Journal of New Approaches in Educational Research, 10*(1), 28–42.

Carvalho, L., Nicholson, T., Yeoman, P. & Thibaut, P. (2020). Space matters: framing the New Zealand learning landscape. *Learning Environments Research, 23*(3), 307–329.

Castelfranchi, C. (2014). Minds as social institutions. *Phenomenology and the Cognitive Sciences, 13*(1), 121–143.

Castorina, J.A. (2003). Las versiones del constructivismo ante el conocimiento instituido y las prácticas sociales. *Contextos de educación, 4*(5), 17–40.

Castorina, J.A. & Baquero, R. (2005). *Dialéctica y psicología del desarrollo: el pensamiento de Piaget y Vigotsky*. Amorrortu.

Cattaruzza, E., Ligorio, M.B. & Iannaccone, A. (2019). Sociomateriality as a partner in the polyphony of students positioning. *Learning, Culture and Social Interaction, 22*, 100332.

Engeström, Y., Engeström, R. & Kärkkäinen, M. (1997). Practical intelligence: Polycontextuality and boundary crossing in complex work activities. In R.J. Stemberg/E.L. Grigorenko, *Intelligence, Heredity and Environment*, (pp. 440–462). Cambridge University Press.

Evans, K. & Furlong, A. (2019). Metaphors of youth transitions: niches, pathways, trajectories or navigations. In *Youth, citizenship and social change in a European context* (pp. 17–41). Routledge.

Fenwick, T. & Edwards, R. (2013). Performative ontologies: Sociomaterial approaches to researching adult education and lifelong learning. *European Journal for Research on the Education and Learning of Adults, 4*(1), 49–63.

Fleming, M. (2016). Exploring the Concept of Performative Teaching and Learning (pp. 189–205). In: S. Even & M. Schewe (Eds.): *Performatives Lehren, Lernen, Forschen – Performative Teaching, Learning, Research*. Berlin: Schibri.

Flick, U. (2004). Triangulation in qualitative research. *A companion to qualitative research, 3*, 178–183.

Flick, U. (2018). *Doing triangulation and mixed methods*. Sage.

Heinz, W.R. & Marshall, V.W. (Eds.). (2003). *Social dynamics of the life course: Transitions, institutions, and interrelations*. Transaction Publishers.

Hölscher, K., Wittmayer, J.M. & Loorbach, D. (2018). Transition versus transformation: What's the difference? *Environmental innovation and societal transitions, 27*, 1–3.

John-Steiner, V. (2000). Creative collaboration. New York: Oxford University Press.

Kerosuo, H. & Engeström, Y. (2003). Boundary crossing and learning in creation of new work practice. *Journal of Workplace learning, 15*(7/8), 345–351.

Kloetzer, L., Clot, Y. & Quillerou-Grivot, E. (2015). Stimulating dialogue at work: The activity clinic approach to learning and development. In *Francophone perspectives of learning through work* (pp. 49–70). Springer, Cham.

Konkola, R., Tuomi-Gröhn T., Lambert, P. & Ludvigsen, S. (2007) Promoting learning and transfer between school and workplace. *Journal of Education and Work, 20*(3), 211–228.

Lage-Gómez, C. & Cremades-Andreu, R. (2022). In Between Transdisciplinary Dialogue and Participatory Creativity: Group Improvisation in Secondary School. In *The Routledge Companion to Creativities in Music Education* (pp. 505–516). Routledge.

Lerner, R.M. (2011). Structure and process in relational, developmental systems theories: A commentary on contemporary changes in the understanding of developmental change across the life span. *Human Development, 54*(1), 34–43.

Lerner, R.M., Hershberg, R.M., Hilliard, L.J. & Johnson, S.K. (2015). Human Development, Theories of. *International encyclopedia of social and behavioural sciences*, 276–282.

Lourau, R. (1970). *L'analyse institutionnelle*. Éditions de Minuit.

Määttänen, P. (2015). *Mind in action: Experience and embodied cognition in pragmatism (Vol. 18)*. Springer.

Markus, H.R. & Hamedani, M.G. (2007). Sociocultural psychology: The dynamic interdependence among self-systems and social systems. In S. Kitayama & D. Cohen (Eds.), *Handbook of cultural psychology* (pp. 3–39). The Guilford Press.

Marradi, A., Archenti, N., Piovani, J. (2018). *Manual de metodología de las ciencias sociales*. Siglo XXI.

Østern, A.L. & Knudsen, K.N. (Eds.). (2019). *Performative approaches in arts education: Artful teaching, learning and research*. Routledge.

Overton, W.F. (2003). Development across the life span: philosophy, concepts, theory. In: R.M. Lerner, M.A. Easterbrooks & J. Mistry (Eds.) *Comprehensive handbook of psychology: developmental psychology* (pp. 13–42). Wiley.

Overton, W.F. (2006). Development psychology: philosophy, concepts, theory. In W. Damon y R.M. Lerner (Eds.), *Handbook of child psychology: Theoretical models of human development, Vol. 1* (6th Ed.) (pp.18–88). J. Wiley & Sons.

Roales Riego, J.L. (1988). *Introducción a la teoría del muestreo*. Secretaría de Recurso Hídricos.

Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context*. Oxford University Press.

Runco, M.A. (2007). To understand is to create: An epistemological perspective on human nature and personal creativity. In R. Richards (Ed.), *Everyday creativity and new views of human nature: Psychological, social, and spiritual perspectives* (pp. 91–107). American Psychological Association.

Sawyer, R.K. & DeZutter, S. (2009). Distributed creativity: How collective creations emerge from collaboration. *Psychology of aesthetics, creativity, and the arts, 3*(2), 81.

Schewe, M. (2020). Performative in a nutshell. *Scenario: A Journal for Performative Teaching, Learning, Research, 14*(1), 103–110.

Shapiro, L. (2010). *Embodied cognition*. Routledge.

Syssoyeva, K.M. (2013). *Collective creation in contemporary performance*. Springer.

Tau, R. (2023). Possible in Human Development. In *The Palgrave Encyclopedia of the Possible* (pp. 1109–1116). Springer.

Tau, R., Kloetzer, L. & Henein, S. (2022). The dimension of the body in higher education: Matrix of meanings in students' diaries. *Human Arenas, 5*(3), 441–468.

Tozer, S., Violas, P.C. & Senese, G.B. (2006). *School and society: Historical and contemporary perspectives*. McGraw-Hill.

Valsiner, J. (1998). *The guided mind: A sociogenetic approach to personality*. Harvard University Press.

Valsiner, J. (2007). *Culture in minds and societies: Foundations of cultural psychology*. SAGE Publications.

Valsiner, J. & Rosa, A. (Eds.). (2007). *The Cambridge handbook of sociocultural psychology*. Cambridge University Press.

Valsiner, J. & Van der Veer, R. (2000). *The social mind: Construction of the idea*. Cambridge University Press.

Vasilachis de Gialdino, I. (2006). *Estrategias de investigación cualitativa*. Gedisa.

Via, R.A. (1976). Participatory English: *Drama. Language Arts, 53*(2), 175–178.

Vygotski, L.S. (1997). *Pensée et langage*. La Dispute.

Vygotsky, L.S. (1925/1971). *The Psychology of Art*. MIT Press.

Vygotsky, L.S. (1980). *Mind in society: The development of higher psychological processes*. Harvard University Press.

Wertsch, J.V. & Sohmer, R. (1995). Vygotsky on learning and development. *Human development, 38*(6), 332–337.

Woolner, P. (2010). *The design of learning spaces*. A&C Black.

Simon Henein

3. The Improgineering course

To improvise is to take the time to listen to the world
and to take the risk of dedicating oneself entirely to it.
Anne Despond, Improgineering student, 2018

Launched in 2017, the course "Collective creation: improvised arts and engineering" (short name: Improgineering) is spread across the academic year with 28 three-hour weekly blocks; 10 are dedicated to practical improvisation workshops, 4 to theoretical teaching about improvisation, 3 to student-led workshops, 4 to rehearsals, 1 to exchanges with artists, 4 to introductions and debriefings, and 2 to public performances. Work will be assessed through "reflexive diaries", oral presentations and final performances. This elective course is open to all Masters students at EPFL (École polytechnique fédérale de Lausanne) and to some Masters students at UNIL (Université de Lausanne). The number of participants is limited to 25.

3.1 Course description

The "Collective creation: improvised arts and engineering" course (*Improgineering*) is part of EPFL[5]'s Social and Human Sciences (SHS) programme. It was developed by Prof. Simon Henein in collaboration with performance artist Joëlle Valterio and the *Centre d'art scénique contemporain de Lausanne (Arsenic)*[6]. Since 2017, this course has introduced students to improvisation techniques developed in the performing arts (theatre, music, dance, performance), and questions their possible transposition to engineering de-

5 École polytechnique fédérale de Lausanne.

6 The *Centre d'art scénique contemporain* (Arsenic) is an internationally renowned cultural center for dance, theatre and performance located in Lausanne, Switzerland. It hosts artists working on their creations and presents interdisciplinary performances and events. [https://arsenic.ch].

sign practices. The collective creative processes studied are implemented in a project that leads to two public presentations on the Arsenic stage. The performances improvised by the students include technical realisations, revealing polarities and articulations between their physical presence and that of their artefacts.

The *Improgineering* course addresses the creative processes in science, engineering and the performing arts. The pedagogical goals of the course are to develop students' listening and expressive capabilities in order to strengthen their collective creative potential. The approach involves the students learning some of the improvisation techniques used in performing arts (dance, music, theatre) and relating them to design techniques used in engineering.

This elective course is open to all EPFL first-year Master's degree students and to some UNIL students. Classes are held once a week throughout the academic year. The students receive 6 ECTS[7] credits for following it successfully. The number of participants is limited to 25. Registration is on a first-come, first-served basis once the online registration portal opens, approximately a month before the semester starts. The course is supported and hosted by Arsenic in Lausanne, a well-known incubator of contemporary performing arts.

Attending the course is voluntary, as with all other courses at EPFL. On average approximately 80% of the students are present at each class. Participation in the workshops is also voluntary: students can attend workshops just by watching them, without participating actively, and can leave the workshops at any time if they wish (in practice, such situations have happened only on very rare occasions). Students work in freely-formed groups.

The learning objectives are: comparing the improvisation techniques of various performing arts; explaining the similitudes and differences between these techniques and the practices of engineering; presenting live shows; developing one's scenic presence; analysing performances in terms of dramaturgy, space, time and audience interaction.

The first edition of the course led to a video clip[8] presenting the course (a joint EPFL-Arsenic press release[9]), and the publication of a collective book-

7 European Credit Transfer and Accumulation System.
8 https://go.epfl.ch/presentations
9 https://go.epfl.ch/publication

let (Henein & Valterio, 2018) presenting the course from the teachers' and students' points of view.

3.2 Structure of the course

Table 3.1 presents the structure of this 3-hour weekly course spread over the full academic year (28 weeks in total). Each of the two semesters during which the course takes place are organised around different activities and objectives, as we will see below.

First semester
The first semester encompasses four 6-hour practical workshops (numbered W1 to W2, each composed of two 3-hour blocks spreading over two weeks) introducing improvisation in dance, theatre, music and performance art. Four additional lectures (numbered T1 to T4) cover the theoretical aspects: dramaturgy and sociology of improvisation, improvisation in engineering design, and creativity in science.

The teachers of the practical workshops (W1 to W4) are Isabelle Bouhet (professional comedian and stage director), Simon Henein (trained dancer), Jacques Bouduban (professional musician) and Joëlle Valterio (professional performance artist).

The teachers of the theoretical blocks (T1 to T4) are a sociologist (Dr Alain Bovet, HE-Arc[10]), a professor of theatre studies (Prof. Danielle Chaperon, UNIL[11]), who treats the dramaturgical aspects, a mathematician from EPFL (Dr Ilan Vardi), and an engineering professor (Simon Henein), treating the theoretical aspects of improvisation in the field of science and engineering respectively.

10 University of Applied Sciences in the Jura Arc.
11 University of Lausanne.

Second semester

During the second semester, which is also distributed over fourteen 3-hour weekly blocks (see Figure 3.1), students work in fixed groups of three to five members towards an improvised performance based on physical artifacts they have created with the goal of exploring creativity in engineering and improvisation. The only constraints imposed on the students are the following: the length of the performance is 12 minutes; all performers are physically present on stage most of the time; actions performed on stage are improvised; an artifact designed and built 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.

Two 3-hour workshops in the beginning of the semester focus on reactivating the practices learned in the first semester. The first one, *Dancing with Real Bodies*, is given by Susanne Martin[12] (professional dancer and choreographer) and is based on the Contact Improvisation dance form, which focuses on physical touch and body-weight sharing as a means for collective action. The second one, *Immersion Workshop*, is given by Alexandra Macdonald (professional dancer) and Mathieu Schneider (professional musician). It focuses on the creation of short, instant composition pieces based on improvised movement and improvised music.

Ten 3-hour blocks are dedicated to the creation of students' performance pieces. In order to explore concepts and ideas and to collect feedback, each student group leads a 1-hour workshop that has to involve the class in the creation of their piece. During this creation period, the groups receive creative support from several performance artists[13] from Arsenic. The course culminates in two public performances presented in one of the Arsenic studios, with an audience of approximately 40 to 100 people. The first public performance is labelled "Dress Rehearsal" while the second one is called

12 http://www.susannemartin.de

13 The artists who have participated in these exchanges via Arsenic are (in alphabetical order): Maud Blandel (dancer); Tiphanie Bovay-Klameth (comedian); Audrey Cavelius (comedian); Duri Darms (stage technician); Pamina de Coulon (performer); Claire Dessimoz (dancer); Christophe Jaquet (performer); Nicole Seiler (choregrapher); Immanuel de Souza (musician).

the "Final Performance" and is evaluated by a jury[14] composed of prominent EPFL professors, artists, Improgineering alumni students and some of the external teachers of the course. After the final performance Joëlle Valterio gives the floor to the jury members, including Simon Henein, then the students and finally to the public, steering a discussion around the formulation of the learning outcomes of the performance and of the course as a whole: "If this same course were given without a public performance at the end, what would be lost or gained in terms of the learning outcomes?"; "What are the learnings outcomes of this course looking back at the full academic year?"; "What does the audience learn from attending this performance?"

3.3 Evaluation

The course evaluation is based on three deliverables: an individual reflexive diary (assessed in four parts over the full academic year), an oral group presentation answering one of the questions stemming from the theoretical blocks, and a 12-minute, on-stage, public, improvised group performance

14 Since the launch of the Improgineering course, the jury composition has been the following:
2018: Isabelle Bouhet (comedian); Danielle Chaperon (professor in Theatre Studies at the University of Lausanne); Gisou van der Goot (dean of the School of Life Sciences, EPFL); Laure Kloetzer (professor in Sociocultural Psychology at the University of Neuchâtel); Susanne Martin (choregraph with a Ph.D. in Artistic Research from the Universities of Northampton and Middlesex); Patrick de Rham (Arsenic director), Nicolas Weibel (engineer and director of Greene, Tweed & Co. SA).
2019: Marilyne Andersen (EPFL professor, Laboratory of Integrated Performance in Design); Pierre Dillenbourg (EPFL professor, Computer-Human Interaction Lab for Learning & Instruction); Christophe Jaquet (performer); Ivan Pittalis (adjunct director, Arsenic); Nicole Seiler (choregrapher); Lucie Perrotta (EPFL student, Communication Systems).
2020: Kim Bachmann (painter); Julia Bierent (EPFL student and et videomaker); Jacques Bouduban (musician); Alain Bovet (sociologist); Nazario Branca (architect); Christina Burkholter (philosopher) ; Felix Grimberg (EPFL student, mathematics); Alexandra Macdonald (dancer); Nicolas Meyer (Cameraman and videomaker); Etienne Thalmann (EPFL Ph.D. student in microengineering).
2022: Isabelle Bouhet (comedian); Simona Ferrar (choregrapher and performer); Sebastian Gautsch (adjunct of EPFL's microengineering section); Markéta Machková (Ph.D. student at University of Neuchâtel and DAMU Prague); Maxine Reys (stage director and Ph.D. student at University of Lausanne and La Manufacture); Cédric Tomasini (EPFL Ph.D. student in Learning Sciences).

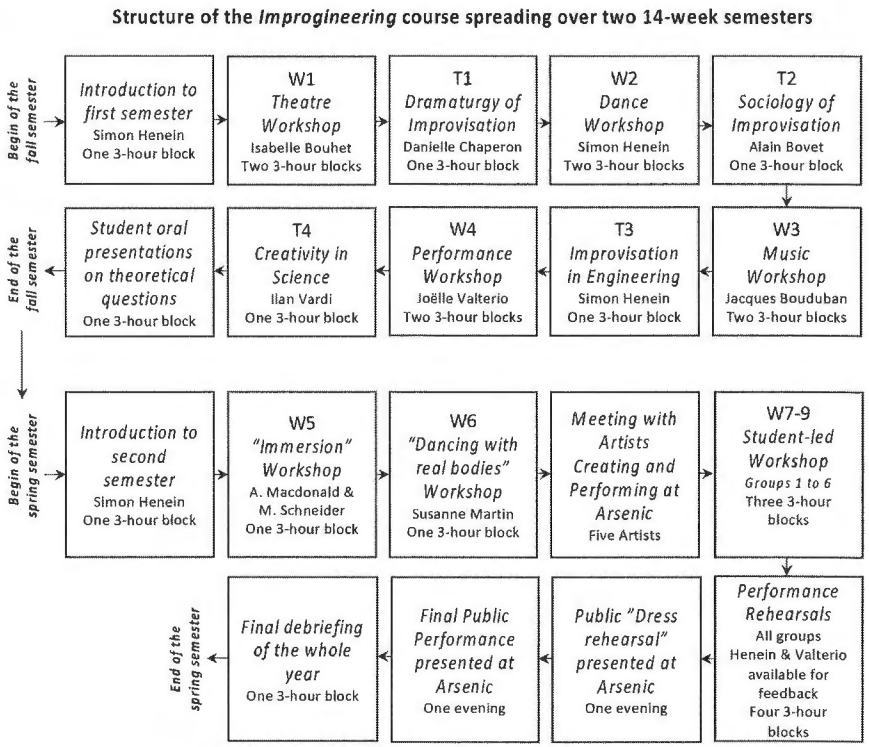


Fig. 3.1 Structure of the Improgineering course spread over two 14-week semesters.

presented at the end of the year (two public presentations). These instances are described in more detail below.

Firstly, the students are asked to write what is called a *reflexive diary* during the two semesters, equating to approximately one A4 page per week (optional annexes such as drawings, photographs and recordings are welcome). The time dedicated to this work, according to the study plan, is 2.5 hours per week. This activity is described to the students as follows:

The role of the *reflexive diary* is to think about what you experience and learn during the course; as one can think out loud, one can think through writing. The style is free and personal and does not need to be polished. It is important not to delete text as you write, but always to add, even if this

sometimes leads to contradictions. It is not a report about what has happened during the class, but a trace of your own learning process and associated reflections. Examples of questions you could address:

- What have I learned?
- Which details within the exercises touched me, interested me, perturbed me, disturbed me, appealed to me the most?
- Which resistances did I encounter, and which strategies did I use to overcome them?
- How could what I learned be useful for my future profession or for my life in general?
- What do I find beautiful, poetic, fragile, banal, strong, interesting?
- How did I solicit my body consciousness during the exercises?

The drawing shown on Figure 3.2 is presented to the students in order encourage them to direct their attention to various aspects of the teaching-learning process. Focus points include the teachers, the material, the other students in the class, the plans for the artifact, the artifact itself, the tools used to design and build the artifact, the users of the artifact or the audience, the broader environment, the world, what the student thinks and feels, the effects of the students' actions on the nearby environment.

The diaries are evaluated on the basis of diversity of topics, the finesse of observations and analyses, and the progression between the parts of the diaries following teachers' feedback. By mid-semester, the two main teachers provide individual feedback on the way students write in their reflexive diaries.

Second, at the end of the first semester, the students form groups of three and give a 12-minute oral presentation in front of the class where they answer specific questions formulated by the teachers of the theoretical blocks. The students' oral presentations are based on a question suggested by the teachers in the first semester; for example, "Which function(s) can an artifact have within an improvisation regime as defined in this course?", "How does a collective improvisation differ from an individual improvisation?", or "Can creativity be taught?".

In their presentations, students focus on their respective questions, and contextualize, discuss and evaluate them in terms of their relevance in the frames of the Improgineering course, their studies and their future professions. Oral

presentations are evaluated on the basis of the clarity of the contextualization, the richness and pertinence of external references, the richness and pertinence of the students' own contributions and the balance of speaking time among the three group members.

Thirdly, the final performance is assessed by an external jury (50 % of the grade) as well as the two main teachers in charge of the course (50 % of the grade) using the following general criteria: spatial dimension of the performance; rhythmic dimension of the performed actions; sound dimension of the performance; integration of the artifact within the piece; visual or graphical aspects of the performance; and pertinence of the text written to present the piece to the audience prior to the showing.

Fig 3.2 Illustration of possible focus points for the writing of the reflexive diaries.

3.4 Concluding remarks

This course has so far been given over 5 years with great success: the students' evaluations systematically showed that the course was highly appreciated. The last official anonymous in-depth evaluation of the fall semester was made in 2020: out of the 22 students who answered (which represent 96% of the class), 96% of the respondents stated that the course was *good*. Respectively, for the spring semester, the last in-depth evaluation was made in 2022: out of the 9 students who answered (which represent 50% of the class), 100% stated that the course was good. The great majority of detailed comments written by the students were steadily positive (some of them are cited in Chapter 8). The external teachers also manifested a strong interest in the course and systematically manifested their wish to remain part of the teaching team, whose composition hence remained practically unchanged over the years. The Social and Human Science Program also manifested its support for this teaching by providing constant financial support and by promoting the course via its social media channels and its website where a video of the *Improgineering* course was presented on the main page of the program for more than one year as a reference example of the programs offered, among a list of over 120 courses. The Arsenic centre also uninterruptedly supported the course by granting access to its studios, technicians and artists. The final presentations all had full-house. This broad positive feedback encouraged the teaching team to set up and invest in the ASCOPET research project, which eventually led to the writing of the present book.

References

Henein, S. & Valterio, J. (Eds.) (2018). *Création collective: arts improvises et ingénierie. Actes du cours 2017–2018*. Improgineering research program, Instant-Lab, EPFL. [https://go.epfl.ch/flipbook].

Kloetzer, L., Henein, S., Tau, R., Martin, S. & Valterio, J. (2020). Teaching through performing arts in higher education: Examples in engineering and psychology. *Scenario: A Journal for Performative Teaching, Learning, Research, 14*(2), 1–25.

Discoveries

Ramiro Tau, Laure Kloetzer

5. Body engagement

Bringing the body back into Higher Education[22]

University is mostly about sitting on a chair all day listening to theories that aren't always interesting, so, I think a class where you can express yourself more freely, through your body, in a small group, attracted me.
Extract from a student diary, Psychology and Migration course.

What happens when the body is returned to the centre of the pedagogical experience? This is one of the key questions in our research on the use of the performative arts in the field of education. The historical process that led to the invisibilization of the body in the educational process, and especially in Higher Education (HE), was strongly questioned during the second half of the twentieth century and the beginning of the twenty-first. In this chapter we will try to show some consequences of the use of some tools from the performative arts in academic teaching and learning contexts and, through the analysis of their personal diaries, try to identify what the body means for the students.

5.1 Disciplined bodies, abstract learning and the student alienation

What happens when the body is returned to the centre of the pedagogical experience? The question presupposes to challenge the Western tradition that mainly conceives the educational process as an intellectual activity, in which the body is seen as an interference or an obstacle.

22 The content of this chapter is a revision and updated version of the original article: Tau, R., Kloetzer, L. & Henein, S. (2022). The dimension of the body in higher education: Matrix of meanings in students' diaries. *Human Arenas, 5*(3), 441–468.

The reasons why mind and body have been configured as two separable and independent categories are multiple: the underlying philosophical assumptions are only one aspect of a system with political, scientific and cultural dimensions. However, it is possible to schematically describe these basic assumptions, which shape a well-established tradition of educational practices. According to Molander (2009), there are five definitory premises in the classical conception of knowledge in the Western world: (i) the acceptance and use of dichotomic pairs to express the problems around knowledge – subject/object, mind/body, innate/acquired – inherited from "the philosophies of split"; (ii) the distinction between abstract knowledge and applied knowledge; (iii) the assumption that knowledge can – and must – be formulated in words or in the language of mathematics; (iv) the characterization of knowledge as a reflection or copy of an objective reality; (v) the assumption of stability over time and space (universality) of the current knowledge. Each of these statements presupposes "that there is a pure form of knowledge with a single goal: to understand". Briefly, "[...] knowledge is in the subject, in a symbolic form, which can be made explicit (be externalized) by means of a mirroring (a re-presentation) of reality (the object)" (Molander 2009, p. 58).

The schema drawn up by Molander seems to be promoted by current educational policies and worldviews on education, in particular within the neoliberal ideological framework that guides a large number of contemporary economies (Nedbalová, Greenacre & Schulz 2014). The phenomenon identified as "marketization of social relations" characterizes social subjects and interactions following productivity, efficiency, and profitability categories (Molesworth, Scullion & Nixon, 2011; Puiggrós, 2017). This orientation facilitates the reproduction of dichotomic logics. The promotion of "creativity", "meritocracy" and also the definition of the educational act in terms of "entertainment", reinforces the conception of an ahistorical subject, decontextualized and, moreover, unilaterally responsible for the successes and failures in one's own education (Marshall, 2017). From this perspective, the student is seen as a client, the teaching process as a service, the learning process as an act of consumption and the pedagogical strategies as a show (Tau & Parrat-Dayan, 2018).

In this chapter we focus on students' own perspectives through the analysis of their personal diaries.

Data and methodology

The data to which we will refer come from the courses detailed in chapters 3 and 4 of this book. *Improgineering* and *Psychology & Migration* are both elective courses at the master and bachelor levels, from two Swiss public universities, one for engineering students, the other for psychology and education students. *Improgineering* examines the creative processes in science, engineering and the performing arts, with lectures and workshops on improvisation, dance, music and theatre. *Psychology & Migration* introduces students to a sociocultural approach, using literature and theatre, of the psychological aspects involved in migration.

As mentioned in chapter 2, we obtained our data from different sources. In this chapter, we will present students' perspective on the use of the body, through the analysis of their "reflexive diaries" and "learning diaries". For this, we collected 47 diaries (22 for *Psychology & Migration* and 25 for *Improgineering*) and used a set of analytical categories (Mayring, 2004) in order to analyse and compare text and visual materials.

The student diaries are remarkably variable, both in content and form. They serve different functions: they help students reflect on the experiences of the course and reconstruct them with semiotic resources; they are also a private way of communicating ideas and feelings not usually shared in the course. The coding of the qualitative material resulted in 1,308 segments, among which approximately 500 deal with the bodily dimension of the courses. After mapping these segments, we performed a reconstructive process and a methodological triangulation (Vasilachis de Gialdino, 2006), in order to identify recurrences, associations, inconsistencies or contradictions.

5.2 Findings

Our findings are organized along five axes. First, we will refer to the way of *communicating the experiences with the body*, through the diaries. Next, we will refer to what we call *thematic modulation*, that is, the way in which the topic of the course is assimilated in the form of an embodied representation. Thirdly, we will show the *spatialization of representations* and experiences, whenever the body plays a central role in the course activities. On the other hand, the body seems to function as a *sensitive bridge to others and to the*

recognition of one's own sensitive experience, two aspects strongly invisibilized in traditional education. Finally, we will refer to *the body as a condition for biographical continuity*, for the historicized connection between past and present experiences.

a) Diaries communicating complex bodily experience

In this section, we present three sub-topics: the function of the diary's addressee in the development of one's thinking about the body; the process of historicization of the bodily experience through its inscription in the diary; and the multimodality of some diaries, and what it says about the kind of experience they attempt to convey.

First, diaries are written by the students considering, consciously or unconsciously, a recipient that, manifest or implicit, sometimes expands beyond the teacher who receives the diary. In fact, while some diaries address teachers explicitly, others give an account of an internal reflection. The role of the recipient of diaries has been studied by literary critics. For example, punctuation is fundamentally a set of instructions for the reader, and its absence and subversion brings writing closer to the flow of thought or free association (Ferreiro, 1997). In this sense, the way in which punctuation is used brings the subject closer or further away from the potential reader. At another level of language concreteness, the formal structure of the text, with headings, closures and explanatory segments, also targets a potential reader. In the analysed diaries, the potential readers are basically of three types: a) the teachers; b) the student authors, in an internal dialogue with themselves; c) the diary, as an abstract recipient, as shown by the beginning of the diaries: some are addressed explicitly to the teachers, some are not clearly addressed, and some start with the "Dear diary" formula. These are different modalities, ranging from the invocation of a concrete presence to a much more abstract relationship with others. Within this spectrum, we can identify certain variations with respect to the way each one requires the support of another entity to think about his or her actions. This is a first approach to the dimension of the body: thought seems to be directed and organized differently if the recipient is "embodied" in a particular entity.

Secondly, the diaries have a double temporality: they keep trace of the past subjective experiences of the course, reflected and refracted at the time of production of the diaries. The diaries are written after each course, so there

is a delay between the experience of the course and its reconstruction in the diary. Similarly, they are written outside the space of the course. This double displacement, in time and space, encourages students to establish bridges between the symbolic and material space of the classroom and everyday life. This connection is expressed by a series of "resonances". Several times, students mention in their diaries some personal events or memories in connection with the activities of the course. The diaries facilitate and promote the integration of the course experiences into the subjects' biographies, as we can see in the following examples:

> I was interested in the course because I had already taken part in several piano improvisation workshops and also in jazz workshops. I really like the approach of improvisation and the listening that is necessary to put it in place. Coming from music, I have no theatrical experience and I worry a little because I am rather shy by nature. (Reflective diary, *Improgineering* course).

> When the movements became freer, when we had the choice of abstraction, I was surprised to perform movements learned in athletics. (Reflective diary, *Improgineering* course).

Thanks to this bridging function, the bodily experience of the course – i.e., the sensory and motor experience of the body in context – can be related to other experiences and situations. The "second-degree experience" may trigger resonances. In this sense, the diary allows the body to begin a process of

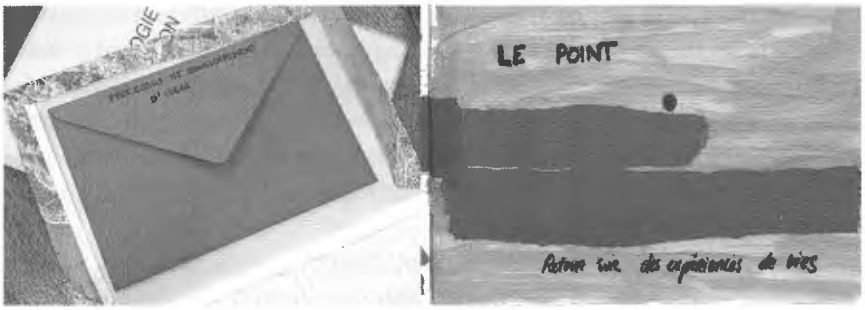


Fig 5.1 Communicating bodily experience in diaries: multimodality.

Fig 5.2 Communicating bodily experience in diaries: multimodality and layers of communication.

historicization of lived experiences, which are inscribed in the biography and acquire temporal density.

Thirdly, a central feature of the diaries is *multimodality*, which provides a reconstruction of the experience through different communicational and semiotic resources (Valsiner, 2001). In addition to narratives, we find in our sample 423 images, drawings or photographs, a hundred quotations – most of them from literature or poetry –, but also handcrafted objects like a wooden mini-theatre, and some videos and music, either selected or composed for the course.

The various ways and means by which students communicate in their diaries are not simply redundant, equivalent and mutually convertible interfaces. In other terms, they are not different "channels" for the same message – as, to rephrase a basic thesis of Watzlawick's communication theory, the channel is part of the message. The variety of resources used to report an experience in a diary seems to show the insufficiency of traditional language to communicate some experiences, especially emotions and body sensations. Embodied experiences inspire a multitude of communication modalities.

Following Watzlawick again, it is impossible not to communicate (Watzlawick, Bavelas & Jackson, 2011). In the diaries, everything seems to be a message because everything is potentially readable. From the general framework established by the pedagogical contract (Jonnaert & Vander Borght,

2003) and the deadlines for the submission of diaries, even absences can be considered as communications. Some images or resources that do not seem to be legible, in the context of the diary, acquire a possible meaning, as is always the case in the reader-author dialectics. A dot or a blank page can be meaningful if they are articulated with a chain of signifiers. Even not presenting the diary in one of the fixed instances is a way of evasion that can be read in the general framework of the course and other layers.

In this dynamic, it is possible to recognize some of the ineffable dimensions of the experience with the body: the alternation of presence/absence, pleasure/displeasure, joy/anguish, among others. Recognizing that it is not possible not to communicate, we must pay attention to all those elements that in a context of discursive analysis would remain unnoticed. With respect to our focus on the body, we believe that this is precisely a dimension that we should privilege if we wish to focus on the specific meanings around the body which merge in these educational contexts. The multimodal aspect of the diaries facilitates the integration of experiences of different orders. Diaries allow students to mediate thought, not only by language of conscious narrative, but by sensory, poetic or ineffable expression, through colours, textures, music or images. Although language is the most extended system of signs and the only one able to act as a metalanguage in itself (Greimas, 1973; Samaja, 2006), the "translatability" between the different modes always implies losses or transformations. The intimate experience of touch or hearing can only be evoked and never completely captured by language. Moreover, collage, mixing text and drawings, making use of maps or even music, make it possible to express fragmented, hybrid or tense experiences. Images are not used independently from text. These different modes of communication act as shortcuts to communicating the experience, and they make it possible to account for the complexity of an experience through the density and contradictions of the different layers of communication (images, words, colors, shapes, layout, music, etc.).

In other words, the multimodal production of diaries makes students and readers aware of not only what belongs to the field of argumentative reason, but also other experiences that would otherwise be lost or invisible. Different ways of mapping experiences facilitate the representation of ambiguity and contrasts, of overlapping or fragmented feelings and ideas. These inherent aspects of the lived experience are too often rejected by the argumentative

logic prevalent in academia. If diaries allow us to approach students' embodied experiences, it is precisely because they succeed in grasping those polyphasic dimensions of the cognitive, sensory, behavioural and emotional levels.

b) Thematic modulation

Comparing the diaries from both courses, we notice that the general topic of each course impacts the selection of images, representations and uses of the students' bodies.

Psychology & Migration is a course that deals with the subjective experience of migration, linked to current topics present in everyday media, such as the mental health of refugees, but also connected to daily life experiences of the migrant students. These topics seem to have functioned as a basis on

Fig 5.3 Thematic modulation.

which to represent and think about the body. Thus, the explicit representations that can be found in the learning diaries often refer to finitude, pain or fragility of the human body. The subject of death also emerges repeatedly in the images. In general terms, the body is represented from its most vulnerable side.

In turn, in the *Improgineering* course, the topic is improvisation and collective creation from the perspective of disciplines such as theatre, dance or music, but also including sociology, mathematics or anthropology. In this case, allusions to the fragility of the body are almost non-existent in students' and teachers' productions. The bodily experience appears to be constantly linked to the creative process of the group, to the encounter with sensations and emotions or to the availability to act in response to the others' requests. The body is described by the students in their reflexive diaries as a source of pleasure, amusement, enjoyment, but also of fatigue, tension or stress.

> I really liked the metaphor of the body as a veil swinging in the air streams, allowing you to relax, to let yourself be carried by the other two, to be sensitive to the forces they imposed, to have some detachment. It was more difficult than it seemed to relax at the level of the ankles while keeping a certain body posture. (Reflective diary, *Improgineering* course).

The topics of the course affect the sensitivity of the students and function as attractors (Valsiner, 2018). Therefore, the bodies discussed in these diaries are different, because of the symbolic mediations with which they are connected. The meanings of the embodied experiences are mediatised reconstructions, carried out twice: at the moment of the lived experience and at the moment of the production of the diaries, with the bias imposed by the themes and semiotic resources provided by each course. This interpretation is consistent with the notion of a body in constant evolution, without a clear and fixed entity and identity. The 'clouds of meaning' around the body have blurred boundaries, expanding and contracting according to the available mediations and relationships established by the subject in each social situation. In sum, we can argue that in an educational context, these thematic modulations channel bodily representations.

c) Spatial modulation

The topic of space is highly present in diaries and frequently connected to the bodily experience, as we can see in the following quotes.

> We learn to see the space. We learn to put our "self" at a distance. (Reflective diary, *Improgineering* course).

> The warm-up that A. makes us do, is absolutely perfect, I come out of it full of energy and prepared. It's a gentle reminder that comes just in time to remind us of the presence of our bodies in space and in relation to others. It allows me to concentrate. (Reflective diary, *Improgineering* course).

> We learned to focus on our movements, the position of our arms and legs, and on what it could mean. Worked on proprioception and exteroception. Indeed, trying to reproduce everyday movements without the context for it forces us to explore: "how do I perform this action?" and therefore, we plunge into this action and its context. We had to reproduce the gesture of picking an apple, eating it and then lying down on the ground, an action that demands the whole of our body. All this always moving in a space. (Reflective diary, *Improgineering* course).

We would like to highlight the way in which different dimensions of the bodily experience, present in the diaries, are connected to space: firstly, to a *safe space* (Rom, 1998) to deploy activities without feeling judged; secondly, to a material and symbolic space, conceived as different from the traditional classroom. As we will see, both aspects of space are interconnected.

At the beginning of the diaries, students usually describe uncertainty about what was expected of them, both in the course and in the production of the diary itself, the role they ought to play, how to meet the course expectations and, by extension, how to position themselves within the course. Students find it hard to integrate the dynamics of these courses with the typical "student ethos". Accordingly, inconsistencies quickly appear in the diaries and are expressed through surprise or rejection about the type of practices proposed in class: "What is all this about?" This uncertainty about the social roles in the microculture of the classroom is translated into expressions of discomfort or awkwardness. But once students move on and discover the logic behind the proposed interactions, that anxiety is progressively dissolved.

Data show us that this transition is directly linked to the configuration of a new type of safe space. To be able to deal with a course in which the demands are fundamentally different from others, it is essential to achieve a change of position. The safe space to which we refer is precisely the result of the recognition of a possibility to act without being evaluated in a traditional way. The constitution of this "space-to-act" involves a transformation of the traditional relationship of instruction and evaluation, change in teachers-students relations in a more horizontal way. The diaries frequently express the surprise and interest of the students regarding the equal participation of the teachers in the creative activities.

Additionally, the space-to-act is both the physical and the symbolic space. Both courses were held totally or partially outside the university buildings: at the *Arsenic*, a public and well-known experimental theatre in Lausanne, and at *Le Lokart*, a dance studio in Neuchâtel. Of course, in these spaces, the material disposition is different from that of the university.

Fig 5.4 Arsenic: one of the spaces chosen for the development of one of the courses.

First of all, the traditional classroom structure does not exist in these spaces: there is no blackboard, screen podium or chairs oriented in the same direction, materializing the teacher/student asymmetry. The lighting, the furniture and the common spaces outside the classroom, are also signs of a different social setup. Consequently, the socio-material aspects of traditional universities (Cattaruzza, Ligorio & Iannaccone, 2019) are not omnipresent at this level, and students adopt other norms and ways of acting. As a result, students (and teachers) move and act differently in the space. We conclude that space impacts body movement and body representation both materially and symbolically. In other words, the lived body is situational:

> First reaction I had when I entered the room: take off the shoes. (Reflective diary, *Improgineering* course).

> When we dance, the notion of space is questioned, dance makes us think about space in relation to the body, its movement, and its interactions with other bodies. It's a bit like in architecture; these two arts aim to make the body evolve in a space. Maybe when we dance, in a way, we are also unconscious architects. The architect shapes the space, models it like plasticine, to create interactions. When we dance, we create compressions, we expand by enlarging it (often when I was doing ballet, I was told to pull my arms out as if I had infinite arms), we hold our breath, we create tensions. It reminds me of Richard Serra's sculptures, which either compress space or expand it depending on where you stand. (Reflective diary, *Improgineering* course).

> Here we are at the Lokart. First action in this place: take off our shoes. That's good for me. It means freedom for me. We're so comfortable barefoot. For me it's a little bit like being equals. No heels that put us on top of each other or above each other. (Learning diary, *Psychology and Migration* course).

The space in which students perform influences the range of possible actions. Implicit logic and the norms attributed to space define, as a continent with its boundaries, the possible performances, even our perceptions of our body. Therefore, one way in which university logic can be subverted seems to be, in our cases, the migration towards places conceived for other types of

interactions. This transgression creates a productive tension for students in non-artistic disciplines, by comparison with conventional courses.

As a preliminary conclusion, sensitive and expressive possibilities of the student's body in learning depend on the qualities of space, being a safe space, and an inspiring material and symbolic space. Being "barefoot" or on the floor "breathing", as mentioned by some students, allows a particular use of the body for learning. The body that emerges here is one with a sensory quality that has almost no place in traditional academic spaces, a neglected body. Body and space appear as the two poles of a dialectical dimension.

d) The body as a sensitive and affective bridge to others and to oneself

Engaging the body – and resonances with other past experiences – is a way to access emotions and feelings. To introduce the body to the teaching and learning processes is to promote the emergence of some kind of awareness of the affective level and the consequences of this. The body/emotions relationship is evident for students, and they express it in their diaries. They connect it to the use of space, time and collective engagement in movement. However, this relationship, which is expressed as a form of contact, or sensitivity to contact, with affective marks and tones, has two directions. On the one hand, we find a large number of explicit references to connection with others, through the sensitivity of the body and its emotional resonances. On the other hand, we find allusions to a process of reconnection to oneself through recognition of embodied subjective dimensions of the experience.

Examples of using the body as a way to connect with others

> New room. It's big. It's big, but the facilitator has delineated the space. We move around, we walk, slowly, quickly, slowly again. These exercises put me unconsciously comfortable, it's a first exercise that progressively puts us all in contact. (Reflective diary, *Improgineering* course).

> During the introductory course, I had already felt this in the room. Glances that suggested some poetry, some glimpses of palpable peculiarities. I could feel, because we had the time, also the posture and the availability, the attention of each person to the bodies, the gazes, interactions of all kinds. (Reflexive diaries, Impro).

> In fact, this past week, I felt like I was opening up to people again! That's nice! (Reflective diary, *Improgineering* course).

> I find it hard to feel the connection with the other people on the stage: communication is not clear. It's very chaotic. (Reflective diary, *Improgineering* course).

> I am also becoming conscious of the body as a strong means of communication. Without talking, we can transmit things, especially emotions. These silent emotions, transmitted by the body, are they universal? Can love, joy, anger, sadness be perceived by any person in this world, just through the movements of the body? I don't know, but I find interesting this idea ... (Learning diary, *Psychology and Migration* course).

Examples of using the body as a way to connect with oneself

> On stage, I felt, in essence: my hands, my legs, the animal movement, a bit of savagery, very intimate connections, only shared with one or two people. And when distance was created, because sometimes we didn't understand each other, I found that we made interesting ruptures. A bit fragile at times, I wasn't too sure what I was doing, but I was testing, I was forgetting the gaze of others in the urgency to find it on myself. (Reflective diary, *Improgineering* course).

> Second dance session. First exercise: become aware of my senses and control my movements. It's incredible how difficult it is to concentrate, but at the same time you discover a new feeling when you do it. It's crazy how I'm almost never in control of my actions: everything is such a trivial automatism. It's also interesting how I gain a lot of confidence when I become conscious of the moment and my movements. (Reflective diary, *Improgineering* course).

This second alternative shows an awareness of "oneself" through bodily sensations connected to emotions. In other words, the body level of experience is also the way to an intimacy rarely noticed.

In both courses this perception of emotions linked to the body is supported by the pedagogical setting. The activities proposed put on stage a dimension of the action that is frequently suppressed in the classroom. As a result, when

this dimension is perceived in these contexts, it provokes surprise, as if it were something out of place.

e) The body as a pre-requisite for biographical continuity

When students refer to their past experiences, especially those from childhood, they do so primarily by referring to bodily experiences. Attention to bodily and affective experiences brings out connections and resonances with experiences from their biographies, especially with children's play. These early bodily sensations, gradually ignored in adult life, reappear and students express diverse feelings, such as joy or shame, in the diaries. The radical child/adult discontinuity of Western cultures may lead to a radical critique of everything in the adult body – and activities – that could be seen as childish. Under this condition, a wide range of experiences with the body are inhibited. Thus, in various passages of the diaries, we could see that the "childish" use of the body – mainly through play – is experienced as something uncomfortable. Again, the courses allow the unexpected to happen in adult life:

> At the beginning of the course, Simon asked the group if they had any comments or anything about the sessions they had had so far. At first, I was hesitant to express how ridiculously childish and unsuitable this circus was for me at the university level... Then when I heard some people saying how rich, exciting, interesting, and full of potential they found it, I thought maybe I would pass. (Reflective diary, *Improgineering* course).

> This day reminds me a little bit of the little girl I was at the time of the breaks at school: I can run around, laugh and talk loudly. I can express myself any way I want. Today they give me this opportunity. What a joy it is to be a little child again. (Reflective diary, *Improgineering* course).

> I felt a bit childish, free to express myself freely without conditioning, free to communicate, free to play with others and also on my own. It is difficult to materialize and put into words what I experienced, but when I came home in the evening and called my parents I said: "Listen, I had an unforgettable experience that everyone should be able to have! The mind/body pair that has to work with creativity produces amazing results. It' s a shame I didn't have the courage to do something like this before". (Reflective diary, *Improgineering* course).

These fragments show the continuity established at the biographical level. We had previously pointed out how body-centred activities are a source for historicization. Here, we emphasize biographical continuity and the emergence of certain activities, such as playful exploration, which are strongly inhibited by traditional education.

This biographical continuity is in clear contradiction with the split imposed by the education systems. We have already referred to the discontinuity between adult and child that characterizes Western societies. In these cases, counter-transferential reactions are a sign of this conflict. Whenever continuity with childhood is re-established, condemnatory judgements emerge as a response to the university student *ethos*.

5.3 Discussion

One question that has guided this paper is how the body is defined for students who are faced with a course that invites them to place themselves on the edge of what is considered "normal" at the university. What meanings emerge under these conditions and what are the common aspects of these definitions?

Both courses redefine the established role of the body in higher education. We look at the body as a spatial semiotic resource that enables a) sensory-motor experience – and thus the relationship to other bodily experiences of the subjects – and b) that sensory connection with others – where gaze and contact play a central role – in terms of exposure, revelation, recognition, concealment, suggestion, discovery, etc. Traditionally, the body has not been seen as a source of knowledge construction, but as a divergent element to be avoided and kept static – not just ignored, but actively denied.

In line with the data presented, we would like to highlight some important aspects. First, the courses analysed do not seek to "add" physical activities to traditional ones. The proposal is not simply to extend the physical experience into the educational setting, but to relocate the processes of teaching and learning into the experience of active bodies. In other words, the central problem of education – how to orient and promote the emergence of new knowledge in other subjects – is repositioned as a multiple bodily, semiotic, affective and reflexive experience. Giving the body back its place in the

educational scene, the challenge of conceiving the learning subject beyond the "prison of the mind" (Maresca, 2010), implies the revision of practices in all their classical dimensions. In this respect, there are three axes to be problematised:

a) the relationship between subjects and knowledge;
b) the relationship with peers and teachers – subjects with other subjects in the same setting;
c) metacognition in the process of teaching and learning including reflection on bodily experiences.

Secondly, this inversion also re-situates the problems of abstract reason in the realm of bodily experience. The topics studied are worked through thanks to the engagement of the body, but they don't lose their theoretical dimension. Abstract theorising is also nourished by reasoning from concrete situations experienced in the body. Therefore, the proposed turn should not be confused with a proposal to educate the body, but to educate from and with the body (Gallo, 2017).

The consequence of this double inversion would be a complete redefinition of the notion of body in education. If the body ceases to be conceptualized as an interference that we must methodically separate from the process of knowledge creation, if it is no longer a simple support of the mind, but rather participates in a central way in learning – then its traditional limits are transcended. What the body is cannot be defined outside the specificity of a particular context, with particular subjects creating something that cannot be predefined or standardised, which of course challenges the traditional ways of presenting and assessing knowledge in academia.

One of the main conclusions that we can draw from this study is that the design and organisation of the course profoundly defines and shapes the experience of the body. From our data we have attempted to trace the particular ways in which the body comes into play for students, through the ways in which they thematise it, and the cognitive and emotional effects this has. The fact that we base our claims on an analysis of the students' diaries implies a focus not on lived experience but on its representation. In other words, the core of our analysis was the "consciousness" of the body (Ferreiro, 2001; Piaget, 1974). In this process of semiotic reconstruction of performative experience, we can find the keys to a way of "teaching with the body" that al-

lows us to overcome the separation of body and mind that is pervasive in our educational models. Teaching with the body offers new critical resources for the creation of new knowledge. At the same time, it reconnects curriculum content with students' social and biographical histories, making science more relevant to everyday life.

References

Cattaruzza, E., Ligorio, M.B. & Iannaccone, A. (2019). Sociomateriality as a partner in the polyphony of students' positioning. *Learning, Culture and Social Interaction, 22*, 100332.

Diome, F. (2003). *Le ventre de l'Atlantique*. Anne Carrière.

Ferreiro, E. (1997). *Alfabetización: teoría y práctica*. Siglo XXI Editores.

Ferreiro, E. (2001). On the links between equilibration, causality and 'prise de conscience' in Piaget's theory. *Human Development, 44*(4), 214–219.

Greimas, A.J. (1973). *Du sens: essais sémiotiques*. Le Seuil.

Jonnaert, P. & Vander Borght, C. (2003). *Créer des conditions d'apprentissage: un cadre de référence socioconstructiviste pour une formation didactique des enseignants*. De Boeck.

Maresca, S. (2010). La cárcel de la mente. Para una Historia de la subjetividad moderna. En E. Assalone & L. Misseri (comp.), *El giro subjetivista de la Filosofía Moderna* (pp. 298–335). Ediciones Cátedra de Filosofía Moderna.

Marshall, J. (2017). *Contemporary Debates in Education Studies*. Routledge.

Mayring, P. (2004). Qualitative content analysis. *A companion to qualitative research, 1*(2004), 159–176.

Molander, B. (2009). What is 'hidden' and what is not? In *Eigen-Sinn und Widerstand* (pp. 54–69). Wiesbaden: VS Verlag für Sozialwissenschaften.

Molesworth, M., Scullion, R. & Nixon, L. (2011). *The Marketisation of Higher Education and The Student as Consumer*. Routledge.

Nedbalová, E., Greenacre, L. & Schulz, J. (2014). UK higher education viewed through the marketization and marketing lenses. *Journal of Marketing for Higher Education, 24*, 178–195.

Piaget, J. (1974). *La prise de conscience*. PUF.

Puiggrós, A. (2017). *Adiós, Sarmiento. Educación pública, Iglesia y mercado*. Ediciones Colihue.

Rom, R.B. (1998). 'Safe spaces': Reflections on an educational metaphor. *Journal of Curriculum studies, 30*(4), 397–408.

Samaja, J. (2006). El puesto de la lengua en la comunidad, el estado y la sociedad civil. *Diagnosis, 3*.

Tau, R. & Parrat-Dayan, S. (2018). Educación y mercantilización. *Desde la Patagonia. Difundiendo saberes, 15*(26), 38–38.

Tau, R., Kloetzer, L. & Henein, S. (2022). The dimension of the body in higher education: Matrix of meanings in students' diaries. *Human Arenas, 5*(3), 441–468.

Valsiner, J. (2001). Process Structure of Semiotic Mediation in Human Development. *Human Development, 44*(2–3), 84–97.

Valsiner, J. (2018). The Concept of Attractor. In G. Marsico & J. Valsiner, *Beyond the Mind: Cultural Dynamics of the Psyche* (pp. 97–113). IAP.

Vasilachis de Gialdino, I. (2006). *Estrategias de investigación cualitativa*. Gedisa.

Watzlawick, P., Bavelas, J.B. & Jackson, D. D. (2011). *Teoría de la comunicación humana: interacciones, patologías y paradojas*. Herder Editorial.

Susanne Martin

Echo A.

Resonance from an artistic researcher: Performing bodies

Performative interviews

I echo the previous topic of the body in the educational interventions, discussed here from the perspective of an artistic researcher, dancer and improvisation teacher. I write from the position of someone who only saw the final showing at the end of one *Psychology and Migration* course, but who engaged with *Improgineering*. I interacted with and studied one cohort of students of the *Improgineering* course in multiple ways. I taught a dance improvisation class (discussed in Martin, 2021) and was an observant participant in some other sessions, included them in a lecture performance created as part of the ASCOPET research project (discussed in Martin, 2022, forthcoming), and I watched their final performances. Finally, on the last day of the course, I conducted a series of short video-recorded performative interviews with them.

The performative interview is a research method I developed when interviewing professional improvisers during my PhD research (Martin, 2017). Instead of trying to eliminate the social, relational and situational from the interview experience, in order to obtain "objective" or "authentic" statements, I set up a situation closer to improvisational practice formats. One of the reasons for this choice is that, as an artistic researcher, I am typically interested in the particular performative doing-knowing within artistic articulations. Therefore, I was curious about the learning experiences of this student group,

and I asked them by the end of the course to actually use the artistic practice they had encountered throughout the year to respond to my research interest.

In the following, I will focus on these ten performative interviews, in which the students answer the question of "what they learned in this course through playfully improvised physical and verbal responses". Each video clip is between one and two minutes long, so it takes about fifteen minutes to watch the whole series. I ask you, dear readers, to view these ten interviews (available here: https://go.epfl.ch/PerformingBodies) because, much more than my words on the page, these very short and very simply produced videos will render further depth to the body discourse in this chapter.

Embodied minds/mindful bodies

Witnessing these embodied minds or mindful bodies in action brings concreteness, immediacy and sensuousness to the idea of bodies in Higher Education (HE). The particularity and rich ambiguity between the verbal and the physical in each video fleshes out what students experience and learn through performing arts interventions. The performative interviews brings to life words such as "pleasure, amusement and enjoyment", "uncertainty", "discomfort or awkwardness", "vulnerab[ility]", "fragility". These expressions, recorded by Tau and Kloetzer in the previous chapter on body engagement, describe important body-related and body-based learning experiences of students. Even more interesting, the performative interviews bring these words much closer to each other than written text, because, at times, all these states overlap and inform each other in the brevity of a one-minute-improvisation with movement and speech.

Performing reflections

In the preceding chapter, the analysis of student diaries yielded a convincing argument against linear and hierarchical dichotomies and the exclusion of the bodily dimension in hegemonic concepts of knowledge acquisition in HE. I now invite you to 10 short improvisations by students who perform their reflections in non-linear, sense-based, associative ways. They all knew that

neither the course nor their spontaneous improvisations for the video camera were about judging their artistic capacities in the field of improvised performing. Their improvisations are *reflection in action*, trying to show sensation, movement, emotion, imagination and memory, as part of the reflective moment. In other words, I invite you to watch these interviews, as a method of embodied reflection at work.

Performing bodies

From an improvisation perspective these interviews are performative in two ways. Firstly, the students make a performance for my video camera. There is a kind of stage, a spatial direction, a relationship to an audience – me –, a beginning, an end, the possibility to speak and/or move and a here-and-now-engagement – improvisation – with the aesthetic possibilities the situation offers. Each interviewee works slightly differently with these possibilities, and with differing degrees of deliberation and clarity.

Through improvisation, the students work out their individual takes on the relationship between movement and speech, which lends each improvisation a very specific, unique angle to the question of what they learned by practicing improvisation. Each time it is the doing – the moving or not moving, the gestures, actions, their timing, placing and tone, or in short: the body – through which more, other, complementary or contradictory meanings arise. For those sensitised to or in any way inclined to the poetics of body this is a major part of the richness, beauty, and intellectual surplus of engaging with the performing arts. Accordingly, my invitation to you is to look at the complexity and multi-layeredness that the inclusion of the moving body brings to their responses to my question "what did you learn, what do you want to keep from this course?" Secondly, these moving interviews are performative as well in the sense of Judith Butler's theory of performativity, which understands performativity as a contrast to expressivity. In very simplified terms that means, instead of expressing ourselves and our sense of reality in our practices and utterings we rather create ourselves and our realities through them. When watching an improvisation – the way it is taught in the *Improgineering* course and executed in these videos – I can see how feelings, (social) relations, modes of thinking and modes of doing are generated in

and through the movements, gestures, words, interactions and their complex – sometimes surprising, sometimes predictable – interrelations. In line with Butler's theory, the students in this artistic practice do not train to express their static, pre-given selves or their static, pre-given scientific or reflective learning contents. But they might tacitly and practically learn something about subjectivity as dynamic doing and becoming, about the situatedness of learning, about the power of recognising and offering recognition, about the endless repetitions in what they/we do and think, and the endlessly many small variations, misunderstandings, failings, subversions and playful/artful ways of doing things otherwise that engender new ways of doing, being, moving, learning, knowing – with our bodies, as bodies.

References

Butler, J. (1988). Performance Acts and Gender Constitution: An Essay in Phenomenology and Feminist Theory. *Theatre Journal 40*(4), 519–531.

Martin, S. (2017). *Dancing Age(ing): Rethinking Age(ing) in and through Improvisation Practice and Performance*. Transcript.

Martin, S. (2021). Dancing with real bodies: Dance improvisation for engineering, science, and architecture students. In Schulze Heuling, L. and Filk, C. (eds.) *Algorithmic and Aesthetic Literacy. Emerging Transdisciplinary Explorations for the Digital Age* (pp. 13–39). Barbara Budrich.

Martin, S. (2023 forthcoming) Other Bodies of Knowledge: Dance improvisation as embodied recognition practice for scientists. In P. Werquin, R. Klein, S. Ravet (eds.) *Decolonising Recognition*. Editions Atlantique.

Ramiro Tau, Laure Kloetzer

6. Transforming teacher-student interactions

The greatest sign of success for a teacher is to be able to say, "the children are now working as if I did not exist".
Maria Montessori, 1949

In the Improgineering and Psychology & Migration courses, specific types of interactions and teaching-learning dynamics can be observed, including transformations in teacher-student relationships. We will investigate in this chapter the extent to which these transformations are due to the introduction of the performing arts as an educational resource, and how we can qualify them. To do so, we will present the transformations that we consider most relevant at the level of teacher-student interactions, as the effects of a series of curricular, spatial, role, and epistemic decentrations. These movements, in relation to traditional teaching conditions, and the consequent transformation of interactions between participants, expand the repertoire of possible actions and encourage the adoption of new perspectives and relationships with others and with disciplinary content.

We begin by discussing the transformations that take place in the *Improgineering* and *Psychology & Migration* courses at the level of teacher-student interactions. The way in which the arts are integrated into educational practice leads to a simultaneous change of possible interactions (Marshall, 2014). This change does not occur as a direct result of the integration of the artistic dimension. It is not the art itself that is transformative, but its potential uses in the educational context (McNiff, 1998). Clearly, by changing the rules that define the educational environment, teachers can modulate the interactions and dynamics of learning.

The didactic contract (Brousseau, 1990) of these courses certainly contains an explicit level where many of these rules that enable and limit actions are stated from the outset. However, as we shall see, many of these rules are tacit (Alsubaie, 2015) and only manifest themselves in the activities that unfold

during meetings and in negotiations that result from these encounters with others (Gueudet & Pepin, 2018). Thus, the patterns and routines that occur in the classroom (Voigt, 1985) define a way of interacting that is specific to each group and social context (Delamont, 2017). These rules are sometimes projected beyond the classroom space, regulating students' interactions in group work meetings and many of the exchanges that take place outside the educational space. This boundary crossing was evident, for example, in the way virtual meetings during the COVID-19 pandemic replicated the dynamics of earlier face-to-face meetings (see Chapter 9). In this chapter we try to show these changes in the interactions, through our observations and the explicit reports of the students themselves.

By referring to "changing" the interactions and dynamics of teaching and learning processes (Martinez, 2003), we are necessarily making a comparison. We contrast the dynamics in our courses with the widespread "master class" format, with a teacher who presents content mainly verbally, and a group of students who must remain attentive and preferably still and silent (Larrañaga, 2012; Manacorda, 1987; Weinstein, 1979). In this stereotyped configuration, which is at the heart of the critique of banking education[23] (Freire, 1970; Arendt, 1996; Blair Hilty, 2011), expected interactions are mostly unidimensional (predominantly with a top-down teacher-student orientation, and eventually with the opposite, student-teacher orientation). Interactions between students are usually interrupted, and exceptionally promoted for the development of specific activities limited in time. The typical spatial configuration that corresponds to this arrangement is some variation of the classical amphitheatre, with one area for the actors and another, opposed, for the spectators (Francesch & i Cirera, 1997; Puiggrós, 2021, Temple, 2008). The traditional university classroom, with a podium and desks facing the front, usually offers little room for other non-traditional teaching

23 The notion of 'banking education' was first used by Paulo Freire in his 1968 publication *Pedagogia do Oprimido* [Pedagogy of the Oppressed], published in English two years later (Freire, 1970). It refers to what he considers traditional pedagogy, an educational model that considers students as empty receptacles to be filled with knowledge, like a piggy bank into which one places external values. This notion had an enormous impact on the specialised literature and in general terms was used to characterise unidirectional teaching models, in which the student is not an active co-constructor of knowledge, but just a passive receptive subject.

set-ups (Barret et al., 2015; Brooks, 2012; Donkin & Kynn, 2021; Park & Choi, 2014). In summary, traditional education implies that: (a) interactions take place face-to-face; (b) it is the teacher who plans and defines the contents; (c) the dynamics of the interactions gravitate around the teacher's figure, (d) the teacher also determines the sequence and duration of the thematic units, (e) the student assumes a passive role or one of low co-participation, (f) the teacher defines the parameters and criteria of the evaluations in advance, and these are generally final, summative and independent of the population with which he/she works (Shor, 2012). This set of para-curricular aspects – ranging from material and administrative conditions to attitudinal ones on the part of teachers – largely defines the type of interactions and possible activities (Granito & Santana, 2016; Seedhouse, 1996; Srivastava, Babu & Shetye, 2019; Zimmermann et al., 2018).

The integration of certain tools from the performing arts, which tend to encourage improvisation, collective creation, physical sensitivity and alternative representations to language, can change this traditional framework (Cahnmann-Taylor, 2013; De Moss & Morris, 2002). The extent to which this happens depends not only on the use of these tools, but also on the way in which the global approach to teaching and learning is transformed by them. The course may then be an experience of decentring from the usual learning experience and expectations of students, and thus diverge from traditional courses. Clearly, not all educational institutions will be willing to offer courses that go far beyond the general guidelines of traditional higher education. Nor will all students be happy to explore these new territories.

The analysis of the students' interviews and diaries in our two courses allows us to identify four levels of decentring from traditional courses: Decentring occurs first at the level of the formal aspects of the course (in the course description, emphasising the collective creation of a short performance; and through the mode of evaluation, based on free reports within the assessment of any content knowledge); it then occurs at the level of space (moving outside the university to an artistic space in a theatre); it also occurs at the level of roles, with a distribution of epistemic authority in the course; finally it occurs at the level of group interactions, with a focus on horizontal interactions between teachers and students and in group work.

6.1 Decentring at the formal level: Course description and evaluation

The course descriptions are the entry point for students into the whole adventure of these elective courses. They emphasise the collective creation of short performances as the core of the course, with a large part devoted to immersion in artistic practice. As these proposals are in contrast to the usual student experience in higher education, it is important to clearly explain the teachers' intentions, both in the course description and in practice during the first courses. A student comments in his diary:

> The first session makes the philosophy of the course clear. It is not about saying that being an engineer or an artist is the same. It's not about transforming scientific work into art or vice versa; it's not about going beyond one's limits etc. We're going to make art for art's sake and then see what connections we can make with other things. (Reflexive diary, *Improgineering* course).

The form of evaluation also transforms the usual student experience. In these two courses, engagement and participation in the activities – both the collective practices and the production of personal diaries as an instance of reflection on the experience of the course – are more important than the verification of the acquisition of disciplinary knowledge. Although students still receive a grade, their expectations and involvement are freed from the need to demonstrate acquired knowledge and can be more freely directed towards creative exploration during the process. Students are freed from the need to demonstrate knowledge and can focus on the journey.

These formal aspects related to the framing of the courses are relevant because they affect the type of interactions (with teachers, with students, with the material) that are encouraged.

6.2 Decentring space

The decentring of space deserves special discussion. As we have seen in chapters 2 and 3, courses take place wholly or partly outside the university campus. The enabling and constraining effects of physical space on education have long been recognised. The layout and type of furniture, the spatial

and material resources available, the "affordances" of that space, the noise, light and atmosphere of the place, and the physical design of the classroom all play a crucial role in the interactions that are possible and thus in the overall dynamics of a course. Spaces do not direct action by their material properties alone. Each place is "read" by the subjects according to the institutional logic to which it belongs and the symbolic imaginaries that it opens. Thus, for example, clothing, language and movement are influenced by the symbolic dimension of each space and the social uses to which it is dedicated. Students will dress and behave differently for a conference, a visit to a museum, a party or a sporting event, etc. In these courses, the displacement outside the university, towards the art centres, transforms the students' material and symbolic experience of space. The use of the body is modified in these "free" spaces: movements are freed by the absence of chairs and desks, with more space and with sound or light installations typically used in the performing arts. The artistic spaces can be used for physical activities involving large gestures, as well as vertical and horizontal use of space (crossing the room, lying on the floor or standing, etc.). They are also plastic, modular spaces that allow for multiple arrangements, group work or changing configurations, linked to fluid social relations and not the set design of furniture that fixes institutional relations. The rigid roles and behaviours of the traditional classroom are dissolved here.

Students comment on the physical, but also symbolic, influence of using an alternative space:

> New room. It's big. It's big, but the facilitator has marked out the space. We walk around, slowly, quickly, slowly again. These exercises put me unconsciously at ease, it's a first exercise that puts us all in touch in a progressive way. (Reflexive diary, *Improgineering* course).

> And the fact that we went to Le Lokart allows us to broaden the subject, to decompartmentalise it by taking it out of the university, to perhaps make it more accessible. (Learning diary, *Psychology and Migration* course).

The symbolic dimension of these quotes cannot be ignored. Here, the student's comment seems to imply that the choice of a place in the city makes it possible to broaden the subject of study itself (migration): we can hypothe-

sise that the physical move outside the university allows this student to more easily combine the scientific study of migration, typical of the university, with her personal experience of migration, as well as her perceptions of its social reality in the country. Interactions are also influenced by the meaning attached to the space. The usually casual dress, the activities without shoes, or even the use of objects or costumes that might be inappropriate in a university context become perfectly acceptable and meaningful here. The artistic meaning that the space has for the students makes it possible to open up the meetings to a much more unprejudiced exploration. In other words, the things that can be done on a stage, which is usually associated with fiction, play, and all that it allows, are much more expansive. This openness is evident in the moments when the courses alternate between a theatrical space and a traditional university space. In each of these different contexts, peer interactions take different forms, influenced by the material and symbolic space. However, we have found that some features of movement typical of the artistic space can be reintroduced (with a lot of energy from teachers and students) in the university setting, provided that the shared practices in the group have already been solidly built up in the artistic space.

The title of the book becomes very clear here: being barefoot invites teachers and students to alternative relationships with one's own body, with the connection to place and matter, with others (also in their sensual existence), with hierarchies of power in the classroom, with the subject being studied. This is noted by a student in her diary:

> Here we are, at Le Lokart. First action in this place: take off our shoes. For me, this is synonymous with freedom. It feels so good to be barefoot. It's a bit like being equal. No heel that puts us above or over each other... (Learning diary, *Psychology and Migration* course [original in French]).

6.3 Decentring roles: Distributed epistemic authority

As a consequence of this decentring of space, roles and functions can also be reworked and decentred.

Co-teaching, with a teacher from the scientific discipline and one from the artistic field, contributes to the transformation of the teaching function. It

dissolves the scientific or artistic hegemony and places the teaching function in an ambiguous zone with regard to the knowledge that legitimises it. In the course as a whole, there is no one figure who has all the epistemic authority, and the teacher's authority, like the course itself, is located at the intersection of fields.

Epistemic authority is also shared between teacher and students. First, the teacher is no longer the figure who is necessarily responsible for offering correct solutions, which some students find particularly confusing. Secondly, when knowledge is embodied not in the figure of the professor but in the process of exploration, knowledge is no longer offered ready-made, leading to greater autonomy but also to uncertainty.

One consequence of such a shift in academic space and roles is what we will call epistemic decentring. When the traditional teaching system is no longer in effect, the centre of gravity is no longer the teacher. Students comment in a collective interview:

> It is not clear who the teacher is in the class. Sometimes we forget that Simon is there. Moreover, there are other teachers and none of them give us clear answers about the final improvisation. We don't know who's teaching, and that gives us more freedom, but also less clarity [...] (Interviews with EPFL students, *Improgineering* course).

We find similar comments in diaries:

> Every time we ask Simon what we should do, he answers "what you want"... obviously, we can't expect a classic answer. (Reflexive diary, *Improgineering* course).

In these courses, the teacher guides the action and, of course, retains his or her institutional authority. But the knowledge that emerges from these courses is highly personal – not exactly the same as that of the teacher, not exactly the same as that of the other students. The proposal invites a personal experience of art as a means of exploration to some topics. There is no single direction in which the student's knowledge should progressively develop (or, if there is such a direction, it is so general that it makes no sense to consider it as an epistemic criterion). On the contrary, the course is offered as an invitation to

follow a path rooted in the unique, embodied experience of each participant. In this journey, there are no a priori criteria to say that one type of experience is more legitimate or adequate than another. Through the experiences offered, each student will create original bridges between his or her everyday life, body, school biography and the artistic and scientific background that underpins the activities. In this process, the hierarchy of knowledge between teachers and students is blurred... A student comments:

> But we were all doing the same thing, there was no difference between teachers and students. (Reflexive diary, *Improgineering* course).

We are not proposing to dissolve the figures of the teacher and the student into a generic one of "participant". We are only pointing out that with regard to the activities and the experiences that the course offers, epistemic authority is distributed.

6.4 A focus on horizontal interactions

A final type of transformation can be found in the relationships between teachers and students and between peers themselves: from hierarchical to horizontal relationships. We observe a preponderance of horizontal relations in the courses, and connect them with three dynamics.

Firstly, the participation of everyone in each of the activities: both teachers and students are involved in the workshops, without one leading the other.

Secondly, the reflective sessions give equal status to all participants, teachers or students: no one has more authority than another. Nor is it the teacher's role to guide the discussions or to synthesise them in order to reach a certain consensus. During the different moments of the course, teachers and students are free to express their personal and critical views. This contrasts with more formal moments when teachers give feedback on students' presentations or performances.

Thirdly, negotiations and decisions in group work are collective, with a focus on peer interaction.

In terms of general dynamics, the courses function more like a social collective formed around an activity that brings people together, rather than a

class with two clearly defined groups: that of the teachers and that of the students. In this process, the students quickly stop looking to the teachers for answers and move towards personal explorations, as can be seen in several personal diaries. However, this raises many doubts and uncertainties. At the same time, horizontality serves to undermine the competitiveness that is often present in university classrooms. Shame, shyness, control over one's appearance and all the typical inhibitions associated with social and physical exposure are diminished. Students comment on the positive classroom atmosphere:

> The whole class got involved without hesitation, teaming up almost without realising it. There was no criticism, and no one censored themselves, contributing to an extremely positive climate. Everyone's free imagination and creativity were strongly encouraged, giving a lot of energy and meaning to this first session. This special harmony was visible in our eyes! (Learning diary, *Psychology and migration* course).

> Nobody judges, we do what we want, what comes to mind, while following the movement of our consciousness, which is then called "dance". (Reflexive diary, *Improgineering* course).

> It allowed another approach through the body [...] a group cohesion, we were all equal [...] there was no one judging, we were watching, we were laughing together, really! (Learning diary, *Psychology and migration* course).

> These few hours of pleasure and discovery began with a pleasant contact with a girl from the course whom I met outside the theatre. A greeting, a smile, an exchange of who we are. A contact that doesn't happen at the Ecole Polytechnique Fédérale de Lausanne. (Reflexive diary, *Improgineering* course).

Conclusions

The transformations we have listed separately are in fact interdependent. They are triggered by the global, multidimensional transformation of pedagogical design to incorporate the performing arts into academic teaching.

What is the contribution of the artistic dimension in the transformations of the interactions and dynamics of teaching and learning? The situation may seem paradoxical. Indeed, as we have seen, a large part of these transformations is based on the use of strategies that come from the field of the performing arts. The use of the body in different shared activities, modification of the traditional classroom space, or use of alternative representational resources are some of the strategies and reasons for these decentring dynamics. But at the same time, decentring is a basic requisite for the introduction of performing arts in the educational process. In other words, decentring is both an effect and a condition: the course design requires, from the beginning, a certain necessary alteration of the traditional order. It is in tension with traditional academic teaching. The transformative aspect of the course requires a coherent course design at all levels of concretisation – and this transformative aspect is not guaranteed, but depends on the appropriation by each student (Kloetzer & Tau, 2022).

Although it is not possible to measure these changes in dynamics and interactions quantitatively, we can identify them qualitatively. The learning tasks, the forms of assessment, the roles of teachers and students, the interactions between peers, the choice of spaces and the learning experiences fostered are all very different from the traditional ones. What are the advantages of these changes?

Firstly, they facilitate an introduction to disciplinary content from an atypical angle. Approaching the topic of study from the perspective of the arts and of the body allows new bridges to be built between these and the students' personal biographies, emotions, knowledge and other areas of experience. It encourages free exploration and multiple meanings.

Secondly, the change in traditional roles and functions – and the consequent distribution of epistemic authority – allows students to recognise themselves as actors in the process of knowledge production. They emancipate themselves from the passive role of the learner who receives knowledge.

Finally, we believe that the overall dynamic of these courses promotes the cultural recognition of the collective nature of knowledge and creation. The use of performing arts emphasises collective creative activities and provides an opportunity to dismantle the fiction of absolutely individual knowledge or creation.

These considerations can be summed up in one: the setting enables participants to engage in types of interaction with others, with objects and with knowledge that are usually inaccessible in a traditional academic learning context. The expansion of possible actions facilitates new ways of thinking and acting in the world and provides opportunities to reflect on the way we produce knowledge in any discipline.

References

Alsubaie, M.A. (2015). Hidden curriculum as one of current issue of curriculum. *Journal of Education and practice, 6*(33), 125–128.

Arendt, H. (1996). The crisis in education. *Entre el pasado y el futuro*, 185–208.

Barrett, P., Davies, F., Zhang, Y. & Barrett, L. (2015). The impact of classroom design on pupils' learning: Final results of a holistic, multi-level analysis. *Building and Environment, 89*, 118–133.

Blair Hilty, E. (2011). *Thinking about Schools: A Foundations of Education Reader.* Routledge.

Brooks, D.C. (2012). Space and consequences: The impact of different formal learning spaces on instructor and student behavior. *Journal of Learning Spaces, 1*(2), n2.

Brousseau, G. (1990). Le contrat didactique: le milieu. *Recherches en didactique des mathématiques, 9*(9.3), 309–336.

Cahnmann-Taylor, M. (2013). Arts-based research: Histories and new directions. In *Arts-based research in education* (pp. 21–33). Routledge.

Delamont, S. (2017). *Interaction in the classroom: Contemporary sociology of the school*. Routledge.

DeMoss, K. & Morris, T. (2002). How arts integration supports student learning: Students shed light on the connections. *Chicago, IL: Chicago Arts Partnerships in Education* (CAPE).

Donkin, R.,& Kynn, M. (2021). Does the learning space matter? An evaluation of active learning in a purpose-built technology-rich collaboration studio. *Australasian Journal of Educational Technology, 37*(1), 133–146.

Francesch, J.D. & i Cirera, J.V. (1997). *La organización del espacio y del tiempo en el centro educativo*. Graó.

Freire, P. (1970). *Pedagogy of the oppressed*. New York: Herder and Herder.

Granito, V.J. & Santana, M. E. (2016). Psychology of Learning Spaces: Impact on Teaching and Learning. *Journal of Learning Spaces, 5*(1), 1–8.

Gueudet, G. & Pepin, B. (2018). Didactic contract at the beginning of university: A focus on resources and their use. *International Journal of Research in Undergraduate Mathematics Education, 4*, 56–73.

Kloetzer, L. & Tau, R. (2022). Teaching and learning online through performing arts. Puppetry as a pedagogical tool in higher education. *Scenario: A Journal for Performative Teaching, Learning, Research, 16*(2), 1–20.

Larrañaga, A. (2012). *El modelo educativo tradicional frente a las nuevas estrategias de aprendizaje* (Master's thesis).

Manacorda, M.A. (1987). *Historia de la educación* (Vol. 2). Siglo XXI.

Marshall, J. (2014). Transdisciplinarity and art integration: Toward a new understanding of art-based learning across the curriculum. *Studies in Art Education*, 55(2), 104–127.

Martínez, M. A. (2003). Análisis de dos conceptos clave en el estudio de las interacciones: Formato y Zona de Desarrollo Próximo. *Psicología y Ciencia Social, 5*(2), 41–53.

McNiff, S. (1998). *Art-based research*. Jessica Kingsley Publishers.

Park, E.L. & Choi, B.K. (2014). Transformation of classroom spaces: Traditional versus active learning classroom in colleges. *Higher Education, 68*, 749–771.

Puiggrós, A. (2021). Lecturas de Freire. *Perfiles educativos, 43*, 11–21.

Rayou, P. & Sensevy, G. (2014). Contrat didactique et contextes sociaux. La structure d'arrière-plans des apprentissages. *Revue française de pédagogie, 188*, 23–38.

Seedhouse, P. (1996). Classroom interaction: possibilities and impossibilities. *ELT journal, 50*(1), 16–24.

Shor, I. (2012). *Empowering education: Critical teaching for social change*. University of Chicago Press.

Srivastava, A.P., Babu, V. & Shetye, S.K. (2019). Exploring students' learning efficacy: Predicting role of teachers' extra role behaviour and art-based innovation pedagogies. *European Journal of Training and Development, 43*(9), 842–859.

Temple, P. (2008). Learning spaces in higher education: An under-researched topic. *London Review of Education*.

Voigt, J. (1985). Patterns and routines in classroom interaction. *Recherches en didactique des mathématiques, 6*, 69–118.

Weinstein, C.S. (1979). The physical environment of the school: A review of the research. *Review of Educational Research, 49*(4), 577–610.

Zimmermann, P.A., Stallings, L., Pierce, R.L. & Largent, D. (2018). Classroom Interaction Redefined: Multidisciplinary Perspectives on Moving beyond Traditional Classroom Spaces to Promote Student Engagement. *Journal of Learning Spaces, 7*(1), 45–61.

Susanne Martin

Echo B.

Resonance from an artistic researcher: Performing relationships

Improvisation and relationships

Here I'm going to focus on some other relevant aspects in the series of ten performative interviews, which I started discussing in my text *Performing Bodies* (available here: https://go.epfl.ch/PerformingBodies). I focus on the improvisation-specific relationships that are performed in these interviews to add another perspective to the problem of the dynamics of teaching and learning in arts-based pedagogical interventions.

Practicing improvisation is a situation and a relationship of playful doing, exploring, thinking, moving in the here-and-now and in front of/for each other. During a practice session, this other – the audience – is decidedly in the role of being an alert and supportive peer audience, paying close attention, trying to recognise the details of what is emerging on "stage" and within one's own resonating audience-self. Witnessing each other practicing also entails paying attention to what is emerging between performer and audience and in regard to the focus topic in the particular practice. That means, when practicing and teaching improvisation, we also perform a very specific kind of relationship to each other, which is rather different from what is critiqued in this book as hegemonic Higher Education (HE) teaching/learning practice. We perform a relationship where all people practice the intimacy of experiencing a mutual, real-time, embodied exploration process. That also means we work on giving permission to ourselves and to the other to not be sharp,

clear, convincing, inventive or entertaining performers at all times. We practice understanding and trusting that in improvisation we expose ourselves to the vulnerability of not only presenting secured and worked-through knowledge. We practice understanding and trusting that this is a route to learn something together and from each other. We practice understanding and trusting that this is a route to possibly discovering something new, interesting and relevant.

I followed this relational logic, and the concept of performative interview – explained in my section on *Performing Bodies* – when I articulated my interview interest in what the students thought they were learning during Improgineering by giving them the following improvisation impulse: "Please tell me for a maximum of two minutes what you want to put into your pocket to take with you from this course. Maybe it is something that you learned or maybe it's a nice moment you want to remember. You can move or speak or do both. It's an improvisation". I rightly expected that they had learned enough about improvisation to be able to deal with this hybrid proposal that carries aspects of research interview, pedagogical assignment and creative prompt.

New relationships through artistic practice

The bodily and/or verbal reflections through which the students answered my prompt all touch upon interesting pedagogical issues – as basic as they are complex and multi-dimensional. In my own words I would say these students, in their improvisations, show us their newly developed relationships to shame, trust and self-esteem (video #1), embodiment and presence (#2), mutual recognition and collaboration (#3), joyful decision-making processes (#4), the courage to experiment and explore without predefined purpose (#5), multiple dimensions of (bodily) awareness (#6), interaction and connectedness without negating difference (#7), confidence and resonance (#8), touch, sensitivity and being and having a body (#9), the interconnected relationships to self, others and the world (#10).

Beyond that, what I found most striking in the whole series is the transparency of the process of relating, recognising and deciding from moment to moment. The students really perform finding something new and sharing something new in real time. We can see how movement, sensations, tone and

rhythm of speech and verbal content are deeply connected and often instantly inspire each other. That makes each single clip so intelligible – at least for me, as an experienced audience of improvisation. I can really follow their minds when they transition from doing to speaking or from attending to sensation towards attending to memory. What is important here is that I – maybe we – can follow their minds not because they reel off prepared content and predicable stereotypical behaviour. They also do not present well-rounded arguments. On the contrary, we follow them finding and making meaning in their own unique way partly because they are in a focused and embodied real-time process of generating their own ideas and decisions. They all allow us to witness them dealing with the vulnerable situation of ad-hoc creation in front of a camera. We see them deciding how much risk-taking feels viable to them in that particular moment. This kind of intelligibility is what an improvising performer tries to achieve and what an audience of improvisation can enjoy.

Performing relationships

None of them later refused to have their clip published. In my interpretation this confirms that none of them went beyond his/her limits or below his/her expectations in a way they regretted afterwards. For science students who do not aim to become professional performers this is a more relevant virtuosity to develop than elaborate motor skills, an opulent poetic fantasy or long, complex layered artistic compositions. They have trained their ability to think, to experiment, to relate, to sense and wonder and question in front of their peers, in front of a teacher/researcher, in front of a device that documents and stores their spontaneous unsecured utterances. Over the course of a year, they have learned that this "being in front of" in the performing arts and especially in improvisation can be a relationship of benevolent "being with". They have learned that it can be exciting, even joyful and uplifting to dare to do other than to reproduce secured knowledge. Therefore, they use this relationship to reflect and to let their individual ideas become public. They construct and perform their own knowledge and relevancies.

I do not claim that they have learned or gained this as a competency, which they can individually apply anytime and anywhere. I expect they have

learned enough about and through improvisation to understand that this playful yet vulnerable being with each other – searching, finding, testing – is not something anyone owns but is a relationship to the self, to each other and to the world, one in which we can invest and that we can perform as teachers, students, and researchers. And, as the performative interviews document, it is a rewarding relationship and one that generates relevant learning and research practices.

Laure Kloetzer, Ramiro Tau, Simon Henein

7. Learning through collective creation

Looking at the creative process is like
looking into a crystal: no matter which facet
we gaze into, we see all the others reflected.
Stephen Nachmanovitch, 1990

The Improgineering course aims to teach collective creation in engineering through improvisation and collective creation in the performing arts. Focusing on students' comments in individual interviews and diaries, we show that this pedagogical challenge is not easy for students. Engaging with the unknown requires deconstructing learning habits, social judgements and norms of truth constructed in their education. We then present a case study: the creation of the "tarpaulin performance" by a group of students, and show how the students mobilise and articulate a variety of resources to succeed in the pedagogical and artistic task: a) material resources (objects in space), b) movement and embodied exploration, c) social exploration, and d) conceptual resources through shared disciplinary knowledge.

A central feature of the *Improgineering* and *Psychology of Migration* courses presented and discussed in this book (see chapters 3 and 4), is their focus on the collective creation of a short performance presented on stage. In the *Improgineering* course, this collective creation is a 12-minute group improvisation (3–5 students) organised around an artefact designed by the students; it is presented on the stage of the *Arsenic*, a performing arts centre in Lausanne, one of the leading creative spaces for contemporary dance and theatre, in front of an audience of over 200 people and a jury in charge of evaluating the performances. In the *Psychology and Migration* course, this collective creation is a 5 to 10-minute theatre sketch, freely inspired by a fictional book chosen by the students (in groups of 3–5) among a selection of stories presenting subjective elaborations of various migration journeys. This performance takes place in a more intimate space, at *Le Lockart*, a dance studio located in the centre of the city of Neuchâtel, in front of fellow students

and selected guests. In both cases, moving activities outside the traditional academic space results in a momentary withdrawal from a certain student *ethos* anchored in the socio-materiality of the traditional educational system. This withdrawal is significant not only because of the material conditions that an artistic space offers for interactions, but also because of its associated meanings. In this sense, the courses are deployed at the intersection between two different socio-material logics (Carvalho & Yeoman, 2021) (Fig. 7.1).

Moreover, although both courses include a theoretical content in their curriculum, the collective creation guides the entire course process from the beginning. Therefore, thanks to the documentation of these courses as part of the empirical exploration of our ASCOPET research project (see chapter 2), they offer the opportunity to explore the process of collective creation in a specific context – as a pedagogical resource for higher education. Again, a careful comparison of the two courses may shed light on similar and specific dynamics. However, as this topic is of particular value in the *Improgineering* course, we will focus in this chapter on an analysis of collective creation in this context.

From the perspective of the teachers, collective creation is not only a tool to approach some academic contents but is actually the main theme of the course. This goal reflects Simon Henein's double affiliation as an innovative micro-engineering designer, and as a dancer particularly interested in im-

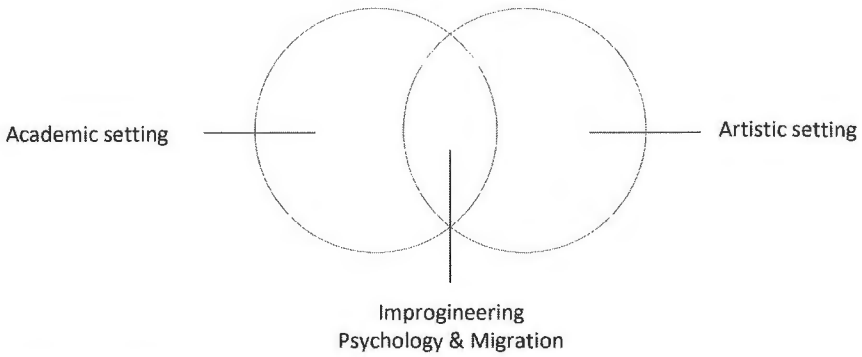


Fig. 7.1 Hybridization of spaces for action.

provisation. His compound experience shows that innovation results from a collective process, strongly supported by techniques from the field of improvisation (see chapter 11). This is transposed into the *Improgineering* course, in which the students' final performances are based on the improvising techniques they have learned throughout the year. The *Improgineering* pedagogical proposal includes the task of creating an artefact that the students must use in the final improvisation. As the course description states, "the students' improvised performances integrate their technical achievements, revealing the polarities and articulations between their physical presence and that of their artefacts". Students learn collective creation by practising the collective creation of an artefact and of a performance. More specifically, the aim is to work with the students, through artistic creation, on a blind spot in engineering design: the moment of creation itself, which includes creative imagination and the expression of ideas (Fig. 7.2).

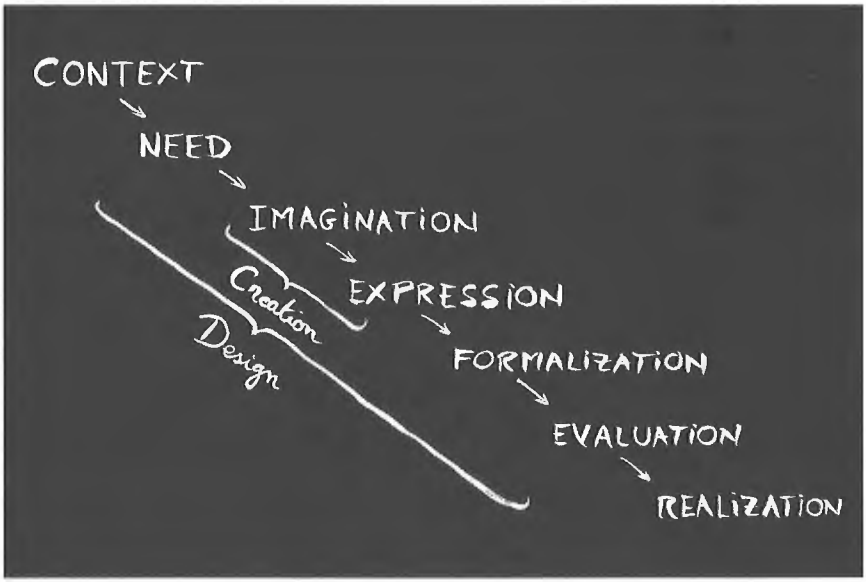


Fig. 7.2 The engineering creation process as described by S. Henein (copyright Instant-Lab, EPFL).

In this chapter, we will first analyse the task of "collective creation" in general, as seen by the students and expressed in their individual interviews – which were conducted at the end of the course and offer a retrospective view of the process. Then we will analyse the creation process of a group performance in which the students decided to use a tarpaulin as their artefact for improvising.

7.1 Engaging with the unknown: Exploring, deconstructing judgements and norms of truth

The process of engaging into collective creation (Shank, 1972; Syssoyeva, 2013) based on techniques of improvisation and other artistic tools is not an easy task for Master's students of an engineering university. At first, the course seems different from what students know. It opens up an alternative, somehow transgressive, space through the absence of technical content, the invitation to engage together in different exercises that bring the body, self-image and attention to others into play in unfamiliar ways. The playful, open and uncertain nature of the course can be met with initial resistance from some students. Yet, in the end, the course came to be seen as "exploring", "breathing fresh air", "learning to use your body in different ways and getting out of this scientific framework you're immersed in every day". A crucial role in this change is played by the practical improvisation workshops led by experienced guest performers. In this way, the course is first understood as a creative opposition to the usual educational framework.

Going one step further into the analysis, the students' retrospective view of the course highlights three central shifts: the transformation of the relationship with oneself through attention to the body, with others (students and teachers) and with the task (in this case, a collective work of creation). All subsequent quotes come from their individual audio or video-recorded interviews, as well as from a focus group with a group of volunteer students.

The attention to one's own bodily sensations, developed in the various practical workshops, is new and stimulating for the students. These sensations become a means for the action in the improvisation situation: "During the workshops, we have learned to be aware of our bodies in a different way each time. These are things we never see". Working on one's own sensations

on the inside, on the body as boundary, on touching, opens up a relationship with the world and the other's body: "Developing bodily expression, being more attentive to the suggestions of others, feeling a little freer in my movements, daring to do more was what I found interesting".

Setting people in motion, outside a fixed frame of reference that would define success or failure, helps to evolve from traditional judgmental attitudes (Arao & Clemens, 2013) towards oneself and others that limits the possibilities of action, but this is not without back and forth movements and difficulties: "We tried to detach ourselves from the judgement of others, from the gaze of others, in order to improvise, and sometimes it worked very well, so that I felt quite comfortable, it was as if I was the only one in the room, and then I focused on my inner feelings, and then suddenly there was a trigger and I became aware of the others around me and the gaze they might have on me, their judgement, and I felt uncomfortable". The process of artistic creation and the attention paid to the body in improvisation are resources for discovering others, getting to know each other and listening to each other: "I think that this course helped us to trust a little more in the energy, the capacity of a group, the strength of the group, and sometimes to let other people bring what they wanted to bring to the exercise, and sometimes to regain a little control over the situation and propose something, to be in a group dynamic and listen to each other".

This attention also renews the relationship with the task, which is conceived as open: "Behind this, we learned to work in a group without having a traditional subject and therefore without progressing in a known structure, with methods already established at school, of sharing tasks, the parts of a written work for example, and by putting more emphasis on the relational and therefore on how to integrate each individual with his or her own specificity in a common work. A little less of the traditional brainstorming and more of looking at what each person can bring to the table by trying to weave something together". Improvisation provides tools to face this openness and may constitute useful knowledge in a scientific approach: "One of the interesting things about improvisation, for example, is that there were no false ideas of error, we did things, we tried, and then there was no error, which stopped everything, no, on the contrary, it always continued. And I think that can be interesting for science, because it's true that we have to have results, we have to be methodical, but maybe there is a moment when we can just throw

out the maximum number of ideas and see what happens ...". Improvisation therefore brings the students into a different relationship with collective work (Sawyer, 2014), especially through a different relationship with time. In a word, it is about de-optimising, abandoning the search for efficiency in favour of openness and experimentation: "The heart of the work was to pay attention to each other's proposals, to add something to the proposals of the rest of the team, [...] So for me it was very interesting, it showed a little bit of singularity, to what extent each one was unique and different". The course opens a space for the uniqueness of each person and their sharing.

This exploratory approach makes sense in the context of solving an open-ended problem, which leads to the invention of something new: "The whole aspect you learn at university is to understand the problem and put it into figures. But what I didn't learn in my bachelor's degree, or not very much, was to think about a solution outside of what already exists [...]. In improvisation we didn't just learn one way of acting, we learned many ways of interacting with our bodies to get almost the same result. I think that's what's missing in engineering, in the broadest sense, is that we're often taught only one way of doing things, when in the end, I think, there could be several ways of achieving the same ends".

Finally, the proximity of artistic and scientific approaches to creation (Chemi & Du, 2017; Sawyer, 2007) was emphasised by the majority of students: "we should be a little bit more aware of the fact that art and science are not so different and that, just like in art, there are many ways of doing things in science".

7.2 A process of collective creation: The tarpaulin as a dance artefact

In this section we look in more detail at the creative work of one of the groups who used a painted tarpaulin as the artefact for their final performance. This group were mostly architecture students, and we will see how the problems related to the use of the space played an important role in their creative process.

The interviews with the group members reflecting on this creation allow us to partially reconstruct its genesis from multiple points of views.

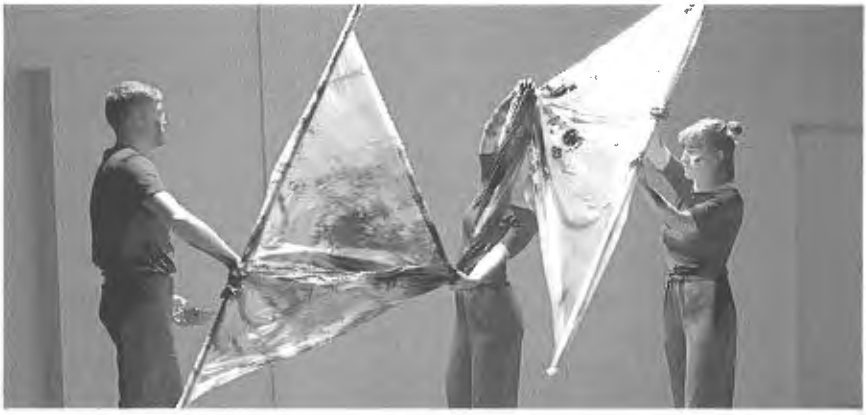


Fig. 7.3 The tarpaulin as an artefact in the performance. Improgineering, 2018[24].

The first interview with a group member describes the artefact soberly, playing down its technical interest: "The artefact itself was just a tarp, there were two pieces of wood with a tarp in the middle. So, there were two people holding it, and then two more people painting on it, and then they changed".

The second interview, with another member of the team, shows the gradual emergence of the artefact through material experimentation, physical play and discussion:

> It's a bit difficult to say when we got the idea to use the tarpaulin. We started using a tarpaulin, but... we started using little pieces of fabric. It was a bit of trial and error, sometimes accidents, and I don't really have a moment... it was really bit by bit that we arrived at the final shape. It was quite experimental: in the beginning we were playing with projectors at EPFL, trying to project textures on the wall and playing with that, using light and so on, and I think there was a moment when we started to stop projecting and really use the element in space.

24 Copyright Instant-Lab, EPFL.

So, the tarpaulin first appeared as a support for the projection, a subordinate object to the use of light, before becoming the main object. The material object became associated with a theoretical notion stemming from their shared training in architecture:

> I also remember interesting discussions, because it quickly became an architectural improvisation [...] Very quickly we said we wanted to build spaces. With the artefact. And to see how we can change the space we create for ourselves and for others. And that was an interesting moment for me, because I am interested in a theory in architecture that says that the architect is there to design places and that it is the user who has to modify his space.

The notion of space connects the improvisation and the discipline studied at the university. The latter feeds the creative process, through the students' renewed interest in performance, which becomes an experiment supported by concepts studied in architecture. These ideas enrich the movements of the tarpaulin, giving it body through a shared meaning. The student stresses, however, that in this evolution, collective manipulation of the material remains essential to renewing possibilities for acting with the artefact:

> Then, I think, there was a moment when we had stopped putting the tarpaulin in a certain position and we tried it in another position and suddenly it changed everything, and that's when the idea of using the tarpaulin as a suspended element – not suspended but held and so on – came up. So, there were moments like that where it's true that it suddenly changed the vision that we had of the object.

The physical exploration opened up new possibilities for movement improvisation with the artefact, a transformation of its possibilities of manipulation and, consequently, of its physical and conceptual affordances.

In a third interview, another student explains how the design and use of the object unfolded as a common project for the group, bridging the gap between improvisation and architecture through the notion of habitat:

> We had tried to apply improvisation to architecture, and we asked ourselves how improvisation could become important in architecture. Given that improv-

> isation means adapting to others, this can also be reflected in architecture: if you live in a communal building, you also have to learn to adapt to others, and so with this tarpaulin we tried to see how we could inhabit this tarpaulin in a way, and what tensions it could bring. So that was the basis from which we started. Once we had the artefact, it was much easier to perform, because we were just testing things, trying to see when we had confrontations with other people. Even in the final performances, of course, some things kept coming up, but it was always researching – you didn't know what was going to happen, it was like experimenting every time. You can do it again and again and it will always be different. We just thought we would like to try these things and then experiment with this or that and then each time we tried again and then it wasn't stressful because we tried and then we saw what happened. There was no possible error.

The artefact offers possibilities for action by dividing the space to which the group gives a common meaning through the architecture: it is about inhabiting the tarpaulin building and exploring the resulting social tensions through improvisation. The movement, orientated and sometimes constrained by the artefact and its manipulation, opens up spaces for encounter to which everyone can give meaning thanks to the shared architectural training. The improvisation can then unfold as a game of exploring the space created by the meeting of bodies, the movements of the tarpaulin and the social meaning of the situation.

In a fourth interview, one student highlights the initial project of the creation of an open-ended artefact:

> Even though in architecture you have to make mock-ups, this was different because we had to make an object that, er ..., what to call it, was not supposed to be so rigid. We all wanted it to be a modular, dynamic object, at least in our group. Because we had to design an object that would give us possibilities. So not something that was too fixed. In our group we used a tarpaulin, so we used something that was already made. Then it's true that the trick was the way we used it in improvising. In fact, we became an artefact, it was us with the artefact.

The student emphasises that their creation is less about the artefact itself than about how it's used and shared. She also mentions that this shared use is anchored in their previous knowledge of architecture:

> What helped us, I think, was to try to apply it to architecture, to try to have a connection with what we know, so what in architecture is improvisation, so that we had a base to stand on, otherwise it was a bit difficult. In architecture, from the first year, we've been talking a lot about space and how we create space in architecture, so that's what we were trying to find in improvisation. Which kind of different spaces we could create with this artefact. I think that guided us well: what is interior/exterior, what is above/below, what is closed/open; these are notions that we study a lot during the Bachelor of Architecture.

Despite this common ground, the methods of collective use of the artefact in the improvisation did not appear immediately. The creative process relies on the gaze of others, on the one hand, that of teachers, on the other, that of peers. It helped the group find freedom with the artefact, stop being subjected to it, and be able to better act with it:

> We realized that we couldn't continue to be enslaved by the artefact. In the beginning, we were very much influenced by what the tarpaulin was doing, by what our artefact was doing, and at a certain point we started to control it more, and that's when it perhaps became even more interesting for improvisation. This came with the suggestions of the teacher. It was during the workshops we led: we saw how the others were improvising with our object, we saw that maybe we were too much under the influence of this object, and then it was when we became more of an artefact ourselves that it was interesting. It was unexpected.

The dynamism of the performance is due to the assumed fusion of the movement of bodies and objects. This fusion is not obvious. Its emergence takes time and requires the material development of the artefact through repeated explorations in movement of its possibilities, as well as external contributions: the observation of peers as well as the comments of teachers, which seem to play a key role.

The path of this group is, of course, like that of all the others: unique. It allows us to illustrate the concrete functioning of a course conceived as a training in collective creation in engineering through the use of improvisation and performing arts, as well as the dynamics of its appropriation by a group of students. The latter combines material experimentation (projector, light, projection surface which gradually grows and becomes autonomous), physical experimentation (tarpaulin laid down, carried, suspended, stretched between two sticks) and conceptual experimentation (tarpaulin delimiting spaces, tarpaulin as habitat).

7.3 The cycle of imagination

An essential element of the process of collective creation in this context is the interplay, the back-and-forth construction between academic concepts on the one hand, and physical and social exploration on the other. We hypothesise that the students' initial discomfort in exploring the unknown, caused by the tension between the *Improgineering* course proposal and the usual university expectations, prompts the use of shared resources by the students to over-

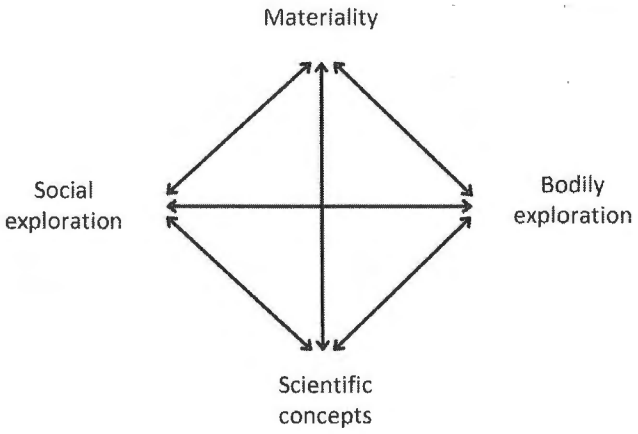


Fig. 7.4 Schematic representation of the dynamics of collective creation in the Improgineering course.

come these difficulties and succeed in the task. The institutional framework of the course (which is part of the elective courses in EPFL's Social and Human Sciences Program) makes the disciplinary concepts acquired during undergraduate training both visible and relevant. The "architectural improvisation" of the group of students we previously referred to, relies on an explicit wish to connect improvisation with some disciplinary notions. It exemplifies the tension in improvisation between meaning (felt, shared, communicated, guiding the conceptual exploration and supporting the development of the movement) and physical exploration (personal and interpersonal sensations guiding the development of the movement, which might lead to the emergence of changing meanings). We hypothesize that this tension supports not only the learning of collective creation by the students, but also their creative appropriation of concepts. We can sketch their creative process in the following way:

Finally, this back-and-forth development of collective creation can be analysed productively using Vygotsky's conceptualisation of imagination (Connery et al, 2018). Vygotsky presents the creative imagination as linked to experience and formulates the main law governing it as follows: "The creative activity of the imagination depends directly on the richness and variety of man's previous experience, because experience is the material out of which the construction of the imagination is built" (Vygotsky, 2004, p. 14–15). The example of the tarpaulin perfectly illustrates the link between the students' previous experience (architecture, in the present case) and the use of improvisation. It also illustrates the full cycle of imagination described by Vygotsky, who writes concerning the products of imagination: "The elements of which they are composed have been taken from reality by humans. From within, they have undergone a complex reworking and been transformed into products of the imagination. Finally, in incarnation, they have returned to reality with a new active force that transforms that reality. Such is the complete cycle accomplished by the creative activity of the imagination" (Vygotsky, 2004, p. 21). Imaginative creations go from being products of personal experience, to productions publicly available to nourish one's and other's future experience, in a developmental cycle: the performance of the students immersed in the tarpaulin artefact, which is the product of their collective imagination materialised in space, is based on elements drawn from their shared reality (e.g., architectural concepts of space and habitat), to which it gives a

"new active force" to transform their reality and the reality of others. In the end, the course allows for a reinterpretation of collective work, which is no longer seen as the efficient application, under time constraints, of a solution already mastered by an efficient sharing of tasks, but as a process of experimentation, taking time to mature and considering the unique contributions of each participant.

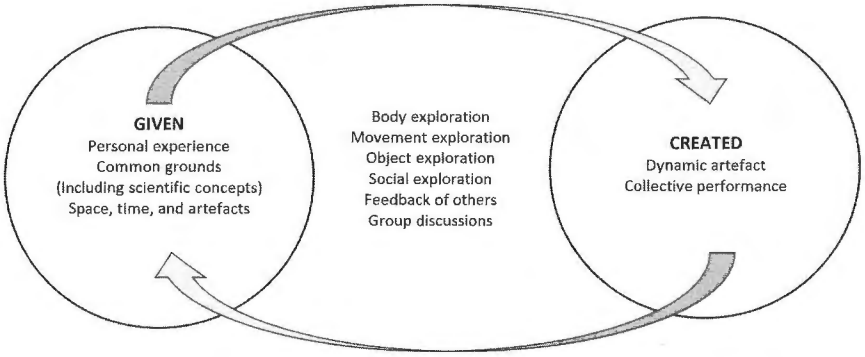


Fig 7.5 A possible schematic representation of the "cycle of imagination" in the Improgineering course.

7.4 Domain transfers

The process of collective creation in courses that make use of the performing arts does not emerge spontaneously but requires certain conditions for its realisation. Our experiences show that it is the curricular conditions that promote this type of activity. If, as we briefly pointed out, the collective creation of these classes results from the tension between four dimensions of interaction, the preconditions for it to occur must be facilitated as part of the pedagogical design. The use of space is a precondition for the invocation of the underlying disciplinary concepts and notions within a performative exercise. Second, it is not only the performative activity, but the use of a physical, rather than symbolic, artefact that triggers a sensory-motor dimension of the interaction that necessarily restores the body in the context of higher

education. Likewise, these object-mediated interactions, with their material facilitations and restrictions, make it possible to connect the negotiations of group dynamics with the body.

It is important to know that collective creation is a well-studied topic in the arts as well as in sciences. In any given field, it is a cycle of dialectical social exchanges that does not allow for the identification of a single author. The agency of creation is recognised as distributed because novelty is always emerging "in between", and originality is judged in terms of co-ordinations that did not exist in the stages preceding the interaction. In this, there is no *ex-nihilo* creation, but a new way of acting with the available resources. Nevertheless, in our courses, the creative process is nourished by two currents facilitated by the same pedagogical design: that of the performing arts and that of the disciplinary contents. The course situation privileges the simultaneous engagement of both paths, from which the main inputs for creation are obtained. In other words, the fields of meanings, as well as the used strategies, are those belonging to the two deliberately hybridised spaces on material as well as symbolic levels. In this sense, in addition to the actions being guided, the channels of transfer from one domain to the other are enabled. It is precisely for this reason that we claim that performative tools have an impact on disciplinary practice, and vice versa.

References

Arao, B. & Clemens, K. (2013). From safe spaces to brave spaces. Reflections from social justice educators. In L. M. Landreman, (Ed.), *The art of effective facilitation* (pp. 135–150). Stylus Publishing.

Carvalho, L. & Yeoman, P. (2021). Performativity of materials in learning: The learning-whole in action. *Journal of New Approaches in Educational Research, 10*(1), 28–42.

Chemi, T. & Du, X. (Eds.). (2017). *Arts-based methods and organizational learning: Higher education around the world*. Springer.

Connery, M., C., John-Steiner, V., P. & Marjanovic-Shane, A. (2018). *Vygotsky and Creativity: A cultural-historical approach to play, meaning-making and the Arts*. Peter Lang Verlag.

Nachmanovitch, S. (1990). *Free play: Improvisation in life and art*. Penguin.

Sawyer, K. (2007). Improvisation and teaching. *Critical Studies in Improvisation/ Études critiques en improvisation, 3*(2).

Sawyer, R.K. (2014). *Group creativity: Music, theater, collaboration*. Psychology Press.

Shank, T. (1972). Collective creation. *The Drama Review, 16*(2), 3–31.

Syssoyeva, K.M. (2013). *Collective creation in contemporary performance*. Springer.

Vygotsky, L.S. (2004). Imagination and creativity in childhood. *Journal of Russian & East European Psychology, 42*(1), 7–97.

Laure Kloetzer, Ramiro Tau

Echo C.

Resonance from two researchers in psychology

Microgenesis of a 7-minute collective improvisation

Reality is never "what we might think", but always
what we should have thought.
Gaston Bachelard, 1938

We (Laure and Ramiro) invited our colleagues, Simon and Joëlle, co-teachers of the *Improgineering* course, to watch, comment on and discuss together a 7-minute improvisation, video-recorded during one of their workshops, introducing the theme of "improvising with everyday objects". This meeting was organised as a self-confrontation interview (Clot et al., 2000), i.e. an opportunity to reflect on one's own activity and that of others, based on a video recording of the event. The fragment of improvisation we have chosen was an exercise that took place with engineering Master's students in one of the rehearsal studios of the Arsenic theatre in Lausanne. We invite you to watch the video recording[25], because this echo refers directly to the interactions which took place at that time. The images and captions are followed by quotes extracted from our self-confrontation session, in which we watched and discussed the details of this collective performance together. Based on this methodology of examining dialogically of what is happening in small increments, we will select some key moments from the guests, Simon and Joëlle, to discuss the function of canonical and non-canonical uses of objects in order to understand the flow and resources for a collective creation.

25 https://go.epfl.ch/impro
We thank the five participants for accepting to share the videorecording of their performance.

Collective creation: Teachers' interpretations

0'39" Opening. Five people on stage, each with a random object of their choice. This is the instruction given to the participants. Susanne, in the foreground with red hair, throws a ball of wool that doesn't unwind, so it doesn't reach its human target, and will return to her.

> Between the players there are like little catches, that's what I'm thinking now. There are already various contacts between them at the level of the gaze, at the level of the gesture that Susanne makes from the front of the stage with her ball of string... It's one of the first gestures that is very clear. This ball of string is really interesting because it creates a kind of paradox, because she throws the ball to someone and it doesn't arrive, and then she gets it back... this ball of string is going to be an object that will play a big role. (Joëlle Valterio).

1'34" The student in yellow began to create a kind of protective zone around the music box, using red and white tape and some wooden blocks. This spatial delimitation creates a stable point of reference, analogous to that created by music in the audible domain. The ball of string becomes a connecting thread, allowing the two participants to cross the stage and the two spatial groups to meet.

A few seconds earlier, the seated student had started the music box.

> There is a first attempt to concentrate something around the music, around the music player. (Simon Henein).

The music will give a framework to the whole piece, and the music player will represent a fixed point that gives stability, orientation and finally an ending to the whole performance, but at this point it is not yet known.

2'04" While the music player remains focused on the music box, and the student in yellow continues to build up his protective zone, Susanne throws her ball, which is interpreted as an aggression. The spray bottle becomes a weapon of defense or protection.

> I feel like at some point he realises that he has this object that he can defend himself with, it's interesting to see at what point it becomes an element of defence. He wants to protect himself and the others, protect the music player, and they start to create a kind of totem pole too. It happens quite often when you play with objects and materials that at some point a totem pole is created. It's true that there's a bit of aggression, but at the same time it's also about creating links, going to look for them, going fishing, bringing her back to the totem pole ... (Joëlle Valterio).

2'54" The construction of the totem pole continues and brings the group together. While two participants use the string to surround the music player, another has taken a transparent tarpaulin that makes noise when handled and surrounds the seated music player with it. The last participant uses the spray, directed towards the sky, like rain, opening a vertical dimension of the play space ...

4'23" Two tarpaulins, two seated music players, contact, it is almost the end of the totem moment.

5'39" The student in yellow has fetched a lighted lamp and placed it next to the music player, where it is waiting to come into play. Then he joins the other three who are standing in a line, occupying most of the stage space.

It's interesting what continues to happen in the background with the music... He's the only one who won't move in the whole piece and then it will end there, he's really the centre, the centre of gravity of the whole thing, it's because it's the music and he's physically static and well anchored, afterwards everything is built around him, so he's also a fixed point of the whole piece, of all the 7 minutes, he's one of the key points of the space, very clearly. It's a kind of installation with bodies, you can also see it as an installation because it's very static, it becomes an object, a kind of object and then you can build things around it, like you could build around a piece of wood that you put there... (Simon Henein).

Nobody knows why there is this lamp, what it can do, but there is a new potential that feeds very calmly without disturbing at all. (Simon Henein).

We have this line and on first viewing I thought it could have been an ending ... It's the first silence in the whole play. It's very intuitive and we're also working a little on recognising this in the group, and it's part of the exercise to feel the endings, at a given moment, I say it from the outside "I see an end". Knowing that it's seven minutes, that there are still two minutes to go, it gives a little taste of an epilogue perhaps, at least that's what I tell myself. (Joëlle Valterio).

Now everything is there, because everyone is watching, this object becomes the centre of everything, him, the others and the lamp. They know they are about seven minutes in, so they are working on creating an ending. (Joëlle Valterio).

5'53" The movement starts again, Susanne first, then all the others follow, with a mechanical movement of up and down, and the music starts again and supports their rhythmic efforts.

6'34" As they pull up the string, two of the participants join the music player, one of them reaches out to the girl in red who joins the centre of the action. Susanne grabs the lamp to illuminate the music player, who has left the box still playing, and has grabbed a bottle for children's soap bubbles. He uses it first to blow bubbles, then to pour soapy liquid on the floor ...

6'49" In a kind of ritual gesture, the girl in red stretches out her hand as if to collect a precious liquid. Then the musician brings the soap to his mouth to swallow it. Susanne intervenes with her lamp to stop him ...

6'50" He drinks the liquid ...

After the standard use of blowing bubbles, very quickly they move on to something else, so something strange, he pretends to spill the liquid on the floor which almost instinctively triggers a gesture... (Simon Henein).

It makes me think of a blessing, a gesture I find very charged at that moment, she with her hand stretching out like that, of sharing attention. (Joëlle Valterio).

After this first transgression where he pours the liquid on the ground, he makes a second one, where he pretends to drink the liquid, again, everyone reacts, and it creates a feeling of fear that passes. So, Susanne intervenes. (Simon Henein).

7'07" ... and they all suffer and die. The end.

We're still waiting, we really don't know what happened, so we wait, he swallows it, it prolongs the suspense. Then, after he drops it so it looks like he's poisoned himself and it triggers ... everyone dies. (Joëlle Valterio).

Joëlle leads this workshop, which works well every time. Every time it's a little wonder, everybody loves this workshop because it stimulates them, there's a kind of stimulation through the objects which is maybe more difficult to have when you're a little bit naked on stage. (Simon Henein).

They're very focused all the way through I think, they're in the moment all the time. Everything is in it, there's nothing that comes out, nothing at any given

> moment that takes us out of the state we are in at the beginning. They manage for seven minutes to do lots and lots of completely strange things, while being in it all the time. Sometimes when there's a strange event, it's actually broken if it's too strange, people can't integrate it. Here everyone integrates everything. (Simon Henein).

> It is, first of all, a question of listening to the situation that is being created, of which I am a part, and then the question is how I participate in this situation that is in the process of being. The image I have now is when you arrive in a place where there has just been an earthquake: what do you do? You can take photos, you can rescue people, you can make phone calls ... you have a situation, and you have a thousand attitudes, a thousand readings of the same situation, a thousand actions ... you read the situation and you act, and if you act according to this situation, you improvise correctly in relation to this situation. We agree that there isn't one action that is right, and the others are wrong... There are thousands ... if they are a response to the situation, they are good. (Simon Henein).

Collective creation: Towards a situational pragmatics of the object

In situations of relatively free interaction such as mentioned above in the improvisation, it is clear that the participants are constantly "reading" or interpreting the gestures and the uses of objects. Whether they are integrated into a recognised line of meaning or broken, there always seems to be a strong predominance of the interpretive dimension. At least a certain systematic aspect of the coexisting actions is perfectly recognisable, which highlights the solidary character of the action over the isolated gestures. In other words, this vignette, like any other observation on collective improvisation, brings to the forefront the signifying dimension of the action and the way in which these meanings discovered by the participants, beyond their polysemy, guide the sequences. Actions always have a framework that is given by physical constraints, but also by the interpretations that each one makes and by the meanings that each participant anticipates or believes he or she recognises in others (Spaulding, 2018). Both the material dimension and the symbolic one direct the possible actions in a more or less creative way.

It is clear that language, in a broad sense, is a powerful tool for self-regulation as well as for the awareness of actions (Basilio & Rodriguez, 2011). Semiotic systems, however, go much further than articulated language. Studies of child language development show that pre-linguistic systems of meaning exist prior to the acquisition of adult articulate language. Thus, language, as a system of signs, is never acquired in a state of vacuum, but is constructed on the basis of a complex preceding semiotic framework, related to the social uses of the body and objects. The communicative function of the sensorimotor activity that precedes children's speech has been known for many years (Bates et al., 1979; Piaget & Szemińska, 1941; Rodriguez & Moro, 1999; Tomasello, 2008). These precursors of adult language account for a semiosis embodied in objects and their everyday functioning (Reddy, 2008). These are the conditions of possibility for the development of an abstract system of signs and for the autonomy of thought with respect to practical action (McGregor et al., 2009). It is precisely this practical dimension of meaning-making – which is not lost with the emergence of the articulated language – that plays a fundamental role in performative activities (Rodríguez & Moro, 2014; Sabena, 2008).

Indeed, the meanings we give to objects and gestures in terms of their concrete use in everyday situations do not vanish with the emergence of language or thought that anticipates or replaces sensorimotor actions. It is a way of signifying events that coexists with language, or that, strictly speaking, is part of the whole extended semiotic field that we call language. With this, we want to point out that the pragmatics of objects – i.e., the meanings associated with their public and consensual use – are part of the language, even if their signifiers are not those of the system of language. Gestures and objects carry more or less intelligible meanings which highlight the symbolic character of action supported by conventions (Müller, 2017).

The uses and symbolic meanings of objects, spatial arrangements and bodily gestures stem from already established uses and symbolic meanings (Rodriguez & Moro, 2014). Intentional understanding – i.e., the ability to comprehend, predict and describe one's own and other subjects' behaviour – is always an interactive, embodied and practical activity (Abramova & Slors, 2015; De Bruin & Kästner, 2012; Hutto, 2011; Lindblom, 2020). Even figurative performative uses largely share this social origin (Alessandroni, 2017), which allows us to recognise a metaphorical use of practical action. As in our

case, a ball of string can become an object of aggression or connection, the demarcation of a perimeter can acquire the semantic resonances of unity or a border to an exterior, but also protection, stability or permanence. All these resonances are based on shared symbolic meanings, and it is precisely this that makes them interpretable. The action of the participants in the improvisation takes place in accordance with these meanings and always seems to be in a more or less clear agreement with these recognitions.

However, considering each moment in the sequence, we can recognise actions that are in agreement or disagreement with the emerging meanings, although this may only be done by a third reading, an interpretation of the observers. We have no direct access to the meanings that each of the participants attributes to the collective improvisation. Even if we could have access to this information, it would not be possible to recognise a single univocal meaning, because the reverberations are multiple and overlapping. It is precisely this symbolic layering, as it occurs in mental activity, that opens up the action to divergent paths. Each gesture can have several simultaneous readings, and in this polysemy lies a large part of the richness of an aesthetic experience or a performance. And polysemy is also the condition for creation in different domains of human action.

Accepting that the progression of improvisation is largely guided by the symbolic function carried by objects and movements, we can recognise that

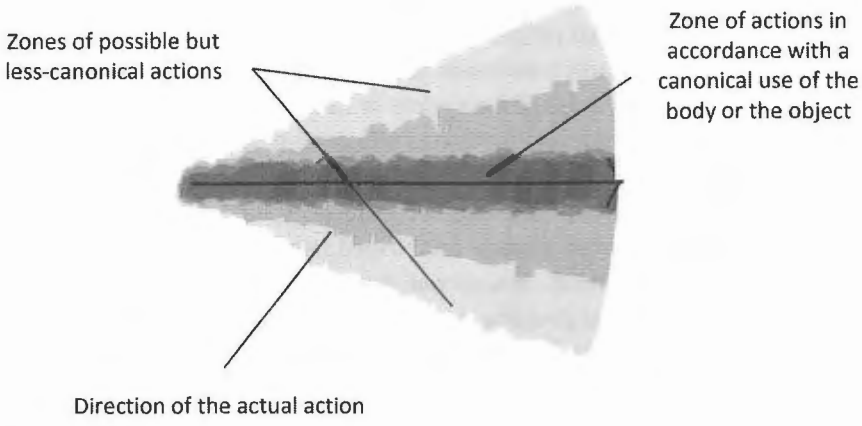


Fig. 1 Zones of possible actions.

this symbolic function has a canonical or consensual vector and a range of alternative possible metaphors. Thus, a water sprinkler can be just that, an object for spraying water, but it can also become a protective weapon. It is these possible displacements of meaning that form the potential spectrum surrounding the canonical use of the object. Each action will make use of the body and of the objects that can be found in the central zone of the canonical uses, or it can move away towards atypicality.

Although material or ergonomic properties may favour a certain function, the canonical use is socially established. This is most evident with gestures or prosodic and pragmatic aspects of communication. It is this canonicity of actions that guarantees a certain level of legibility and capacity for anticipation and adjusted reaction. When usages deviate from the consensual parameters of a social group, interpretability is reduced, and this can be due to two reasons. The first is the lack of a shared cultural background. This occurs when objects and gestures from one culture are read from a different one, leading to misunderstandings or extemporaneous interpretations. But the second situation is the one that interests us most. We refer to the situation in which the lack of understanding of an act is the result of the atypical use of an object. Variations in uses are, by definition, creative, because they disrupt the intended and known function to open up a new field of possibilities. This might be a catachresis (Clot, 1997), i.e., a way to adapt an object to a non-intended use (for example, when a folded envelope is used to support a table leg). There is a creative way of using an object for another purpose – the creation of a new use for a new purpose. Here however, both the new purpose and the new use are created in interactions. Thus, one way to recognise creativity – or even to provoke it – in a situation of collective interaction is to search for those moments in which objects and gestures become non-canonical. In the sequence, these moments are recognised because they shift the thematic direction and move towards another path. As an effect of a metaphor or a new meaning/function of the object, the sequence then is reoriented towards a different and unpredictable context.

This path of disruption can only be reconstructed retroactively. Neither the creative uses nor the metaphorical or metonymic slippages from which a new context for the action emerges can be anticipated. But in each snapshot of a sequence, we can recognise the precursors of the actual performance, the links between two consecutive moments and the way in which the non-canonical use of an object or the body was the bridge between one and the other.

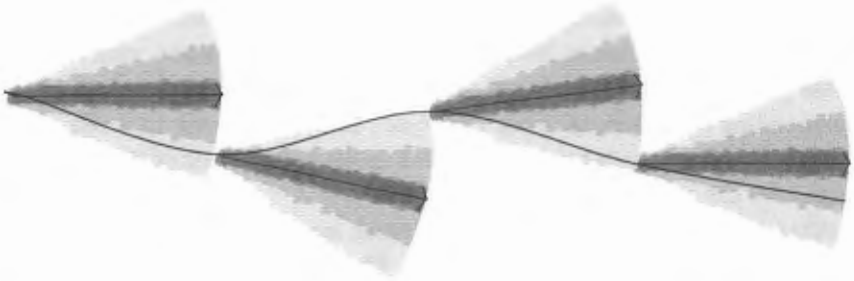


Fig. 2 Creativity as deviation from canonical uses and the openness to new possibilities.

The series of actions that take place during the improvisation give rise to a dynamic that can be reconstructed as a script or a timeline of actions. But the course of such a line is modulated by canonical and non-canonical patterns, and the degree of creativity of the actions seems to depend on this.

This model assumes that one sequence may be less creative than another if the actions are based on consensual functions or instituted practices. In such cases, the "way of doing" is culturally shaped and the action is closer to habit. Conversely, the sequence acquires a greater degree of originality when the performative activity deviates from the cliché form. To what extent does this model, based on the pragmatics of the object and the body, find its way into other fields of human interaction? To what extent can it be used as a heuristic guide to design courses that promote creative acts through the subversion of familiar practices?

References

Abramova, E. & Slors, M. (2015). Social cognition in simple action coordination: A case for direct perception. *Consciousness and Cognition*, 36, 519–531.

Alessandroni, N. (2017). Development of metaphorical thought before language: The pragmatic construction of metaphors in action. *Integrative Psychological and Behavioral Science, 51*(4), 618–642.

Bachelard, G. ([1947]1938). La notion d'obstacle épistémologique. Dans *La formation de l'esprit scientifique*. Librairie Philosophique J. Vrin.

Basilio, M. & Rodríguez, C. (2011). Usos, gestos y vocalizaciones privadas: de la interacción social a la autorregulación. *Infancia y aprendizaje*, 34(2), 181–194.

Bates, E., Bretherton, I., Camaioni, L. & Volterra, V. (1979). Cognition and communication from nine to thirteen months: Correlation findings. In E. Bates, *The emergence of symbols: Cognition and communication in infancy* (pp. 33–68). Academic Press.

Clot, Y. (1997). Le problème des catachrèses en psychologie du travail: un cadre d'analyse (Catachresis: problem and framework for work psychology). *Le travail humain, 60*(2), 113.

Clot, Y., Faïta, D., Fernandez, G. & Scheller, L. (2000). Entretiens en autoconfrontation croisée: une méthode en clinique de l'activité. *Perspectives interdisciplinaires sur le travail et la santé*, (2–1).

De Bruin, L.C. & Kästner, L. (2012). Dynamic embodied cognition. *Phenomenology and the Cognitive Sciences*, 11, 541–563.

Hutto, D.D. (2011). Elementary mind minding, enactivist-style. In A. Seemann (Ed.), *Joint attention: New developments in psychology, philosophy of mind, and social neuroscience* (pp. 307–341). MIT Press.

Lindblom, J. (2020). A radical reassessment of the body in social cognition. *Frontiers in Psychology*, 11, 987, 1–16.

McGregor, K.K., Rohlfing, K.J., Bean, A. & Marschner, E. (2009). Gesture as a support for word learning: The case of under. *Journal of child language, 36*(4), 807–828.

Mollo, V. & Falzon, P. (2004). Auto-and allo-confrontation as tools for reflective activities. *Applied ergonomics, 35*(6), 531–540.

Müller, C. (2017). How recurrent gestures mean: Conventionalized contexts-of-use and embodied motivation. *Gesture, 16*(2), 277–304.

Piaget, J. & Szemińska, A. (1941). *La genèse du nombre chez l'enfant*. Delachaux et Niestlé.

Reddy, V. (2008). *How infants know minds*. Harvard University Press.

Rodríguez, C. & Moro, C. (2014). Objeto, comunicación y símbolo. Una mirada a los primeros usos simbólicos de los objetos. *Estudios de psicología, 23*(3), 323–338.

Rodríguez, C. & Moro, C. (1999). *El mágico número tres. Cuando les niños aún no hablan*. Paidós.

Sabena, C. (2008). On the semiotics of gestures. In L. Radford, G. Schubring & F. Seeger (Eds.). *Semiotics in mathematics education: Epistemology, history, classroom, and culture* (pp. 19–38). Brill.

Spaulding, S. (2018). *How we understand others: Philosophy and social cognition*. Routledge.

Tomasello, M. (2008). *Origins of Human Communication*. MIT.

Simon Henein, Danielle Chaperon

8. Learning from improvisation

> *[The] task is to restore continuity between the refined and intensified forms of experience that are works of art and the everyday events, doings, and sufferings that are universally recognized to constitute experience.*
> *John Dewey, 1934*

A description of the genesis process of the Improgineering course is useful in understanding its content and nature. The course was built around the practical training of collective improvisation skills to which theoretical content has been gradually added. This chapter presents the observations made throughout the course and the lessons to be learned from the associated reflexions for the transformation of higher education, far beyond the well-known project-based-learning approaches and transversal skills development.

8.1 *Improgineering*: A course designed from practice to theory [S. H.]

The *Improgineering* course (see chapter 3) emerged primarily from observing that within my professional life as a micromechanical design engineer, researcher and teacher, I was extensively exploiting *practical knowledge* and *modes of thought* which I had acquired through my training as a dancer and an improvisation art performer, rather than through the higher education curriculum I had followed. As I considered the assets, I had imported from the world of performing arts into my scientific career and that were key to exerting my profession, I simply assumed the same would hold for a representative number of EPFL[26] students. Consequently, after discussing the issue with the Dean of the College of Humanities in 2016, I decided to elaborate the "Collective creation: Improvised Arts and Engineering" course to which

26 École polytechnique fédérale de Lausanne, Switzerland.

I gave the portmanteau name: *Improgineering*. The course was launched over the 2017–2018 academic year within EPFL's Social and Human Sciences Program. The core of the course was based on practical improvisation training sessions inspired by my own intensive dance training in Instant Composition, Contemporary Dance and Contact Improvisation with prominent dance improvisation teachers such as Julyen Hamilton, Barre Phillips, David Zambrano, Steve Paxton, Simone Forti, Andrew Morrish, Andrew Harwood, Kirstie Simson, Nancy Stark Smith, among many others.

Since my background as a performer is centred around dance, I selected as external teachers for the *Improgineering* course professional artists with a long experience in improvisation. I asked them to lead the improvisation workshops in *theatre* and *music*, and I hired an assistant (Joëlle Valterio) who has a broader *performance art* background to support me throughout the year.

For this particular course, I felt that taking the students outside of the perimeter of the university campus and bringing them inside the enclosure of a theatre was necessary. I therefore contacted the directors of nearby theatres to inquire about their availability and willingness to support the *Improgineering* initiative by offering access to some of their rehearsal studios and performing spaces once a week over the full academic year, and putting us in contact with some of the artists working on-site in order to involve them in exchanges with the students. Patrick de Rham, who had just become the head of the Arsenic,[27] accepted, and the collaboration was quickly established. From the beginning (September 20th, 2017), the course has taken place almost entirely in the Arsenic rehearsal studios, and two public performances are presented each Spring in one of the larger performing spaces with technical lighting and sound equipment. In addition, artists who are in residency at Arsenic are involved in the *Improgineering* course, presenting their working methods to the students, and giving them feedback while they are working on the creation of their own performances.

Concerning the theoretical aspects of the course, as improvisation is not a clearly defined discipline, I decided to invite teachers from other institutions than EPFL who had treated some theoretical aspects of improvisation in their

27 *Centre d'art scénique contemporain*, Lausanne.

own research: a sociologist (Dr Alain Bovet, HE-Arc[28]) who covered the sociological aspect and a professor of theatre studies (Prof. Danielle Chaperon, UNIL[29]) who treated the dramaturgical aspects. In addition, a mathematician from EPFL (Dr Ilan Vardi) and myself focused on the theoretical aspects of improvisation in the field of science and engineering.

As the course developed over the years, I felt the need to consolidate its theoretical side and thus decided to spend a full year at the Centre for Theatre Studies (CET), Faculty of Arts, University of Lausanne as Visiting Professor during a research leave. During this period, Prof. Danielle Chaperon and I co-taught a seminar entitled: "History and Theories of Improvisation in the Living Arts" (*Histoire et théories de l'improvisation dans les arts vivants*). The course was based on a series of readings from several fields of knowledge in which improvisation has been theorized: Anthropology (Mauss, 1950 [1934]; Ingold, 2017); Sociology (de Certeau, 1990 [1980]); Ancient World Studies and Sinology (Detienne & Vernant, 1974; Jullien, 2005); Ethology (Von Uexküll, 1934); Literary Theory (Macé, 2016) and Philosophy (Merleau-Ponty, 1964b; Bergson, 1912 [1899]).

As a result of this work I wrote, with the support of Prof. Danielle Chaperon, a class support note consisting of 13 statements which outline a possible definition of improvisation. This hitherto unpublished note is used as a handout in my courses and will be presented in the following section.

Furthermore, during my research leave, I had the opportunity to follow the Certificate of Advanced Studies (CAS) "Dramaturgy and text performance"[30] led by Prof. Danielle Chaperon and to contribute to it with a full day's teaching on the topic of the role of the body in the performing arts. Following and participating in the teaching of this CAS program allowed me to learn about the history and the functions of improvisation within the performing arts. Hence, the reflections below stem from my visiting period at the Centre for Theatre Studies.

28 University of Applied Sciences in the Jura Arc.

29 University of Lausanne.

30 'Dramaturgie et performance du texte', Certificate of Advanced Studies (CAS): continuing education program given by UNIL and La Manufacture, Haute école des arts de la scène de Suisse romande, and administrated by 'Formation continue UNIL-EPFL', 2020–2021.

8.2 A set of positive assertions about improvisation [S. H.]

Etymologically, the word improvisation comes from the latin *improvisus* formed by *im-* and *provisus*, the latter being formed by pro and *videre* (to see). The resulting definition is negative: improvisation is action without prevision. What is improvised is what is not seen, conceived, prepared, decided in advance. Improvisation is therefore considered to be an action from which prevision is missing. To go beyond this common but deficient definition, this chapter will attempt to describe improvisation, not negatively through its difference from planned action, but positively through its intrinsic properties, by making thirteen claims about fundamental aspects of improvisation. While each of these claims considered separately can appear as patently incomplete, their intersection nevertheless reveals a rich image of improvisation, which will be helpful for understanding the premises of the *Improgineering* course.

Action modality
Improvisation is an action modality in which action is decided upon at the very moment of its execution. In other words, improvised action is invented on the spot: conception and realization are simultaneous; both happen during the time span allocated to the execution of the action. In this modality, the notions of decision and choice which, as deliberations, necessarily precede action, lose their relevance. Only a posteriori can the departure from normal actions be defined or a plan be traced, as an emerging construction stemming from the action itself (Margel, 2016). This differs radically from the common notion of plan which usually denotes an underlying construction – thus anterior to action. In improvisation, it is not action which follows the plan, but the plan follows action instead.

Preparation
The preparation phase that may precede the execution of action aims at expanding the "field of possibilities" (Tau, 2022): bodily training, development of a repertoire of gestures and know-how, habits, embodied routines, craftiness, tricks, aesthetic or social codes, etc. The multiplication of paths which can later possibly be taken during the unfolding of action enlarges its potential. In this sense, the preparation of an improvisation resembles that of

a collective sport: the more the players train together and automatisms are acquired, the more action can then "liberate" itself during the game, leading to "inspired" actions which can lead to a "goal" (Margel, 2016). Preparation can also deal with the elaboration of a frame, such as *scores*, or a musical *theme*, or the *subject* of a conversation.

Frame

The preestablished frame of an improvisation can be implicit (location, duration, light, acoustics, audience, date, etc.), or explicit (score defining the rules and constraints). Frames are necessary for improvisation, but neither "contain" nor "determine" it. The opposition between improvisation as "liberty" or "spontaneous creation" and obedience to a ready-made canvas is obsolete. Indeed, the example of speech is eloquent: as we speak, we use pre-existing vocabulary and follow a multitude of highly elaborate grammatical rules which are specific to the language used, however, this by no means hinders spontaneous speech, or the improvisation of a discourse or a verbal exchange. The linguistic rules constitute a remarkably strict frame which empowers the production of all possible statements of a language – engendering an incommensurable field of possibilities – while excluding the statements which do not comply. The same applies to the frame of an improvisation: it has at the same time the function of a *generator* and a *constraint*; these two functions are neither antinomic, nor paradoxical: on the contrary, their fertile conjugation is a core *resource* for improvisation.

Attention

Attention is a concentration of the mental activity on a specific target. With training, it can be intentionally oriented, steered, focalized, like a projector beam. During improvising, attention is consciously directed towards certain elements of the situation (context) of action, towards the effects produced by action, towards bodily internal sensations of the improviser, or even on attention itself. In the latter case, the improviser observes him or herself improvising. Redirecting attention on itself constitutes a reflexive process that emerges in real time on stage. In that sense, attention becomes a central object of all improvisations. The improvisers concentrate primarily on listening and perceiving, rather than on their acts. Attention can be trained during the preparatory phases of improvisation and sometimes lead to *attentional scripts*,

which are procedures or interactional rules defining attentional targets which the improvisers focus on during the improvisation (Margel, 2016).

Perception

During improvisation, the focalization of attention reveals the sensorial process of perception to the spectator. As described by phenomenology, perception is regarded as an active exploratory experience that leads to making contact and meeting with the world. The painter reveals the way he or she sees though what is drawn, i.e., the *echo* in his or her body of what he sees (Merleau-Ponty, 1964a). Similarly, the improviser reveals through his or her actions on stage how s/he perceives, restoring into the world traces of what in his or her body has been impacted by the world. This process reveals the interweaving of the world's fabric with the texture of the body, which Merleau-Ponty (1964b) calls "flesh" ("*chair*", in French), transcending the body-mind dualism. The improviser reminds us that the body is made of the same matter as the world, and vice versa: he or she plays with his/her body as with a thing which can be seen, touched, smelled. He or she shows us that what is perceived is not simply an impression of the world onto his or her body, as light photons would impress onto a sensitive photographic film; it is also a projection of one's own perceptive hypotheses, as the hollow mask illusion vividly shows: the concave side of a mask appears to the viewer as a normal convex shape, due to the fact that his a priori knowledge assumes that what looks like a face is obviously of convex shape (Bernard, 1991). The body is a malleable and sensitive matter that receives the world while participating in it. The body perceives itself: perceiving, exploring and expressing oneself are actions which cannot be strictly distinguished from one another.

Situated action

Indexicality is the property of certain terms whose signification depends on characteristics of the context in which they are enunciated. "Here", "now", "me" are typical examples of indexical words. The same applies to improvised actions whose meaning and functions depend fundamentally on the context in which they are executed. As a result, the notions of *contingency* or *accident* do not apply to improvisation. These notions are to be replaced by that of *affordance* (Gibson, 1966): any event happening during an improvisation is per definition part of it, it constitutes the material of its progression,

its fuel (Von Uexküll, 1934; Debord, 1957; Marcolini, 2012). In improvisation, the events taking place during an action or under the effect of action are treated as *affordances*, i.e., grips, supporting elements, for the progression of action. In this sense, improvised action is indexical and incorporates all contingencies: it is therefore a *situated action*.

Movements and gestures

In dance, movement is generally seen as the displacement of the body segments through space; it is essentially a geometric and kinematic phenomenon. Various methods for analysing the danced movement have been proposed, such as:

- *gravitational play* (*"jeu gravitaire"*) which relates to the loci of the supporting points of contact of the body with the ground, with respect to the position of the body's centre of gravity.
- *intensity*, which relates to the modulation of the body tonus similarly to the modulation (i.e., the volume change over time) of musical sound that is commonly analysed in terms of phases – *attack*, *decay*, *sustain* and *release* – forming together the envelope of the acoustic signal.
- *musicality of movement*, dealing with its temporal or rhythmical structure;
- steps, forms and figures;
- Rudolph Laban's *efforts* and *movement quality* categories.
- etc.

Pre-movement describes the body-posture prior to the execution of any movement. The musculature and motor coordination which are active in order to stand upright are also the ones which are activated by emotions. Hence pre-movement carries meaning already before the execution of movement itself. The fact that the same body tissues are involved both in the execution of movement and in the manifestation of emotions allows for a double reading of movement: a geometrical or kinematic one, and an emotional or affective one. In the latter case movement is interpreted as being a gesture.

Gesture is considered to be movement aiming at expressing (semiotic gestures), executing (ergotic gestures) or perceiving (epistemic gestures) something. Since both movement and gesture emanate from the body, the latter can be seen as the place where geometry meets meaning, emotion, action, etc. As Artaud puts it:

> The important thing is to become aware of the localization of emotive thought. One means of recognition is effort or tension; and the same points which support physical effort are those which also support the emanation of emotive thought: they serve as a springboard for the emanation of a feeling. (Artaud, 1958 [1938], p. 138).

As improvised movement draws both from the registers of geometric movement and gesture, it blurs the frontier between dance and theatre.

Memory

The corporal training of the actor or dancer leaves traces which are inscribed in his or her body. Hence, training collectively creates a common base from which improvised action will arise. The body can thus be seen as a memory substrate in which the life experiences of the performers are inscribed, in addition to their specific physical training, routines, habits, automatisms, etc.

The body of the spectator

Movement takes place both on stage and in the mental and kinesthetical representation of the spectator. The discovery of the mirror-neurones (Rizzolatti et al., 1996) which are activated when a movement is executed, but also when the same movement is watched as it is executed by another person, gives an underlying neurological explanation to this phenomenon: the observed movement induces an internal neurological simulation of that same movement in the watcher's brain. Similar bodily effects are observed as a spectator looks at a drawing (in which case the neural networks needed to execute the gesture required to make the drawing are activated), or reads a text describing gestures or bodily sensation. In that respect, the artwork is not outside the spectator, but *inside*. Reciprocally, the body of the spectator prolongs itself into the artwork and participates in it (Berthoz & Recht, 2013; Chestier, 2007) as s/he projects his/her own perception hypotheses onto it. From a neurological point of view, the distinction between acting and perceiving gets blurred. Improvisation exploits these phenomena by revealing them on stage.

Participation

In improvisation as performance art, the public participates implicitly in all improvised actions: indeed, it constitutes a major element of the scenic action

frame. The audience is a major element of the performance situation (Schechner, 2008 [1967]): the mutual exposure – in some cases the face to face – of the performers and the audience constitutes a resonator, a soundbox, inside which action gets amplified; the spectator gives action its meaning by projecting his or her own hypothesis and schemes onto it; the audience is a source of contingencies whose integration into the action manifests its improvised dimension. The participatory dimension can possibly be made explicit or even heightened, leading to new forms, such as *happenings* and other participatory performances. All the mechanisms described above rely in essence on the bodily copresence of the performers and members of the public. In that sense, improvisation exalts the living dimension of the theatrical event, thus continuously celebrating the presence of the bodies gathered in one place at one time.

Collective action

The modality of improvised action gives a primordial role to the collective undertaking. In a collective improvisation, the individuals' actions are immediately acknowledged and taken into account by the other group members. The notion of *leadership* loses its pertinence. The hierarchies are not those of one group member over the others, but of one event of the action over the other elements of the ongoing action. The more participants recognise an event as pertinent, the more significant it becomes, and the more it gets assimilated as one of the elements of the situation at this specific moment. The bodies of the performers merge into some kind of "rhizome" forming a unique body incorporating the individual bodies. The attention of each person is focused onto what this meta-organism is experiencing and producing, which, in choreographic or theatrical terms is often called "the piece". The unity of the improvised performance stems from this focalised attention of each individual performer to the ensemble (Bernard, 1991). The reflexive attention of each group member is elevated towards a reflexive attention towards what the group is doing. This is what allows the group to compose as time unfolds and improvisation becomes performance.

Composition

When the *temporal* and *spatial* relationships between actions are acknowledged as relevant, then *composition* is taking place. In other words: if *when* and *where* things are happening with respect to each other is considered to

be significant, then these things are considered compositionally. Improvisation is commonly used in the early stages of creating a piece as a means of producing choreographic, musical or theatrical material which will then be sorted out, memorised or written down to be incorporated into the composition which will be rehearsed before being presented publicly on stage. But improvisation can also be treated as an artistic product in its own right: the act of composition then takes place on the spot, in full view of the audience. This "Instant Composition" implies a process of memorisation of the events as they unfold, and a process of continuous anticipation of their possible futures (Hamilton, 2011; Margel, 2016). The time-scale over which these temporal and spatial relationships are taken into account can be short (i.e., a small fraction of the duration of an improvisation), or long (i.e., the whole duration of an improvisation, or beyond). Anticipation relies on the notions of *intuition* and *instinct*, the former being a form of direct and immediate knowledge devoid of reasoning, based – etymologically – on the "attentive look"; the latter being an ability of sensing, hunching, what is about to happen based on innate or acquired knowledge, i.e., based on the past, whether near, far or archaic.

Fusion of art and life

Improvised action resembles human "everyday life" action in many aspects: holding a conversation, walking around town, cooking a meal, playing a team sport, etc. In each of these situations the improvised dimension is manifest and takes advantage of the affordances offered by the context. Bringing improvision onto the stage is hence an attempt at including something of daily life (Dewey, 2005 [1934]; Kaprow & Kelly, 1996). The pre-thought, the pre-conceived, the pre-seen, the planned, which are isolated in the mind and affected by its logic and rationality are replaced by the lived experience of the fleshly body, bathed in the environment – the *milieu* (Canguilhem, 1992) – from which it emerged, and of which it is a constitutive part. This reveals how each organism generates its own "world" based on its perceptive capacities (Von Uexküll, 1934).

In artistic terms, improvisation tends to dissolve the frontier between *art* and *life*, as it bridges the gap between performative action and day-to-day life action. This brings the aesthetic experience nearer to the usual experience of the body engaged in the natural world and in life.

8.3 About the role of improvisation in the performing arts [D. C.]

Within theatre, which aspires to the "natural" from the 18th century onwards and frees itself from the sclerosis of classicism in the 19th, improvisation was considered to be a resource giving access to popular forms thought to be stemming from the "origins". This argument used to legitimate the use of improvisation was in fact largely fantasised, whether concerning the Greek, Etruscan or Latin comedies, the *théâtre de foire* or the *Commedia dell'arte*.

First, during the 20th century, improvisation takes part in a context of mediatic repositioning of theatre in a competitive context. Theatre is indeed threatened by technical inventions allowing for the recording of sound (phonography) and movement (cinematography), and then by their live broadcast (radio and television). As a cultural industry and as a mass media, theatre was clearly jeopardized by the development of silent, and then talking, cinema. Consequently, it had to redefine itself – following a modernist logic (Greenberg, 1940) – by exploiting the specificities of its medium, which led to the birth of the *live performance* category ("art vivant", "lebendige Kunst"). Although theatre shares with cinema several elements – frontality, a public gathered as an assembly, the obscurity in the room fostering the fictional immersion –, it seeks to distinguish itself from cinema by the co-presence, in space and time, of the bodies of the actors and spectators (Gouhier, 1943). Craig (1920) claims from the beginning of the 20th century movement to be constitutive to theatre and dance to be its "ancestor"; Appia (1986 [1904]) praises the plasticity of the moving body heightened by lighting and stage configuration; Jaques-Dalcroze (1920) theorises the rhythms of living beings; Copeau (1913) calls for the "bare boards" ("tréteau nu", empty stage), and actors as only material.

Second, improvisation can be considered in the context of the *art of performance* which the plastic artists of the *néo-avant-garde* of the 1960s mobilised in order to create "bridges between art and life" (Bourriaud, 2009). Going back to Antonin Artaud and Jerzy Grotowski (1971), these innovations were absorbed by theatre from the 1970s onwards in order to strengthen its own "living art" identity. Improvisation can indeed be considered as one of the three resources likely to emphasize the specificities of the performing arts:

- *Action* (in the sense of the "Viennese Actionism" (Roussel, 2008 [1995]), body art, events or happenings) which erases the border between reality and fiction, "presentation" and "representation";

- *Participation*, which erases the fourth wall and abolishes the distinction between actor and spectator;
- *Improvisation*, which challenges the planned and rehearsed nature of performance.

These three modalities have their own genealogy, precursors and theorists, but in practice they are very often combined.

The art of performance is strongly marked by the will to eliminate the category of the work of art as an activity which is cut off from life (Cometti, 2010). While the theatrical representations were previously intended to remedy the contingency of human existence by the fabrication of autonomous artworks which are "solid" (Arendt, 1958), or which "stand all alone" (Deleuze, 1981), the art of performance seeks to make the theatrical representation "fragile". This is done by exposing the – vulnerable – body of the performer to the – unknown, reticent, frightening – spectator, as well as to the initiatives of the – more or less reliable – performing partners. The intensification of these transformations is associated with the notion of *postdramatic theatre* which reached a climax at the 2005 edition of the Avignon festival (Banu, 2005).

8.4 What the teacher learns [S. H.]

After examining the onset of the *Improgineering* course and presenting the associated notions about improvisation as a creative process and as a transformative resource in the performing arts, it is worthwhile considering some of the salient reflections of the teacher with the hindsight of a few years (the current 2023–2024 academic year is the 6th edition of the course).

Student exposure

The *Improgineering* course puts the students as individual human beings and their own productions to the foreground via the two final public performances, but also throughout the year, via the careful reading of their reflexive diaries by the teachers, the many presentations the students make in front of their classmates during the workshops, the interviews they participate in during the ASCOPET research work, the video clips made for the promotion

of the course, the exchanges with the artists during the creation process, the panel discussion with the jury members following the final presentation, etc. Each of these exchange moments constitutes a situation of exposure for the students, i.e., a situation in which they are seen inside and also outside of the classroom and in which they receive feedback about their work, in various forms. As most of these exposures happen outside of the grading protocol, the associated working effort, and in some cases the pressure, is not related to the study curriculum but to the real situation of confronting oneself and the world. In this sense, this course happens outside of the university borders geographically (by taking place in a theatre), but also academically: as the preponderant feedback comes from the outside world, the grading, which is based on a predefined set of criteria established from within the academic frame, becomes a marginal aspect. As a result, the students become conscious of the intrinsic value of their contributions and of the potency of their actions on the world, not only within the university context. This repeated exposure also leads to a multiplication and an enrichment of the feedback sources – course teachers, artists involved in the course, researchers studying the course, audience of the performances, friends and family attending the performances, fellow students who discuss the course, etc. It intensifies and deepens the learning process and heightens the value of the delivered work, both in the eyes of the students and in the eyes of those who take their work into consideration.

Mutual exposure

The exposure process presented above is complemented by my own exposure as professor within this course. Indeed, how could teaching and learning happen without the teacher laying her/himself out to view? Traditionally, the classical architectural classroom space – frontal classrooms and auditoriums, with a pulpit and blackboard for the teacher – is designed specifically to direct the focus of the learner onto the teacher, as well as to expose the former to the sight of the latter. For learning to happen, both parties need to accept the tacit contract of mutual exposure – this is why it is so annoying for the teacher when students turn off their cameras during online classes. This notion of mutual exposure is the nexus both of the classroom architecture and of the teaching-learning process. It is obvious that exchanges happening in such spaces go very far beyond the transmission of the taught "content". From my

experience, the knowledge of the mechanisms at play in this particular form of human exchanges are by far more developed in the field of performing arts than in the field of university education – and probably of education in general. This is one of my motivations for sharing some of my experience as a performer with other teachers.

Professor exposure

In my own case, I learned how to work with exposure mostly through my training as a performer. When I say "working with exposure", I don't mean "working in spite of exposure", or "working while handling exposure"; I mean working using exposure as a central lever for teaching. I believe that it is because I dare to expose myself – "self" being a notion deserving clarification – that substantial learning is given a chance to happen within the teaching-learning setting. I would say that this applies particularly well to my experience with the *Improgineering* course: I have exposed myself to the students in several situations: while learning social science aspects of improvisation which the external teachers were teaching with them; while actively taking part as a participant in the practical workshops – in theatre, music and performance – led by the external teachers; while teaching the dance classes, which goes beyond my usual role of professor in an engineering school; while leading, under the eyes of the students, the complex logistical organisation of the final public performances. In this sense, throughout the *Impogineering* course I have consciously and explicitly created situations of exposure and interaction with the students that go far beyond those of a classical *ex cathedra* teaching setup. My belief is that the remarkable engagement of the students within this course owes a lot to my own willingness to expose myself.

At the heart of the SHS target

As I first drafted the *Improgineering* course, I imagined that it would be on the edge of what is targeted by the Social and Human Science program (SHS). Indeed, the SHS aspects *per se* were co-lateral dimensions of a course centred on learning a practice. But, as the course became consolidated with the input from external teachers and later received its first visibility and feedback from the SHS program at EPFL, I realized that it was manifestly at the

centre of the target. Indeed, a closer look at the objectives listed in the brochure[31] of the SHS programme reveals the following (extracts):

> The SHS program aims to develop the students' capacity for introspection and critical thinking, allowing each of them to become conscious about his/her role and his/her responsibility as a citizen within a given society, and more broadly throughout the world. [...] It is therefore essential that students acquire a solid awareness of the social and ethical dimensions related to their work, as well as a great capacity of engaging themselves publicly. [...] More fundamentally, the creative forces allow for adopting new perspectives on the major issues today's world is confronted with. The teachings of the SHS program allow an engagement through art and artistic production which can lead to a better understanding of the creative processes.

I believe that the *Improgineering* course addresses these issues in a very direct, practical and pragmatic manner. The SHS issues arise directly from the collective activity and become a required transdisciplinary knowledge to approach, describe and handle the questions emerging within the performing situations which can be considered to be "mock-up models" of the social and human situations the SHS program aims to address.

Reception by the artistic scene

The obvious initial motivation behind the design of the *Improgineering* course was to offer the EPFL students an opportunity to benefit from the knowledge and experiences stemming from the performing arts worlds. But as the course came to life, it appeared that significant curiosity and interest in several forms was also coming from the artistic and cultural scene: the Arsenic centre opened its doors wide, offering studios with technical support one afternoon per week over the full academic year; the director afforded free entry to all the *Improgineering* students to all shows happening on the days of the course. The unusual regular presence of the large group of EPFL students within the premises of the Arsenic contributes to the mission of this institu-

31 *Programme d'enseignement en sciences humaines et sociales* (SHS) (2021). *Collège des humanités*, Reprographie EPFL.

tion of extending to all layers of society. Additionally, other theatres manifested their interest in presenting the work of the *Improgineering* students on their premises. Indeed, this initiative is in full accord with the current intention of the performing arts scene to construct links beyond the artistic milieus through outreach to schools, universities, associations, etc. It aligns with the mediation events – panels, meetings with the artists, debates – theatres are designing around their shows themselves in order to facilitate their reception. Furthermore, the artists involved in the *Improgineering* course established lasting bonds with the course. The ones who were involved during the first year have stayed on until today, which has led to a large but very stable teaching team with limited turnover.

8.5 Improvisation in teaching and learning: Plea for a living education [S. H. & D. C.]

One of the premises of the *Improgineering* course is that training the collective improvisation skills of students is an effective way of developing their capacities to work and create *collectively*, which is essential to their professional career. Since this goal is very broad, it is interesting to inquire what the students themselves consider they are learning through attending this course. One approach to doing so is to read the course evaluations which the students are asked to fill out anonymously every semester by EPFL's Teaching Support Centre. Here is a representative selection of four student comments (translation from French to English made by the authors):

1. "This course is a true opportunity at EPFL. It is beyond comparison with any other course, and it allows us to see other things than what EPFL usually proposes. The teachers are all very interesting and open us up to numerous themes: artistic, sociological, philosophical... that we can easily connect to our studies. The fact of having a course which lets us work on our relationship to our own body, to the space and to others allows us to evolve in the way we work in groups even on much more scientific subjects. We develop a true capacity to listen to the group and to exchange with others."
2. "I find this course a great discovery in the many courses EPFL offers. First of all, I wasn't surprised by its relevancy to my studies: it uses differ-

ent methods but enables people to explore different fields of performing arts, proving to themselves that they are capable of anything, and that teamwork is what is most valued. It is also very good to have access to a program like this, because it gives more freedom and space away from everyday topics and problematics to be solved in other courses. A lot of people hearing about this lecture and having seen the final outcome of the course were intrigued and willing to participate (give their contribution) but above all, learn more about the methods of improvisation in engineering."

3. "It is incredible that EPFL gives us access to such a course, which for me is one of the best ones to develop the individual, in addition to developing the scientist."
4. "This SHS course is incredible and of great quality! It allows us to recreate links to others, to oneself, to one's own body and one's own humanity, to push our creativity, to listen in order to accomplish things together. It puts our sensitivity to the foreground, our intuition, our capacity to release our acuity in communication and cooperation with others. The theoretical as well as the practical course blocks are of quality. I recommend this course which I consider to be primordial, or even *vital*."

A first observation is that student testimonies seem to confirm that the course is effective in developing their capacities to work and create collectively. In that sense, the course appears to be reaching its first goals.
Another striking observation is that this course seems to touch upon fundamental educational elements: students saying the course developed their links to their own "humanity", to their own "sensitivity", to their own "body", or that this course is "vital" show that they see a deep value in what they have learned. In addition to the acquired theoretical background, this course seems to develop the individual far beyond the "transversal skills" which most universities have fostered more and more overtly within their curricula over the recent years.[32]

32 Authors such as Guo et al. (2020) distinguish the *cognitive knowledge* benefits and the *professional skills* and *soft skills* benefits of *problem-solving* and *teamwork*. These soft skills correspond to what is called *transversal skills* in the EPFL curriculum, which are categorized on Fig. 8.1.

Beyond Project-Based-Learning and Transversal skills development

In the academic context, the capacity of working collaboratively is generally trained and evaluated through *Project-Based-Learning* (PBL) courses (Pengyue et al., 2020). Indeed, most higher education engineering schools claim PBL to be an effective approach to preparing students for their future professional life. The general argument is that "connecting theory to practice [is] beneficial for learning as it provides students with the opportunity to apply previously acquired theoretical knowledge to real-life problems and situations. This motivates students to learn, enables them to build a deeper understanding of theoretical concepts and often has the added benefit of a concrete outcome which students can refer back to".[33]

PBL is supported at EPFL as it contributes to "developing the ethical, management and collaboration skills"; "developing innovative, cross-disciplinary teaching methods that combine engineering and the social sciences to encourage critical thinking about global sustainability challenges"; "developing a respectful, supportive conduct and a diverse community"; as mentioned in EPFL's strategic Plan 2021–2024 (Caillet, 2020). The most frequently cited benefit of PBL is "connecting theory and practice", followed by "improving student learning", and "developing specific skill sets".

33 According to the survey made for the academic year 2020–2021 by the PBL Commission of EPFL set by the Associate Vice Presidency for Education, at least 161 courses out of the 1,461 registered course taught by the school (i.e. , more than 1/10) included PBL components. This represents a total of approximately 4,145 bachelor students and 5,842 master students distributed across all sections who are involved in PBL with EPFL. 44 % of the projects are made in groups of 2 to 3 students and 36 % in groups of 4 to 6 students. 78 % of the project lasted a full semester, 21 % 4 to 8 weeks and 17 % 2 to 4 weeks. The main transversal skills which are aimed for through these PBL courses are: "teamwork" and "communication and presentation skills". The second priorities are "project management" and "leadership". The "environmental impact" and the "respecting legal guidelines" skills came as last priority.

Communicate, process, manage and generate information	Personal effectiveness	Project management
• Access and evaluate appropriate sources of information • Collect data • Design and present a poster • Make an oral presentation • Summarize an article or a technical report • Write a literature review which assesses the state of the art • Write a scientific or technical report	• Assess one's own level of skill acquisition, and plan their on-going learning goals • Continue to work through difficulties or initial failure to find optimal solutions • Demonstrate a capacity for creativity • Demonstrate the capacity for critical thinking • Manage priorities • Take feedback (critique) and respond in an appropriate manner	• Use both general and domain specific IT resources and tools • Assess progress against the plan, and adapt the plan as appropriate • Plan and carry out activities in a way which makes optimal use of available time and other resources • Set objectives and design an action plan to reach those objectives • Use a work methodology appropriate to the task

Working in the society	Working in groups and organisations
• Respect relevant legal guidelines and ethical codes for the profession • Respect the rules of the institution in which you are working • Take account of the social and human dimensions of the engineering profession • Take responsability for environmental impacts of her/his actions and decisions	• Take responsability for health and safety of self and others in a working context • Chair a meeting to achieve a particular agenda, maximising participation • Communicate effectively with professionals from other disciplines • Communicate effectively, being understood, including across different languages and cultures • Evaluate one's own performance in the team, receive and respond appropriately to feedback • Give feedback (critique) in an appropriate fashion • Identify the different roles that are involved in well-functioning teams and assume different roles, including leadership roles • Keep appropriate documentation for group meetings • Negociate effectively within the group • Resolve conflicts in ways that are productive for the task and the people concerned

Tab. 8.1 List of transversal skills categorized in five competence families in the EPFL curriculum, based on (Kovacs et al., 2020).

8.6 Conclusion: Rationale for including an improvisation course in an engineering curriculum

According to the student testimonies, the *Improgineering* course answers an ardent need for collective work and is greatly appreciated and received. From the university's viewpoint, it appears that the *Improgineering* course complies with the definitions of *Project-Based-Learning* and seems to lead to the development of some of the *Transversal Skills* of the students. These two basic observations explain the support this course immediately received from the College of Humanities and from the Arsenic theatre, and the visibility it received via the support of EPFL's and Arsenic's communication services (Aubort, 2017; Jollien, 2018).

But beyond these facts, the authors wish to stress that the motivations and outcomes of this course spread far beyond the above-mentioned objectives.

This book is an attempt at capturing some of these aspects. The authors consider that the presented results provide significant elements of evidence which consolidate the rationale for including an improvisation class in an engineering curriculum.

While considering the role that improvisation has played in the history of theatre, one should not underrate its critical scope. Along with the other aspects of performance art (*participation* and real *action*), improvisation contributed dismantling forms that were considered as structurally too closed and frozen in conservative certainties. In this sense, improvisation plays a part in denouncing forms of "bourgeois" theatre that contribute to propagating obsolete representations of human society. Introducing the art of improvisation in an engineering school is therefore not without consequences. Firstly, the practice of collective improvisation reminds us that research and teaching in the fundamental and natural sciences, although distinct from the human sciences, are nonetheless human activities, carried out in a social, economic and political context – and this is all the more true when these sciences are combined with technological developments. Secondly, the practice of improvisation leads to remembering that knowledge, beyond the established and demonstrated facts, is "living" and that scientific progress and technological advances are most often the result of the questioning of thinking habits, solid paradigms and figures of authority.

References

Appia, A. (1986 [1904]). Comment réformer notre mise en scène. In *Œuvres complètes. 2, 1895–1905*. L'Âge d'homme.

Arendt, H. (1958). *The human condition*. University of Chicago Press.

Artaud, A. (1958 [1938]). *The Theater and Its Double*. Grove Press.

Aubort, S. (2017). Les futurs ingénieurs sur les planches de l'Arsenic. *EPFL-Magazine*, 10.

Banu, G. (2005). *Le cas Avignon*. Editions L'Entretemps, Regards Critiques

Bergson, H. (1912 [1899]). *Le Rire, essai sur la signification du comique*. Felix Alcan.

Bernard, M. (1991). De la corporéité comme "anticorps". In *Le Corps rassemblé* (pp. 17–23). Ed. Agence d'Arc.

Berthoz, A. & Recht, R. (2013). Les vertiges du corps et les espaces de l'art, *La Lettre du Collège de France, 36*.

Bourriaud, N. (2009). *Formes de vie, l'art moderne et l'invention de soi*. Denoël.

Caillet, J. (2020). EPFL Strategic Plan 2021–2024.

Canguilhem, G. (1992). *La connaissance de la vie*, Librairie philosophique J. Vrin.

Chestier, A. (2007). Du corps au théâtre au théâtre-corps, *Corps, I*, 2.

Cometti, J.-P. (2010). Que signifie la "fin des avant-gardes" ?. *Rue Descartes, Collège international de Philosophie, 3*, 69.

Copeau, J. (1913). *Le Théâtre du Vieux-Colombier, un essai de rénovation dramatique*. NRF.

Craig, E.G. (1920). *De l'art du théâtre*. [Trad. Geneviève Séligmann-lui]. NRF.

de Certeau, M. (1990 [1980]). Arts de faire. *In L'invention du quotidien* (pp. 139–164). Gallimard.

Debord, G. (1957). *Rapport sur la construction des situations*. Mille et une nuits.

Deleuze, G. (1981). *Qu'est-ce que la philosophie?*. Minuit.

Detienne, M. & Vernant, J.-P. (1974). *Les ruses de l'intelligence. La mètis des Grecs*. Flammarion.

Dewey, J. (2005 [1934]). The human contribution. In *Art as experience* (pp. 255–282). The Berkeley Publishing Group.

Gibson, J.J. (1966). The senses considered as perceptual systems. Houghton Mifflin.

Gouhier, H. (1943). *L'Essence du théâtre*. Plon.

Greenberg, C. (1940). Towards a newer Laocoon. *Partisan Review, 7*(4), 296–310.

Grotowski J. (1971). Vers un théâtre pauvre, Lausanne, L'Âge d'Homme.

Guo, P., Saab, N., Post, L.S. & Admiraal, W. (2020). A review of project-based learning in higher education: Student outcomes and measures. *International Journal of Educational Research, 102*, 101586.

Hamilton, J. (2011), About performance and the making of improvised pieces, *Contact Quarterly*, Vol. 36, No. 1, 29–36.

Ingold, T. (2017). Walking with dragons. In *Entrancement: The consciousness of dreaming, music and the world* (pp. 37–63). University of Wales Press.

Jaques-Dalcroze, E. (1920). *Le Rythme, la musique et l'éducation*. Fischbacher, Rouart.

Jollien, N. (2018). Improgineering: improvisation et ingénierie fusionnent sur la scène de l'Arsenic. Communiqué de presse EPFL-ARSENIC. [https://actu.epfl.ch/news/improgineering-improvisation-et-ingenierie-fusionn].

Jullien, F. (2005). *Conférence sur l'efficacité*. Presses universitaires de France.

Kaprow, A. & Kelly, J. (1996). *L'art et la vie confondus*. Éditions du Centre Pompidou avec l'aimable collaboration de l'Université de California Press.

Kovacs, H., Julien, D., Mekhaiel, M., Dehler Zufferey, J., Tormey, R. & Vuilliomenet, P. (2020). Teaching Transversal Skills in the Engineering Curriculum: The Need to Raise the Temperature. In *SEFI 48th Annual Conference: Engaging Engineering Education. Proceedings* (pp. 906–917). University of Twente.

Macé, M. (2016). *Styles. Critique de nos formes de vie*. Gallimard.

Marcolini, P. (2012). *Le mouvement situationniste: une histoire intellectuelle*. Editions L'échappée.

Margel, S. (2016). De l'improvisation. Etude lexicale d'une notion. In S. Margel, *Pratiques de l'improvisation* (pp. 9–19). BSN Press.

Mauss, M. (1950 [1934]). Les techniques du corps. In *Sociologie et anthropologie* (chap. 6). Presses universitaires de France.

Merleau-Ponty, M. (1964a). *L'Œil et l'Esprit*. Folioplus.

Merleau-Ponty, M. (1964b). L'entrelacs – Le chiasme. In *Le visible et l'invisible* (pp. 170–201). Gallimard.

Pengyue, G., et al. (2020). A review of project-based learning in higher education: Student outcomes and measures. *International journal of educational research, 102*, 101586.

Rizzolatti, G., Fadiga, L., Gallese, V. & Fogassi, L. (1996). Premotor cortex and the recognition of motor actions. *Cognitive brain research, 3*(2), 131–141.

Roussel, D. (2008 [1995]). *L'Actionnisme viennois et les autrichiens*, Les presses du réel. Domaine Otto Muehl.

Schechner, R. (2008 [1967]). *Performance, Expérimentation et théorie du théâtre aux USA*. Editions théâtrales.

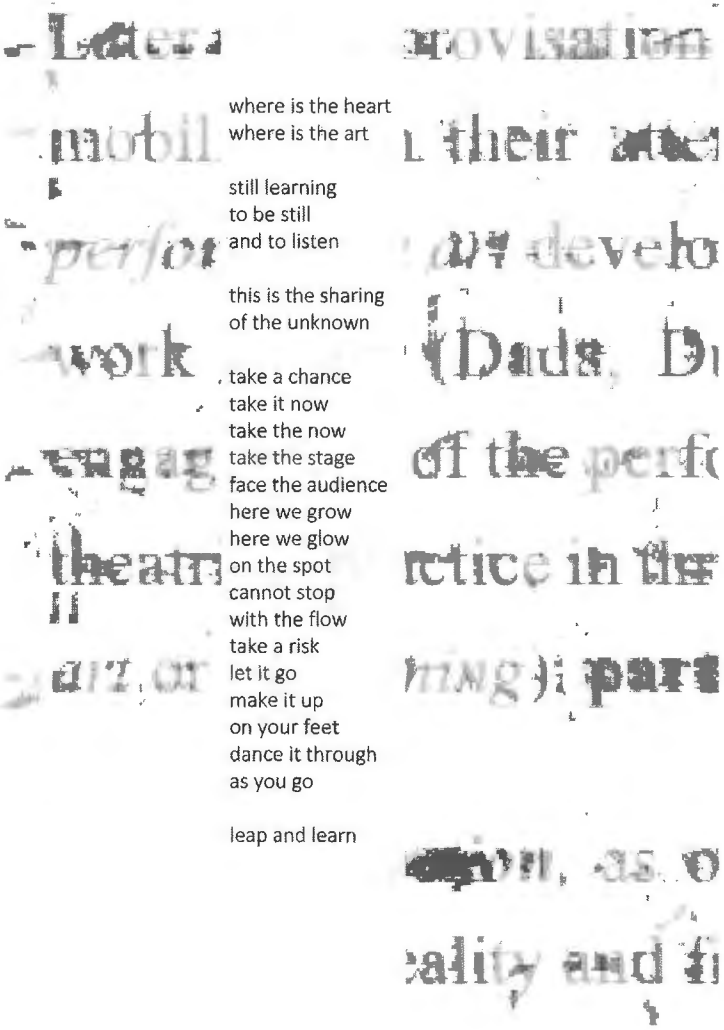
Tau, R. (2023). Possible in Human Development. In *The Palgrave Encyclopedia of the Possible* (pp. 1109-1116). Springer International Publishing.

Von Uexküll, J. (1934). *Mondes animaux et mondes humains*. Paris: Denoël.

Joëlle Valterio

Echo D.

Poetic resonance from a performance artist



where is the heart
where is the art

still learning
to be still
and to listen

this is the sharing
of the unknown

take a chance
take it now
take the now
take the stage
face the audience
here we grow
here we glow
on the spot
cannot stop
with the flow
take a risk
let it go
make it up
on your feet
dance it through
as you go

leap and learn


Bring
life,
replac
pre-li
staine
bathe
whicl
produ
the mechanics of the living
the milieu of the mind
the mind is writing
the mind is living
the mind is
between my crossed legs
think but think
art vivant
fringe art
art débordant
kinetic art
art déroutant
body art
art magnifiant
live art
art déroulant
not living
live
art cruel
be careful
life could be everywhere
we are not prepared
no we are not prepared
for life
rovisio
of life
mechan
he pre-
logic
enviro
consti
us and

learn to improvise and
improvise to learn

you are given
permission to translate
into context and
negotiate the
structures of reality

put words and more
words and words of
others together
add names history
stories theories

but here we don't
learn in theory
let the animals in
let us grow our garden

we reach high higher
highest education
touch and be touched
grasp the grips and
dot to dot to dot to
dot
make sense with open
eyes and ears and
pores and hands and
backs

body is just
another word for soul

be prepared to
improvise
for life

Cédric Tomasini

Echo E.

Resonance from an Improgineering student

For as long as I can remember, I have been fascinated by our capacity to formulate and to structure knowledge. During the last years of my studies, I discovered, sometimes with wonder and sometimes with dismay, how complex this subject is and what implications our beliefs about it have on the society we live in. From a naïve computer science enthusiast, I became a solutionism sceptic. I discovered how the two things I like the most: cultural phenomena and science, share beauty and cultural relevance but have in some respects fundamentally different founding principles that make them incommensurable, and why engineers should keep this incommensurability in mind to make the best out of their work.

I studied Computer Science and Digital Humanities at EPFL. In 2022, I achieved my Master's degree, during which I followed the Improgineering course, in the 2019–2020 academic year. From April 2022 till January 2023, I was hired at Instant-Lab (laboratory directed by Prof. S. Henein). During this period, I explored the possibility of committing myself to a Ph.D. within the EPFL-ETHZ Joint Doctoral Program in Learning Sciences, which I eventually declined. During the academic year 2022–2023 I participated in the Improgineering course by teaching a 3-hour theoretical block on notions of cartesian dualism and embodied cognition, which I will develop below. The following echo hence stems from my position as one of the over one hundred students who have participated in the course so far, but also as a member of the ASCOPET research team interested in the pedagogical implications of this teaching.

When I was asked about my experience and my personal learnings just after the completion of the *Improgineering* course, the most striking element for me was *emotion*. I had been deeply attached to the course, and I regretted it was over. Why, I asked myself, did I develop this special link to this course specifically? I know how I can be moved by the most eye-opening courses:

those which put everything together, those in which the theories developed are so fundamental that they permanently reshape my reading of the world, and I concluded that this course was one of them.

Of course, one unique aspect of this course was the experience of a pure exercise of creation oriented to the sole purpose of offering something valuable to our public during the final performance. Never had the process of experimenting, exploring freely and lingering on subtle ideas felt so important and rewarding, in contrast to the usual feeling of having to go through an annoying but incompressible period of time needed to be spent before diving into the real things. Here, we could take time and we had to take time to mature our ideas.

And above all, the experience of creating collectively, creating with *others*, working with *others*, interacting with *others*, being with *others*. *Others'* bodies, *others'* minds, embodied *others* ... The bonds we established during this collective artistic creation process had something unique. It was quite intimate: in some sense it sometimes felt even more intimate than friendships or romantic relationships, not to mention professional relationships! Going through this process with a group of cocreators gave us the sensation of a deep trust and ability to communicate and understand each other. To experience this type of link is in my opinion crucial to elicit motivation to act differently. It may provide a unique invitation to work with others, to listen to them, to respect them, and to perform this act of permanent collective recreation that would truly be *acting as a society*.

Admittedly, one could argue that such unique, joyful collective experience was tantamount to nothing more than a nice pastime, and the enjoyment of sharing time and a common artistic goal with my peers definitely contributed to my attachment to the course. In fact, I would have a hard time pointing out some negative aspects or limits of this course, for the same reason that after a walk in the forest, it would never occur to me to comment on the majesty of the trees or the greenness of the leaves to rate to what extent this walk let me optimally connect to the present. Nevertheless, the reason that made this course unique was also the one that made it much more than a simple hobby, and I would sum it up by the word *contrast*. This course alone was sufficient to be an intellectual revolution for me, in the sense that it provided me with an understanding of a new perspective previously unknown to me. By putting us, engineering students, together in a context radically different from the

one we had lived in during the entire remainder of our cursus and allowing us to reflect about it, this course made explicit how its internal structure and motivation were in contrast with everything else I had constructed as an engineering student.

To be more precise, I would say that this course allowed me to understand the connection between the very theoretical and domain-specific studies I made and my body, the others, and by extension, the rest: the world, socio-political issues. Subjects we treated like creativity allowed me to understand what engineering is in relation to the world. In other words, it was at this time that I really realized that engineering is not apolitical, guided only by physics and technical possibilities. I realized that many things I had taken for granted, both as a person and as a student, could in fact be questioned. This range from the purely personal development through the awareness of artistic and collective practices to the will to take inspiration from this microsociety we had created in the context of the course to think about which society I was hoping for and how my work would really impact it positively or negatively.

I consider that been able to adopt multiple perspectives is critical to act on the world, and thus to exercise my profession, whatever it will be, and few of my experiences have been as relevant in this context as *Improgineering*. Let me describe more formally what one learns in a course such as *Improgineering* and understanding why it felt important for me were the reasons that made me join Instant Lab (the research laboratory directed by Simon Henein). When I started my research, I was quickly advised to focus my attention on the notion of *embodiment*. In the context of learning sciences, an embodied learning activity is an activity in which the use of the body, whether through its gestures, movements, postures or simply position in space, is tailored to play a role in the learning process. This idea has been applied to a vast variety of subjects, such as math (Chatain et al., 2023) or chemistry (Müller et al., 2021). Having a background in computer science, I made some attempts to find ways to teach algorithmic or programming using embodied methods. For example, I proposed in a workshop to explore two sorting algorithms of different time complexity by making participants each play the role of a scalar value and guiding them into sorting themselves in a row, using simple interaction rules and partitioning of the room space.

However, I found these ideas rather underwhelming. Admittedly, I got positive feedback that suggested that such activities might have the potential to

make participants get intuition on how some algorithms work by "experiencing them from inside" and might thus be a useful addition to a teacher's toolbox. Nevertheless, I felt that the underlying issues raised by a course such as *Improgineering* were much deeper than a simple teaching tool. In fact, embodied cognition, the theoretical framework that support research in embodied education, tells much more than just acknowledging that the body plays a role in cognition. Embodiment is a proposition about the nature of cognition itself. In the field of embodied cognition, the body is so central that it structures all aspects of our experience of life and of thought, to the point that conceptualizing ourselves as featuring a mind distinct from our body is not appropriate. In this context, "reintroducing the body in the teaching process" is a formulation that still implies that the *body is a nice extra for our mind to learn*. What embodied cognition proposes is that *cognition itself is a nice extra for our body to learn*. We are organisms in environments, not minds carried by our bodies, and in this sense, learning is essentially adapting to our environment (Di Paolo & Thompson, 2014). Cognition can be seen as a side-effect of this adaptation process. As empirical evidences are mounting in favour of the embodied perspective, in opposition to more cognitivist approaches, the most striking question that arises is why we neglected the body in our common conceptions in the first place? Through my journey during my work at Simon's lab, I discovered more and more insights about what could be the beginning of an answer.

Cartesianism is the dominant idea that shapes how we conceptualize knowledge in Western societies. In short, this idea encompasses the assumptions that we are rational beings, capable of rational thinking that can be disturbed by our body and environment through phenomena such as emotions or illnesses. In such a society, the ideas supported by embodied cognition are so revolutionary that they cannot be considered as simple tools. This is why the existing quantitative literature about embodied education seemed so underwhelming for me. The outcomes of embodied cognition research disturb how we conceptualize our mental abilities and therefore ourselves as human beings! Consequenty, the ultimate outcome I am aiming for is not a tool, but a socio-political change of paradigm!

Let's define cartesianism and embodied perspectives more precisely. Some of the key conceptions of cartesian rationalism are the use of dichotomic pairs to refer to knowledge issues, such as subject/object, mind/body (the

cartesian dualism), or acquired/innate; the distinction between abstract and applied knowledge; the assumption that knowledge must be formulated in symbols, such as words or math equations; the characterization of knowledge as mirroring objective reality; and the assumption that knowledge is eternal and universal (Tau, Kloetzer & Henein, 2022). At this point, many people, especially engineers, may be dismayed by the proposition to challenge these seemingly obvious statements, so fundamental for their everyday practices. Let them be reassured: the point here is not to pretend that physics do not work nor that a mathematical proof may not prove anything after all. What matters here is how humans really think, and how they think they think. As a simple example, research in the domain of conceptual change has shown that our mental knowledge structures about the world are far less coherent than we might believe, and that even expert knowledge remains fragmented (DiSessa, 2013). Globally, the main argument of embodied cognition could be summarized by saying that even if we are capable of logical inference, the metaphor of our mind as a computer just does not work. We are emotional, imperfect – compared to a computer – deceivable human beings. Our senses have the mission to inform us about the environment but not to provide us a camera-perfect view of it. Our mind has the mission to make us adaptable to our environment but not to master arbitrary abstract computations like a machine.

These considerations can have a lot of practical applications, the most relevant for me being what choices we make in the very big picture. As the dominant ideas of cartesianism shape our choices as individuals and as a society, they have tremendous impact on our life and social organizations. To open perspectives and to moderate these dominant ideas can thus be a powerful way to improve as a society, and I believe that this is what *Improgineering* is about. This is why I suggest that learning through improvisation is above all a political proposition.

Of the numerous challenges our modern world is confronted with, I consider two families of issues as major, global and deeply concerning. Unsurprisingly, the first one is the sustainability of the use of the energy and natural resources that is at the root of every aspect of our way of living. In my vision, the cartesian idea that our rational mind is capable of understanding the world and therefore of controlling it may have not only been at the origin of the development and legitimacy of modern sciences, but also at the

origin of the current dominant idea of progress that allowed and justified the industrial revolution itself, and that continues to justify the path of our civilization following the industrial revolution. This path led admittedly to a level of comfort never seen in human history for some parts of the population, but also to the current multi-headed crisis of planetary boundaries overtaking (including for example climate change, biodiversity collapse or soil erosion), which itself has led and will more and more lead to economic and political crises (Jancovici, 2015). I suggest that this situation is not rooted in "the greed" nor "the evil nature" of humans, but in the very cartesian idea that our mental abilities will always ensure that we triumph, and that it will last for as long as this idea will be dominant in our society.

The second family of issues concerns us, as humans living in a society, even more directly. In this more and more constrained world, cartesianism has been the breeding ground for many noxious strategies that, by reducing humans to rational machines, may be more harmful than beneficial for us. For example, in her book, Shoshana Zuboff (2019) introduces the notion of sanctuary, in the context of digital privacy. The right to sanctuary expresses the right to dispose of one's own body and mind in a private space like a home, out of reach of external forces. This right, one of the most ancient and fundamental according to the author, is threatened by surveillance capitalism and its ability to take over our personal resources even in the most intimate rooms of our home, via the omnipresence of technological means such as smartphones. Surveillance capitalism has emerged in a context where security at all costs was seen as rationally desirable and where humans were considered as rational beings capable of choosing to not be affected negatively by such surveillance. The same belief of humans being perfect minds in an imperfect vessel, and that this imperfection should be mitigated by controlling and reprogramming themselves, support, to my way of thinking, the new self-development trend that is condemned by Edgar Cabanas and Eva Illouz in their book (2018). They argue that behind the incentives to quantify and optimize our happiness or the entrepreneurship discourse, we are in fact witnessing a shift of the burden of handling risks and dysfunctions from organizations to individuals. I believe that this can help explain ongoing structural tendencies in the professional world that cause more and more severe mental health

problems at work[36], with more than 30 % of the Swiss working population emotionally exhausted in 2022 (Ulshöfer & Jensen, 2022), indicators up.

Those converging tendencies are in my opinion nowhere better summarized than by the notion of *solutionism* developed by Evgeny Morozov in his book (Morozov, 2014). Briefly, solutionism can be summed up as the tentation to propose simple answers to extremely complex problems, because these answers imply a novel technology on which far too many expectations are set. From geoengineering to over-computerization of our work, studies or hobbies, the many scopes of application of solutionism have in common that they almost always consider problems where humans are involved, like crime prevention, politics, happiness, or learning. Unsurprisingly, such uses of technology are often not only disappointing, but have pernicious effects. Ironically, a lot of quantitative learning science research may be solutionist itself. As a little thought experiment, I mischievously imagine that if quantitative learning sciences methods were applied to the world of historical documentary, the canonical study would consist in the creation and comparison of 15 variations of the same film, assessed by a questionnaire designed to measure after which variation the spectators have become the most cultivated, an idea so ubiquitous that I have never heard of any real-world realization of it.

To sum up, uninformed use of technology will no longer save us. Because we are in a limited world, and because technologies do not have the magical ability to change the world for the better by their existence alone, we cannot count on a purely blind productive economic development to enhance or even maintain our living conditions. In such a context, I believe that only the cocreation of new approaches to the concepts of knowledge and action in the world may open truly relevant opportunities to think about building a society and tackling core issues such as the above-mentioned ones. In particular, I believe that Improgineering is precisely a course that can participate in turning this wishful thinking into concrete experimentations implicating people.

36 https://go.epfl.ch/incapacites-de-travail-psychiques

References

Cabanas, E., Illouz, E. & Happycratie, E. (2018). Comment l'industrie du bonheur a pris le contrôle de nos vies. *Premier Parallèle*.

Chatain, J., Varga, R., Fayolle, V., Kapur, M. & Sumner, R. W. (2023, February). Grounding Graph Theory in Embodied Concreteness with Virtual Reality. In *Proceedings of the Seventeenth International Conference on Tangible, Embedded, and Embodied Interaction* (pp. 1–13).

Di Paolo, E. & Thompson, E. (2014). The enactive approach. In *The Routledge handbook of embodied cognition* (pp. 68-78). Routledge.

DiSessa, A. A. (2013). A bird's-eye view of the "pieces" vs "coherence" controversy (from the pieces side of the fence). In *International handbook of research on conceptual change* (pp. 31–48). Routledge.

Henein, S. & Valterio, J. (Eds.) (2018), *Création collective: arts improvises et ingénierie. Actes du cours 2017–2018*, Improgineering research program, Instant-Lab, EPFL. [https://www.epfl.ch/labs/instantlab/improgineering/#flipbook].

Jancovici, J.M. (2015). *Dormez tranquilles jusqu'en 2100: Et autres malentendus sur le climat et l'énergie*. Odile Jacob.

Kloetzer, L., Henein, S., Tau, R., Martin, S. & Valterio, J. (2020). Teaching through performing arts in higher education: Examples in engineering and psychology. *Scenario: A Journal for Performative Teaching, Learning, Research, 14*(2), 1–25.

Morozov, E. (2014). *Pour tout résoudre, cliquez ici: L'aberration du solutionnisme technologique*. Fyp éditions.

Müller, C.H., Kapur, M. & Reiher, M. (2021). Real-Time Haptic Chemistry: Dive Hands-First into the Molecular World. In *Swiss Chemical Society Fall Meeting (SCS 2021)*. [online].

Tau, R., Kloetzer, L. & Henein, S. (2022). The dimension of the body in higher education: Matrix of meanings in students' diaries. *Human Arenas, 5*(3), 441–468.

Ulshöfer, C. & Jensen, R. (2022). Job-Stress-Index 2022: Monitorage des indicateurs du stress chez les personnes actives en Suisse. Promotion Santé Suisse, Berne: Feuille d'information.

Zuboff, S. (2019). *The age of surveillance capitalism: The fight for a human future at the new frontier of power: Barack Obama's books of 2019. Profile books.*

Towards Open Water

Joëlle Valterio, Simon Henein, Laure Kloetzer

10. Recipe for barefoot academic teaching

10.1 Some cooking advice for your own recipe

If you wish to set up a performing arts-based course in higher education, you will need to invent your own recipe, depending on your own appetite and gusto, on how many people you intend to feed, what you already have in your fridge and how big your budget is. But here are some ingredients that could be crucial:

Personal taste – *You should have a taste for what you want to serve to others*
The performance art form you chose to use in your higher education course should at least be a personal passion of yours and ideally a solid practice. It should be a significant enriching aspect of your personal life and have an influence on your professional life, so your motivation to share it is really anchored in your daily life. You should have a taste for what you want to serve to others.

Team – *Bring multiple perspectives to the table and find hungry students*
Consider teaching/learning, as well as its organisation, documentation and communication, as an ongoing collective creation in itself. Try to find one close partner (co-teacher or assistant) with whom you can continually share, reflect on and develop the course. Find external teachers and lecturers who can bring multiple perspectives to the table with sufficient convergence for the students to be able to make sense of the whole. Practice should be taught by artists and theory by lecturers who have a personal interest for the subject. Find students who are hungry and interested in sharing this experiment.

Frame – *You don't want to eat on a wobbly table*
For your course, design a frame you can hold, within which the teaching/learning experience can happen. The frame should be solid (define practical aspects: who, where, when, assignments, deadlines, grading) and flexible enough to adapt a little to upcoming contingencies (for example to space

availability or grading systems) or a lot (for example to move from in vivo to in vitro). A clear frame helps everyone to relax into a creative mode, where the unexpected can emerge and new connections can be made. In other words: you don't want to eat at a wobbly table.

Space – *Cooking can happen on a simple stove*
Find a space that is not a classroom, where you can move, lie on the ground, be messy and loud. It could be a theatre or a rehearsal room, it could be off campus. Being with your students in a space like a theatre, where performing arts already happen and you can meet other artists, would be of course very supportive of your undertaking, but cooking can also happen on a simple stove.

Body – *Ease in and out*
Warm-up before you dive in and warm-down on the other side. Be aware and make the body aware of body and space in the teaching/learning experience. Taking in and digesting all the new information your course will provide is an intense physical experience which you need to ease into (with an appetizer) and out of (with a digestive).

Reflection – *The pleasures of the table*
Practicing and performing together should be at the centre of the teaching/learning experience. Use different ways to reflect on it: writing, drawing, audios, videos, feed-back, discussions with/among students, teachers, researchers, audience. Part of the pleasure of the table is to praise the shared meal and have good conversations to set the world to rights.

Participation – *Let them cook their own meals*
Students should be given the opportunity to create a project on their own in the shared performance art form. Dare to give students total artistic freedom and responsibility for their performance and invite an audience. Give your students a taste of what you love to eat but let them cook their own meals.

Navigating the institution – *Taming exotic flavours*
As an institutional authority (such as a person holding a professor's title) with an understanding of the values and culture of your institution, you should

give access and insider perspective to mediate the expectations and understandings of your whole undertaking. Maybe your institution is not ready yet to welcome overly exotic flavours. Therefore, document and communicate (blog, website, videos, articles, books, public performances, etc.) carefully and with purpose. Be discreet until you have proof of success. Get proof through students' voices (they know what is good) and possibly add to your credibility through academic research and external partnerships.

Finances – *Ask your friendly neighbours for an egg*
Find allies, partners and sponsors both inside and outside the institution, who are willing to support the experience not only with money, but with time (teaching), space (theatre, rehearsal rooms), material (instruments, tools) and endorsement. If you are missing salt or an egg to start cooking, ask your friendly neighbours.

And if you don't know where to start, take off your shoes!

10.2 Example 1: *Improgineering* recipe

Ingredients:
- A teacher with experience in collective engineering research projects and team management, with a living artistic activity, plus experience in teaching both science and the arts.
- A teaching assistant or a co-teacher with a solid artistic experience.
- A theatre offering access to its premises, technicians and artistic network.
- A teaching team covering the whole breadth of the course, from practice to theory.
- A budget for funding the teaching team.
- A university curriculum allowing for the introduction of novel elective courses in the field of human and social sciences.

a. Before committing to putting the courses together, make sure you already have a teaching team composed of people you know personally and who understand your vision about the course you are projecting and are enthusiastic and willing to back you up over the long term.

b. There should always be at least two teaching persons in the class at all times, as the presence of one gives credit to the other. The one who is not teaching at a given moment takes part in the activities as a simple participant. Having two teachers – ideally of different genders – present in the classroom at all times is a great asset, as it offers a broader reference to the students. It also lets the student witness how the course itself is at all times collectively designed and taught.
c. As a teacher with acknowledged expertise in the scientific domain who is offering a course including an artistic content, your epistemic authority on the artistic aspects will come from a recognized artistic activity, i.e., a regular artistic practice, regular public presentation of the artistic work – even within small-scale public events – and regular exchanges with the artistic community of your art form.
d. Presenting such courses before they have taken place is a very difficult task, so the course descriptions required to present it to the committees responsible for decision-making about the university curricula should be as brief as possible. In-person meetings with these people should be preferred over written documentations and short videos should be preferred over text descriptions. Having some people with recognized authority within the teaching team is an important asset for acceptance of the course.
e. Finding a theatre willing to offer access to its premises for your course on a regular basis over the full academic year is a practically indispensable prerequisite for such courses. At least 80 % of the duration of the course should be taking place at the theatre, which should, if possible, offer the students regular, free access to some of its shows as a means of including them in the life of the place.
f. Once the course is accepted, communication about it should be made as discreet as possible and the focus should be put entirely on setting, the details and running the first edition. The risks are high in the first year that things will not work out immediately. Having to go into a defensive mode to justify the validity of the approach would be a significant waste of energy. Wait until the course, as perceived by the student and the teaching team, is considered to be successful before communicating broadly about it.
g. When welcoming the students to the studio space, leave your shoes at the entrance door, and ask the students to do the same. Working barefoot has

a strong symbolic power and is also very effective in bringing awareness to the body.

h. If the academic rules of your institution impose grades to be given to the students, then be explicit with them about the fact that the course is actually a pass/abandon course and that grades will be given simply to comply with the rules. All students who participate in the course over the full year, including the public shows, pass. Then calculate the grades using simple principles such as level of engagement in the production of the deliverables balanced with the input from the panel of judges attending the performances.

i. During the follow-up of the students' creation process, give your subjective opinion about the work, but make sure not to take the role of a director. The focus should be on ameliorating the process the students are going through, not necessarily the output.

j. The final performance is an important moment not only because of the experience of sharing the work with the public, jury and classmates, but also because the students get to see how the team of teachers coordinates to make the event happen, sharing roles for welcoming the public, managing lighting and sound technicalities, leading discussions after the performance, etc. As much as possible of this coordination work should be done in the presence of the students.

k. During the latter phases of the course, let small groups of the students lead workshops, taking the whole class into practically exploring the topics they are considering for their performances. Putting the students in this leading role with the responsibility of providing an enriching experience for the class, the official teachers, and each other, is an important moment of concrete role inversion.

l. Setting up a pedagogical research project that runs parallel to the course benefits the educational process, from the very beginning – i.e. before the research project has reached any results. Indeed, the observation tools set up for the research – like diaries, interviews, video recordings, and others – are very effective in gathering pertinent information about the development of the pedagogical proposal. In addition, formulating the research questions helps with planning and with design of the activities.

10.3 Example 2: *Psychology of migration* recipe

Ingredients:
- A topic with a strong scientific tradition, personal echoes and social resonance for the students;
- 20 well-chosen scientific papers;
- 5 profound, sensitive novels (or films, poems or songs ...) that show the complexity of migratory journeys (with humanity and a little humour, if possible);
- Two teachers who love games, theatre, surprises and teaching by creating spaces for reflection and supporting the students' dialogues and creations;
- A curious and energetic professional artist who wants to bridge theatre and higher education;
- A dance studio;
- A few university rooms for group work.

a. Carefully discuss and plan the place of the performing arts in your educational project. In this course, the use of theatre was a decision based on an ethical desire to avoid approaching the sensitive issue of migration from a distant, abstract perspective. Therefore, the course needed to articulate theoretical and practical content, and we thought that drama could mediate the students' appropriation of first-person perspectives on migration. The theoretical content in the beginning of the course provides a framework for the topic and engages students in learning about complex and sensitive migration journeys and issues, thereby also providing a common ground for the later creation of the play.
b. Design your course as a safe space for collective discussion, learning, reflection and creation. At the beginning of the course, explain that the students may share personal (direct or indirect) experiences of migration during the course, which is co-constructed with a lot of experience being in the room (and not in the sole hands of the teacher), and that everything discussed here should remain confidential. The teacher's role from the start is to put people at ease, frame the discussions, encourage the students to participate, support them in telling their stories and thoughts, by listening, reacting tactfully and respectfully to what others said, reflecting together; it is also to thematise, and sometimes put what the students say

into scientific and historical perspective. Try to create a learning group with a strong sense of cohesion and openness to others. Ask students to announce their absence if they are unable to attend for a week, and apologise to the others for their absence so that participation is not anonymous.

c. Add participation and a taste of fun even in the theoretical part of the course. During this first phase of the course, students are invited to present key points and concepts of selected recent scientific papers, and they are also requested to design playful activities at the end of their presentation to engage their classmates in the following discussion (in the past, these activities have included analysis of song lyrics, short films, audio and video recordings of historical archives, role-playing games, quizzes, and the creation of a story told in front of an audience, etc.).
d. Rearrange the physical layout of your classroom. If the course is not held in the dance studio, but in the faculty's usual classroom, arrange the tables to a) facilitate discussion (U-shaped tables), b) create some empty space without chairs and tables, to move freely.
e. Start all sessions with some short and fun movement exercises, to transition into a specific atmosphere (relaxed and connected to yourself, to others and to the present time and space) with the students.
f. Find some budget so that you can co-teach at least part of the sessions and teach the practical part with a professional artist, in our case, an experienced local actor and stage director. Co-teaching is a very valuable luxury in this course (in our case, with a limited budget, we have 2 or 3 teachers: the professor, an assistant with a personal interest in migration if possible, and a professional artist). So far, we have worked with 4 different professional artists in the field of theatre, alternating every two years, to take into account variable constraints of the artists' calendars, but also to discover different ways of working.
g. Prepare the course program with the theatre professional. Understanding what you are trying to achieve with performing arts in higher education requires time and thorough discussions as well as selecting the best options for introducing students to performing arts in a very short time frame. If you need special expertise, organize a preparatory workshop with everyone participating as teachers in the course. For example, when (due to COVID-19) we decided to run the course online using puppetry, we asked our theatre associates to find an expert in puppetry who could

help us learn the basis of the art and select appropriate forms for our pedagogical project.

h. Find a studio outside the university for practicing performing arts, creating and presenting the students' performances. In our case, we have a partnership with the Lokart, a local dance company, and use their rehearsal space: a free and versatile space for 20–25 people max, that is bright, well ventilated, and can also be darkened, with the basic commodities (changing rooms, toilets, a trunk of accessories including some costume pieces, etc.)
i. Explain to the students that they will work barefoot, so that they do not feel uncomfortable because they have holes in their socks or dirty feet. In the studio, take your own shoes off, breathe, move, relax, have fun, and use your body to communicate!
j. Ask the students to keep a learning diary to record their personal reflections and learning in the course. Students are asked to write one entry a week from the beginning of the course, about any reflection or learning that has been triggered by the course itself, or by any other event in their lives that is related to the topic of the course. We do not give an example of a "learning diary" but tell them that it can (but does not have to) include drawings, scrapbooking, music or any other form of expression if they wish. Freedom of content and form is very important.
k. Explain at the very beginning of the course how the course will be assessed, as these courses can be quite disturbing in the context of the university. In our case, the performances are not assessed. The individual mark depends on global participation (participation in all steps of the course project is required), as well as on the assessment of their learning diary.
l. Keep the surprise: during the practical phase of theatre creation in the course, students work in 4 groups of 5. The groups work independently, with teachers offering comments and feedbacks at different steps. We try to book different rooms or timeslots so that the students discover the work of the other groups on the day of the performance.
m. Organise a final show, presenting the performances of every group, in front of an audience (in our case, the students from the other groups, the teachers, and some external guests). In our case, the day of the final performance includes: a collective warm-up, then a presentation of each

group creation, followed by feedback from the audience and short discussions with the performers, and a final social moment in the nearby café to have a drink, discuss, relax and laugh together after the performance. The collective performances and related discussions can be video-recorded for the course archives.

n. In the final class, one week after the collective performances, encourage students to relate the experiences and learning from the practical phase of the course to the relevant concepts introduced in the theoretical part of the course, and to reflect on the benefits and limitations of the performing arts in their learning experience.

o. Engaging in a research project can be an opportunity to build an enthusiastic team of researchers and teachers passionate about the performing arts in higher education and to discuss, analyse, synthesise and promote your shared experiences.

Ramiro Tau, Laure Kloetzer

11. Beacons for open water navigation

Through the looking glass

Recipes, in the field of education, always have the flavour of something unreal. When they are too precise, they seem to be unfeasible, because we never find the same ingredients or the exact conditions for their realisation. When they take the form of vague recommendations, they also leave us perplexed, unable to decide whether what we are actually doing conforms to them, or whether in a certain sense any activity could fall within their margins. One of the problems that implicitly runs through the discussions in the preceding chapters concerns the generalisation of these types of educational settings: is it possible to reproduce or scale up these experiences? Is there a recipe for this? In the end, the analyses of our research project aim to shed light on precisely those ingredients that are crucial and necessary for the expansion of these educational experiences. In this respect, in our "Recipe for barefoot academic teaching", certain transformations at the level of the body and the dynamics of interactions are more important than following a set of procedures, and this is the reason for the metaphorical and ironic tone of the preceding chapter. Even if we know what we are looking for, there is no single curricular way to do. Far from the precision demanded by the chemistry of cooking, we do not believe that, for the replication of a syllabus, strict copying of a model is a satisfactory option, even if this is somewhat counterintuitive. But we are convinced that, if the axes that we have identified in our analyses are taken into consideration, we will have a useful and inspiring guide for the development of courses combining the performing arts with non-arts higher education. Thus, halfway between a strict guide and an attempt at inspiration, we enter a middle ground. Based on our results, the compass must guide us towards offering the conditions for a series of transformations to take place in the educational setting, without fear of exploring the different paths that could lead to new ways of teaching and learning. In order for these transformations to take place effectively, we cannot ignore the specificity of each context. To forget this would be to fall into a clumsy reductionism, which

has frequently happened in the history of education with many cases of naïve transfers or applicationist uses. For this reason, we would like to summarise the curricular transformations that we believe a syllabus could work towards, in order to be able to offer a "recipe" that will lead to unique outcomes, albeit with different but equivalent effects.

Before we dwell on this, we should mention another critical issue that is not directly addressed in the preceding chapters, but on which, nevertheless, some reflections can be offered. We refer to the evaluation of the pedagogical experience and its consequences for the curricular design. Measuring the results achieved in a course or the quality of education in general is a delicate matter, quite problematic, and no assessment is free from criticism. Some of the most important institutional reports on university educational quality are based exclusively on the opinion of a small number of academics or on the consideration of certain publication indexes and other outputs that account for a small fraction of the total process. The most widely cited academic evaluation and ranking systems use the same methodology, but on a larger scale, which makes them the target of countless objections and suspicions. For an evaluation to have any meaning, it should provide data that is comparable with those obtained in equivalent cases and, in addition, feeds back into what happens in the classroom and into other parts of the curriculum. Without these two flows, external and internal comparisons, evaluation can be reduced to a set of pedagogically and politically irrelevant reports. Ultimately, the questions we must ask ourselves concern what we want to evaluate for and *how evaluation can improve teaching and learning conditions*.

The courses in question were subject to internal evaluations. Teachers were informed of the students' perspective through personal diaries, course interactions and the anonymous final evaluations. At the same time, the research project that ran in parallel added interviews, focus groups, video observations, and offered a third view of the educational process, all of which allowed for better informed adjustments and decisions. However, we do not currently have external evaluations or systematic cross-sectional or longitudinal comparisons that would allow us to compare performances and perceptions with those of other students in the same study programmes who did not participate in our courses. Also, comparisons with other curricular designs based on the use of the performing arts in higher education are preliminary and asystematic. One of the conditions for such comparative evaluation is precisely the

possibility of these experiences being replicated in other contexts and with different participants. Even so, we believe that the perspective of the students and teachers involved is a valuable resource, because it is generated against the backdrop of the traditional educational experiences with which they are familiar. The positive or negative aspects of these courses are often easily recognised and made explicit precisely because of the contrast they represent with respect to traditional educational practices, and this is a methodological advantage for us.

Finally, the institutional-organisational dimension is also not directly addressed in the pages of this book, and it should be noted that these types of courses always maintain a paradoxical tension with the institution in which they are developed, *and this tension is precisely the reason for a large part of their effectiveness*. We refer to the tension between the disruptive or instituting character of the designs – which highlight a format of education that is partially criticised and which touches the students' ethos – and a certain degree of acceptance of the novelty by the institution. These courses take place precisely in the cracks, those small institutional gaps that enable and constrain certain relatively marginal actions, but which are nonetheless inscribed in the academic perimeter. They are not completely subversive courses, among other reasons because they ultimately contribute to the general educational project, even if they do not appeal to traditionally accepted strategies. If they were radical disruptions, they could not be successfully developed or would have to be presented outside the formal frameworks of the institution. But, at the same time, it is impossible not to see their critical dimension, which calls into question a model of teaching, of learning, of being a teacher and of being a student. Familiar practices are seriously challenged and the known patterns are no longer relevant. In this sense, we believe that it is necessary to recognise and sustain the equilibrium that allows this tension to emerge, without veering into the realm of total disruption of the education system or slavish adaptation, which would result in a proposal that is disconnected from the problems that give rise to it and, therefore, be ineffective.

Upside down

The topics around which the chapters of this book are organised are some of the main pillars for the use of the performing arts in non-artistic programs. Once again, there is neither a single type of activity or "teaching position", nor a single classroom arrangement or exact time or sequence for reproducing this type of experience, but rather the redefinition of some of the axes around which higher education is organised.

Putting the body back at the center of the learning experience

The body is one of these central axes. In any form of education, the body is subjected to the proposed teaching model, either through its material features, such as spatial arrangements, time or even climatic conditions, or through the tacit or implicitly authorised clothing, as well as the socially promoted and restricted ritual dimensions, authorized gestures, etc. The educational setting and design channels the ways in which the body must show itself or hide itself, and its interactions with the world. Any pedagogical proposal will modulate the body, domesticate it instrumentally and provide the conditions to reproduce its embodied patterns as a system of invisible norms. In a proposal that aims to appeal to the performative arts, embodied actions cannot remain tacit. Careful consideration must be given to the way in which sensorimotor activity becomes a central part of the teaching and learning processes. In proposals such as the ones we have analysed, the body is central: its legitimate participation to the learning process allows for non-verbal communication, for alternative representation and metaphorization, and biographical continuity (see chapter 5). Of course, this is true for any educational relationship but, as we saw in our cases, it is mainly a question of making these dimensions a key aspect of the learning process, of giving them legitimacy and their right to exist in classroom practices.

Transforming the status of the body implies transforming the possible interactions and, therefore, the institutional culture. The repertory of possible and legitimate actions is affected by curricular design. The detailed planning of activities then influences the way in which all participants relate and communicate. But curriculum design does not achieve or guarantee the transformation of interactions. The general proposal of the course has to be enacted by the teachers and students in the general dynamics of the exchanges. This

is why intervention at the level of embodied interactions must be considered on multiple levels: planning, proposed activities, possible variations of the instructions, forms of communication and forms of evaluation.

The performing arts also require an intense participation that can never be reduced to the mere spectator. The student must act in situations that are essentially unpredictable, that involve others and, for this very reason, cannot be precisely anticipated. This indeterminacy is a risk: students need to be helped to appreciate this openness, which brings with it freedom, but also the anxiety that comes with uncertainty.

Teaching collaborations

As we pointed out earlier, the development of such a syllabus must be supported, paradoxically, by an institutional framework. A central aspect of the legitimisation process of such a course seems to come indirectly from the academic role of the figures in charge and their professional recognition. Being an established teacher in the institution is useful: the personal legitimacy of the teacher in her/his scientific and pedagogical fields supports the legitimacy for the institution of an atypical course in the curriculum. For students, its inclusion in the university's course programme is the main source of legitimacy. The interdisciplinary participation of experts from the artistic field represents a tacit validation of the collaboration between the arts and non-arts disciplines. Working with professional artists as co-teachers obviously brings specific artistic knowledge and skills. It also brings a rich tradition of teaching and continuous learning that focuses on the body, perceptions of self, others and space, movement, emotions.

The course curriculum is naturally coloured by each teacher's specialities and tools. Prior discussions allow the co-teachers to discuss and refine their pedagogical choices and to adapt their workshops and interventions to the general project. Indeed, in this kind of arrangement, the artists in performing arts put their expertise of "learning by experiencing with the body" at the service of the university teaching project. However, the diversity of the pedagogical approaches means that students will inevitably be exposed to a variety of feedback and discourse that is not always coherent. This should not be a problem, but a resource to enable them to find their own way through the course, grasping one aspect or another of the syllabus. Co-teaching destabilises the traditional forms of authority that are implicitly and explicitly

established in the classroom and is one way of promoting more horizontal working relationships.

As a consequence, a logical step is to extend co-teaching and engage students into leading some parts of the course, such as offering specific workshops or leading discussions on specific topics. The teacher in charge very often explains at the beginning that the course is the product of the joint work of students and teachers, and that one of its assets is the diversity of the participants' experiences. In this way, he or she can make everyone aware that the quality of the course is built collectively through everyone's participation.

Space as a symbolic and material resource

Another of the central dimensions to be considered concerns socio-materiality. Far from being an empty container, space is symbolically associated with culturally established practices, ways of acting and types of activities. The transgression of a certain university pedagogical code is also expressed in the partial abandonment (or transgressive use) of its usual spaces. And the new spaces chosen will have consequences in accordance with the university's associated system of uses and values. Shared representations, as well as the expectations generated by inhabiting a theatre, a rehearsal room or another type of space related to the performing arts, facilitate the emergence of new ways of interacting, using the body and relating to disciplinary content. The performing arts, for the non-expert, tend to be primarily concerned with the playful and relaxed dimension of entertainment, much more than with the sophisticated exploration of performing arts professionals. Capitalising on these social representations for pedagogical purposes is something that should be considered. Should a change of space not be possible, it may be useful to modify the configuration of the classroom in order to mark the discontinuity with the usual practices. Teachers should consider both the material and symbolic dimensions of spaces and how they impact interactions.

Acting and learning as (collective) re-creation

We have seen that the performing arts can be used in very different ways, depending on the objectives of a given course. A recipe for the multiplication of these pedagogical experiences can lead to an infinite number of proposals. The key does not seem to lie in copying steps, because what must be guar-

anteed is that these dimensions – the body, teaching collaborations, transformations of space, improvisation and collective creation – reach *a point of tension* capable of promoting reflection and the transformation of stagnant practices.

In our case, the tools of these artistic fields were introduced with different central objectives: in *Improgineering*, the goal was to promote collective creation through collective improvisation (and we have seen that students used concepts from their disciplinary field as resources and common ground for their performances); in *Psychology and Migration*, the goal was to make key concepts of the field concrete, through collective creation and partial improvisation. The central role of collective creation and improvisation, as well as the additional role of disciplinary concepts, in both courses is not an anecdotal feature. In a certain sense, all our activities, in any domain, involve some articulation of conceptual thinking with improvisation and collective creation. That is why the proposal to experience these dimensions in an exacerbated way ultimately aims at making us aware of their omnipresent character.

Creation and innovation cannot be a completely individual phenomenon even if Western education has contributed greatly to the individualist fiction. The semiotic systems and cognitive tools deployed in each action are the result of a dialectic relationship between the subject and the society, which provides pre-elaborated resources, or the conditions for their creation. On a much more concrete level, the realisation of a symbolic or material artefact also requires the simultaneous or sequential collaboration of others. The courses we analysed used the performative arts precisely to highlight this social dimension: one cannot create without being attentive to the other, first, through a series of tools taken directly from the performing arts, and second, through meta-reflection on the resulting experiences, in the form of diaries, plenary sessions, discussions or focal sessions.

Every action also contains a history, something repetitive, stereotyped and conservative, making use of what is already known, but at the same time it is always new, because the conditions of its realisation are constantly different, renewing what is already known. To act is, to a greater or lesser degree, to improvise based on a repertoire of previous knowledge, experiences and competences, in connection with the world. Although this may seem obvious when formulated in this way, recognition of this innovative dimension of all action does not seem to be a frequent theme in education. To act, to create,

to work in a team and even to learn, is to re-create, to improvise a partially known action, albeit in a way that is always original from the subject's point of view. It is in this originality that improvisation should be sought, not as random or chaotic behaviour, but as the emergence of guided and undetermined novelties.

Short biographies of the authors

Danielle Chaperon is Professor of Theatre Studies in the French Department of the Faculty of Arts at the University of Lausanne (Switzerland). At this university, she contributed to the creation of the "Centre d'études théâtrales" in 2017. She helped to set up a joint Master's-level program in dramaturgy and theater history at the universities of Lausanne, Geneva, Neuchâtel and Fribourg (created in 2013). Since 2005, she has been in charge of a Continuing Education Certificate in Dramaturgy (CAS) awarded jointly by the University of Lausanne and The Manufacture, University of Performing Arts. Her research focuses on intermediality and contemporary

Simon Henein is Professor in Microengineering at Ecole Polytechnique Fédérale de Lausanne (EPFL, Switzerland) and Director of the Micromechanical and Horological Design Laboratory (Instant-Lab). He has a Courtesy Appointment from EPFL's College of Humanities where he teaches a course entitled "Collective creation: improvised arts and engineering" (Improgineering) within the Social and Human Sciences (SHS) programme. In 2013 he founded the dance company L'Âme-de-Fonds with international artists. His teachings in the field of engineering are project-based courses on the design of precision mechanisms. His engineering research focuses on the design of micromechanical mechanisms for mechanical horology, biomedical instrumentation and aerospace mechanisms. In 2018 he initiated a research project in learning sciences entitled "Performing Arts as Pedagogical Tool in Higher Education" (ASCOPET) which led to the present book.

Laure Kloetzer is Professor of Sociocultural Psychology at the Institute of Psychology and Education at the University of Neuchâtel (Switzerland). Following the footsteps of Vygotsky, she is interested in lifelong development and learning, especially for adults in the workplace. With colleagues from various international networks, she creates, uses and studies collaborative, citizen, artistic and developmental research methodologies that seek to transform the relationship between institutional researchers and the community. She is the founder and co-chair of the ECSA (European Citizen Science Association) Learning and Education Research Group. She also works with teachers and children on the relationships between humans and other living non-humans (animals and plants), and the role of botanical gardens and zoos in transforming these relationships. She also writes fiction books (science fiction and fantasy) with her husband, under the pen name L.L.Kloetzer.

Susanne Martin is a Berlin-based choreographer, researcher, and teacher in contemporary dance. Her artistic practice and research focus on improvisation as an art form and as an educational intervention, on critical practices and representations of age(ing) in dance and on artistic research methods. In her PhD research Dancing Age(ing) she examined how improvisation-based dance can develop images and practices of age(ing) that allow dance to evolve as an age critical arts practice. In her postdoctoral research within the ASCOPET project at the Ecole Polytechnique Fédérale de Lausanne (Switzerland) she examined dance improvisation in its potential to rethink and advance processes of learning and researching in a technical university.

Ramiro Tau is a psychologist graduated from the National University of La Plata (Argentina), where he was appointed Associate Professor of Developmental Psychology and History of Psychology. He was a postdoctoral scholar at the Jean Piaget Archives (Switzerland), and he participated in different research projects at the Universitiy of Neuchâtel (UNINE), the University of Lausanne (UNIL) and École polytechnique Fédérale de Lausanne (EPFL), in the fields of cognitive development, education and history of science. He is presently carrying out his research activities at the Centre Jean Piaget of the University of Geneva (UNIGE).

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