What is new in new media art education?

A critical discourse analysis of the mythologies of media art education at the university

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ABSTRACT

What is new in new media art education?
A critical discourse analysis of the mythologies of media art education at the university

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Concordia University, 2017

This dissertation investigates the training and education of new media artists in higher education. Based on textually described orientations, rationales, and best practices I analyzed discourses that bear on the development of curricular and pedagogical approaches to educate practitioners and professionals in new media arts. Using a critical discourse analysis methodology, I investigated the most predominant concepts, statements, and discursive formations in academic texts published on this topic from the 1980s' until today. I bring forward the ideologies, the theories, the discursive legacies and discursive patterns that characterize new media art education, and shape the culture of those involved in teaching future media artists. One of the central points of this analysis is the emphatic and cyclic rhetoric of the adjective of '*new*,' which is embedded in discourses that curiously express 'old' inherited disciplinary pedagogies and assumptions. I also examine the perceived and expressed roles of new media artists, and the varied proposals of how these roles can best be cultivated through curricular programs. The analysis of the discourses of the so-called new pedagogies for media art education revealed what is, as well as what is not, new in the education of media artists at the university. The predominant discourses of new media art practices are characterized by calls for changes in the pedagogies in place. Yet this rhetoric is consistently confronted with the inert architecture of the institutions of higher education. I situate the discursive communities and their teaching-learning interactions in the systemic context of the modern western university that promotes a neoliberal orientation—especially in regards to the education of artists.

This study provides an informed critical understanding of the discourses that have, to date, crystallized in this relatively young field, and to a demonstration of the (un-)likelihood of newness in media art education, in spite of fast-evolving technology, and of the expanding scope of practices of the communities within this field.

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My thanks as well to the members of my examining committee, Dr. Eldad Tsabary and Dr. Mindi Rhoades, for agreeing to read and discuss my work.

I would also like to express my gratitude to the Faculty of Fine Arts, Fonds de Recherche du Québec, Hexagram, the School of Graduate Studies, and to Endeavour Fellowships – Australian Awards, for the financial support towards this research.

One cannot remain critical without occasionally stepping outside of the topic and of the context under study. This, I owe to Alex, who literally took me outside, to far and remote places where I would have not gone alone, and where I found the distance and detachment that I would have otherwise not been able to impose to myself. I am grateful that he interrupted the ideas and events that consumed me during the writing of this dissertation with discoveries of places and cultures and a way of without the computer and the internet, let alone all other media. I am also grateful for his patience and his friendship.

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CHAPTER 1. Overview of the research

1.1 Statement of problem

My path as an emerging scholar has been transversal, moving across art education, design and computation arts into broader media art practices, histories, and theories. In my day-to-day movements my journey has also been, quite literally, a vertical one; In the past years, several times a day, I moved up and down and up again, between the Art Education department on the second floor of the Engineering and Visual Arts integrated building, and the top two floors where I worked and mingled with peers at Hexagram – the International Network for Research-Creation in Media Arts, Design, Technology and Digital Culture, and the Milieux Institute for Arts, Culture and Technology. Downstairs, I took graduate seminars and I taught undergraduate students at the Art Education department, while upstairs I was programming coordinator at Hexagram. There, I forged my local and international network of scholars in the fields of media art, digital humanities, media art history, and science and technology studies. Recently, I became more closely involved with media artists and practitioners of the local and international scene. At this conjuncture, although these groups exist within the same faculty and their interests intersect, I perceived a gap, which I first found noticeable in their discourses. The problem I identified, which this research addresses, is thus situated at the intersection of these departments, institutes, and their communities, and is concerned with new media art education, concretely with the training approaches and pedagogies of media artists at the university.

In the art education department, through exchanges with peers, but especially when I taught future art educators, I was touched by students' interest and a general sense of urgency to integrate new media and to design art lessons that will foster cross-disciplinary competencies. It is important to mention that the Art Education program at Concordia University emphasizes nurturing the artist identity and practice, in tandem with training in art curriculum development and art teaching. In this program, which is offered within the Faculty of Fine Arts, students learn to be artists and educators. I found that future art teachers grapple with strategies to define the roles of artists and the place of art in the face of rapid technological change and complex systems of interrelated media. The rhetoric surrounding new technological art calls to update curricula, to integrate key-concepts such as media art, media literacy, cross-

disciplinary and interdisciplinary competencies, since these terms are equally present in policy text and circulate in the theory of art education. When searching for art education literature with these key terms, one is hard pressed to find a text that does not stress the importance of bringing them into pedagogical practice at all levels of education. Hence, educators share common perceptions in regards to the relevance and implications of these concepts for their professional practice, but – in my view – with limited understanding of how and why they came about. Even younger educators who, it is assumed, are more likely to embrace the new media, are overwhelmed when it comes to discerning what histories and theories of media are most relevant to integrate in the curriculum. Not only for the technophobic educator, but also for the technophilic one, understanding and selecting relevant references from the diversity of theory and contemporary media practices to form a concise curricular structure that addresses any or all of these concepts can indeed be a difficult task. Additionally, the technical and material aspects of media art production are not always germane to the arts, but they are drawn from other disciplines, that also employ distinct methodological approaches for teaching and learning. These approaches are often at odds with the most common art education approaches. This can deter educators who are looking for an entry point from which to introduce themselves and their learners to creative experimental practices with new technological media.

Amongst media artists and scholars, clusters of research in media art and creative practices with new technologies are common and have already forged their place and advanced their contributions in the academic knowledge economy. Media art is an established field of study and practice, with communities of scholars who are prolific producers of theory and material contributions. Contrary to what several authors claimed (Ascott, 2008; Schnapp & Shanks, 2009), art is no longer secluded in an isolated corner of academia. Media art is a vibrant and expanding field, in dialogue with other established as well as recent fields of study. In addition to cross-pollinating with multiple disciplines, media art examines its own histories and speculates on its future evolution as a discipline, with conferences and publications dedicated to this. Yet, theoreticians and practitioners who are leading the field seldom reflect (or at least write and disseminate research) about their roles as educators. Due to limited critical analysis of its pedagogies and approaches, old models and philosophies of education tend to remain in place.

Art that explored new technological media was introduced in higher education by faculty whose personal artistic practices evolved into new media, leading them to introduce their students to the aesthetic possibilities of the new technologies. Schools of art traditionally hired artists based on their prestige in the art world. When turned educators in academia they taught new media the way they learnt ‘old’ media. The first university art programs that included new

technological media were naturally instituted within art schools, where educators and instructors carried and perpetuated assumptions and ideologies attached to the traditional conceptions of the artist and to the established pedagogical models believed to best nurture the desired knowledge, skills and competencies of artists. These models of art education are generalized across artistic genres and heterogeneous practices, and remain in place with little change.

The conceptual foci, curricular structure, and the pedagogies for the education of media artists in the modern western university have not been sufficiently examined. I found reports and descriptions of isolated programs, curricular models, descriptions of pilot initiatives and policy documents, but little evidence of concerted action towards a better understanding of how to best prepare future professionals and scholars in the field. The meta-study I conducted seeks to begin to address this gap. It is at the teaching level – for the teaching mission of the university is about the introduction of learners to the foundations of a field, to the culture of its communities and its professional practice – that the defining focus, theories, objects, techniques and knowledge of a field are articulated. I examined the discourses about teaching media art education at the university to uncover what assumptions, beliefs and approaches are at work.

The problem that this dissertation addresses is of concern to both art educators in regards to the foundations of media art as a field of study and practice, and to media artists and scholars who may be inclined to examine their roles and approaches as educators.

1.2 Research question

What is new in new media art education ?

The common discourses of the different communities I have been a part of in my *parcours*, from art education to media art research-creation, are characterized by a sense of urgency towards the new and change. I noticed this predominant rhetoric much before I found it expressed in the texts I analyzed as data of this study. Propelled by this rhetoric of urgency, both art educators and media artists are concerned with how rapidly evolving technologies and the affordances of new media radically transform the cultural and social landscape, specifically how they alter our ways of making and thinking about art.

The *new* – which I extensively analyze early on in this dissertation – is used in the formulation of the question in a purposely-ambiguous way: does it qualify the media or the media art? Does it refer to education? I did not have the answer to that question at the onset of this research. What is new, what are the powers at work, and the possibilities for newness and for change, is precisely what I examined in the analysis of the discourses about the roles and constructs of the artist, about the pedagogies, and the systemic conditions of the institution for the training of new media artists.

1.3. Positionality of the researcher

Bloor and Bloor (2007) contend that social researchers "often hold similar beliefs and attitudes to the participants in the discourse that is under analysis" (p.4). They warn that for this reason, researchers ought to remain critical of their place within the communities they investigate, and be aware of their own *rapport* with their topic or object of research. This study did not involve participants per se, but I consider as well that I come to this research as an insider to my topic of inquiry, and as an insider in the discourse community of authors and readers of the texts I analyzed.

Since 2000 I have attended higher education institutions in five different western countries, three of which were in English, and always in the related subjects of Media Arts and Art Education. I have been a student, an instructor and now a doctoral researcher, amongst other roles, in higher education in the field of study and practice that I am now investigating. My interest in institutional organization and higher education policy stems from having assisted in the development of an academic program. Professionally, I have and continue to navigate the social context I am studying. I feel a sense of belonging to the culture of the field and the disciplines involved. This was an advantage to the research in that I knowledgeable of, or at least familiar with the educational and art making practices, and the technologies I read about. There were challenges as well, namely the constant exercise of making myself a stranger in this familiar environment. Bloor and Bloor (2007) call this the act of "making strange" (p. 6): a necessary condition to remain critical of the discourses in place, since I am likely to have adopted them myself without reflecting on their implications and genealogies.

I decided to pursue advanced higher education and research after I completed my training in media art and design, to investigate ideas that arose towards the end of my bachelors' degree. As one of the first cohorts of students affected by the reforms of the European Bologna accord[1], I took advantage of the mobility this reform promoted between students across institutions within the European Union (EU), and from the EU to the rest of the world. I participated in three international exchange programs between 2002 and 2005. It was certainly through those exchanges that my interest for education and training in new media art was born; I remember being fascinated at the time by the realization of the common aesthetic languages, tools, methods, beliefs, and knowledge across different art learning contexts. I

[1] The Bologna accord ensures comparability of standards and quality across European universities, thus creating a European Higher Education area. Portugal was amongst the first group of signatories, in 1999.

believe we were amongst the first generation of professionals in design and media arts lured by the rise of the creative industries – the implications of which I further analyze throughout this dissertation. In my cohort, we were fascinated by art and design agencies and schools in London, Amsterdam and New York, and by the diversity of specialization options related to new media that were flourishing. Unlike other degrees, our accreditations were not bound to national standards or orders – a quality I would come to greatly appreciate immediately after graduation, in face of the economic recession Portugal fell into in 2005. In this socio-economic context, and as a generation that was affected by the relative newness of global information and communication technologies, our emphasis was in the global, rather than local values and culture. Our common interests were evident in the tremendous similarities in our practices, our choice of media, tools and aesthetic preferences. This was also noticeable and promoted at the level of curricula where the structure, methods, and resources did not greatly differ across institutions. It seemed that no matter which institution I attended, we were all working on similar projects, using the same tools, with the ambition of one day standing out in the same industries.

Back in Canada (my birth country), I worked as a freelance graphic designer in tandem with my post-graduate studies in art education, and developed an interest in the influence of the neoliberal ideologies on the organizational structure and missions of modern higher education institutions; more specifically, how these ideologies had affected my expectations, my professional identity and my professional practice. My entire background in higher education institutions, always in the disciplines of media art and design, led me to the present research. Preliminary readings and my knowledge of the history of the field, of the evolution of digital technologies and new media, and the socio-political context of these histories helped me delimit the time frame of this study, to start from the 80s until today. Coincidentally, I was born in 1981, so the ‘times’ of this research study are ‘my times’.

I long hesitated on whether to acknowledge specific themes, interests, and theories as part of the framework guiding the design of the study or, alternatively, to address these themes as and if they showed predominantly in the content of the texts. I decided to do both. My researcher lens was already colored with awareness to the prevalent rhetoric of the new, the manifestations of neoliberal ideologies that permeate all realms of society, including the orientations and discourses of the western higher education context. Birks and Mills (2011) explain how acknowledging one’s philosophical position illustrates the researcher’s theoretical sensitivity and “reflects their intellectual history, the type of theory that they have read, absorbed, and now use in their everyday thought” (p.11). Nevertheless, I forced myself to

remain aware of my own biases and remain open to the possibility that other themes might emerge as predominant in the discourses, which I had not anticipated.

1.4 Contributions to knowledge

This research contributes in an original fashion to bridge knowledge from two main disciplines that have not been sufficiently in dialogue with each other: education, particularly art education, and the broad field of media art, with its entangled threads of histories, theories, and practices. The temporality of the evolution of art education and of media art, the scope of these two fields, and how they came about in academia are very different, but they intersect. Namely, in that they are both concerned with the perceived roles and the agency of artists, and in their common claims regarding the value of experimental material practice as a way of constructing knowledge. Nevertheless, they rarely consult each other in regards to their common grounds. This research is precisely rooted at this intersections and speaks to, and about both fields. The critical analysis of the predominant discourses of new media art education that lies ahead is intended to be broad, and to uncover the multiple theories, discursive trends and established assumptions that influence the discourses and praxis of the academic communities concerned with teaching and learning media art. It also takes into consideration the institutionary conditions and interests that shape these discourses and that hinder the exchanges between these groups. With this thesis, my desire is to interrupt acquired, unquestioned mythologies and institutionary boundaries that are immanent to the cultures and the interactions (or lack thereof) between these communities in academia.

In a way, each analytical chapter I present speaks primarily to one of these three communities (educators, media art scholars and practitioners, and governing bodies), without losing the others from sight. When I dwell on media art or related theories and when I describe specific practices, I am speaking to educators; reversely, when I elaborate on philosophies of teaching the text is addressed to media artists who educate or are training future artists. My goals are, on one had, to highlight theories of education that are being perpetuated by media art practitioners who also teach, as a way to invite them to reflect on common approaches and beliefs about teaching-learning art. On the other hand, for educators of art, this dissertation aims to touch on the pillars of media art and media theories, in ways that will allow educators to articulate their understanding of key-concepts that have taken center stage in calls for new pedagogies for new technological art. Hopefully, the media art theories that I elaborate on and the references I use to support my analysis – which are by no means exhaustive and reflect only a selection of streams of thought of this heterogeneous field – will serve educators as starting points or anchors from which to further develop their curricula, in regards to both

content and strategies. I do not preclude that many of my readers will be as well-rounded artists as they are educators, in which case they will hopefully rediscover a structured weaving of insights from both areas, that sometimes in everyday practice are difficult to articulate.

My analysis goes beyond the examination of pronounced and repeated statements and key-concepts. To deconstruct the power of the predominant discourses and recurrent ideologies, one must take into consideration the established social orders and institutions where these discourses circulate. Therefore this dissertation situates the predominant discourses of new media art education in their systemic context. For that, I offer a critical overview of the domain of the study – the modern western model of the university. Chapter 3 is designed to describe the socio-cultural-economic dynamics of the university and the place of media art in it, so that later in the dissertation, the reader can return to the characteristics of this environment and understand the predominant discourses as part of it. The critical issues I unveil regarding the architecture of the institution, the political and bureaucratic systems by which it is ruled, make this thesis a valid contribution of knowledge to the governing bodies of academic institutions, and to developers of media art curricula.

The final contribution is my own proposal for new and change, which admittedly, is not without some irony, given the extensive critique to rhetoric of constant change I will have previously offered. Informed by the critical analysis of the most predominant discursive commonplaces of new media art education, I take on the emerging concept of ‘complexity’ and areas of study that are dedicated to complex, adaptive phenomena to review the construct of the individual artist and how they ought to be trained to understand technologies, what they do, and how they shape the social fabric. This proposal goes as far as to invite educators to reflect on the roles of future artists in the ecology of systems of knowledge that is academia.

1.5 Structure of the Dissertation

After this introductory chapter, I lay out the method and procedures of the research project. I present the foundations of critical discourse analysis (CDA) and I argue for its pertinence to address the question of this research. I describe the procedures for sampling, for content and discourse analysis. Chapter 3 lays out the domain of the study. I define the construct of the modern western university with the socio-economic ideologies that have come to shape its three historical missions. Then, I zoom in into the arrival of art and media art education into the institution. From this overview I determined an anchor point from which I departed for the design of this project, which was instrumental to begin and develop the framework of analysis of the discourses of new media art education.

There are four central analytical chapters in this dissertation, corresponding to the four main discursive threads I extracted from the analysis. Additionally, the final chapter investigates recently emerging discourses in light of the findings of the preceding chapters.

Evidence statements of the four main threads can be found across the timeframe of this study to different degrees and with different nuances. *The Discourses of the New* (chapter 4) are the most salient throughout the three and half decades of publications that this study analyzed, followed by the discourses of the *Roles of New Media Artists* (chapter 5). Although these two discursive threads are cyclic and run along the unit of analysis until the most recent publications, I explain them using statements and ideas of the earlier publications (from the 80s and 90s) as a way to uncover early in the dissertation the ideologies that have been carried through to the most recent discourses. The reader will find that the analysis of discourses of the new and of discourses of the roles of new media artists offers a broad overview of rhetoric, ideologies and interpretations of key-constructs as expressed by artist-educators that adapted and adopted to the changing techno-scientific and socio-economic contexts from the 90s through the turn of the century. It was in these decades that the very concept of new media art rose to prominence and emerged as a field of practice and theory. Chapters 4 and 5 thus also serve to present general definitions and media art theories that are seminal to the field and therefore have been considered central for the education of media artists. The analysis in these chapters leads into, but is not the crux to answer the questions of this study, which pertains to context, content and methods of media art education.

The goal of discourse analysis is to understand how we arrived at the present, so once the characteristics of the two strong discursive streams are laid out, I tend to focus on the most predominant statements of the last two decades. Again, this does not preclude that these discourses begin to manifest in earlier publications, but from chapter 6 the focus is, for the most part, on the analysis of post-2000 publications. It was in the last two decades that the term new media art and related designations settled (to some extent) as communities of study and practice formed the field. Hence, at the turn of the century I was able to find more cohesive discourses across publications, shared assumptions about teaching-learning, and comparable programs of study and curricular structures. I was also able to demonstrate in these discourses the legacy of the broader discursive formations analyzed in the earlier chapters, and how these have been perpetuated in spite of significant and rapid changes in the context of the field. The texts published in the last two decades are rich in statements that testify of the persistent legacy of disciplinary cultures (the mythologies) that manifest in this relatively young field of study at the university.

Discourses of New Pedagogies (chapter 6) is the largest chapter. I demonstrate that discourses calling for new pedagogies continue to rest on philosophical theories that have been carried on for decades. I specifically point out the legacy of postructuralist theories of education that bring forward individual emancipation and critical analysis. Postructuralist teaching-learning theories are enacted in student-centred approaches that polarize literary-discursive learning and practice-based learning. The described approaches are very reliant on the former type of learning even though new media art is repeatedly defined as a practice-based discipline. A crucial point of this chapter is the analysis of the discourses of interdisciplinary learning in media art, which offers evidence of 1) conflicting methods and assumptions about teaching-learning derived from rationalist and postructuralist disciplinary cultures that are hard to conciliate; 2) the persistent hierarchy of disciplines and relatedly, 3) the imbalance in art-science configurations of interdisciplinarity.

Chapter 7 situates the discourses of pedagogies within the institutional architecture of the modern western university, with specific socio-economic orientations. I analyze how groups (faculty, administration and students) within the university hold values and assumptions according to which they exercise powers that are at odds with the predominant discourses of new media art pedagogies. What I argue in this chapter is that the concepts of creativity, innovation, interdisciplinarity, and the idea of facilitating individual, unique paths of learning that are central in the discourses of new pedagogies are reframed in the systemic discourses in

ways that meet the neoliberal agenda of the institution. This is evidenced, I conclude, in the similarities between the constructs of ‘new media artists’ and of ‘graduate entrepreneur’, which, I argue, are two faces of the same coin.

Finally, chapter 8 – *Emerging discourses* is simultaneously an analysis of the recent discourses in light of the most predominant discourses examined previously, and a concluding proposal. It is meant as a prelude to the present orientations of media art education. My analysis of the predominant concept of ‘complexity’ leads me to propose that approaches and methods of complex organizational structures have the potential to steer the education of media artists away from the traditional art education constructs of individual authorship, unique individual skills-sets, and of the neoliberal entrepreneurial artist-persona that the institution promotes. Models drawn from complexity science that are restructuring social organizations for the advancement of knowledge and innovation may contribute to renewing media art teaching-learning in ways that stimulate collaborative authorship, complementarity of skills, and a general conception of media art (and consequently of media artist training) as an adaptive, collaborative and applied method of participating with analysis and practice to the understanding of complex contemporary realities and phenomena.

CHAPTER 2. Method

I begin by situating this study in Critical Discourse Analysis (CDA) and demonstrating the suitability of this methodology to my research goals. CDA is presented here as a constructivist approach that draws on the Foucauldian archaeology and genealogy of conditions and relations of power for discursive formations to form and be sustained in specific institutional contexts, and/or historical periods. Attending to the textual nature of the discourses I analyze, the forces at work in the dissemination of these discourses are not only of social and institutional order, which are at the heart of the Foucauldian theories and method. Therefore, I extend Foucault's theories about the archaeology of knowledge (1972) and the power of knowledge (1980) with Kittler's (1999) theories of material media, which account for the technological processes of media as important aspects in the formation of discourse networks. The mechanisms by which texts are distributed and accessed are determinant of how text-based media circulate. These are crucial aspects I took into consideration from the design of this study to the analysis of data.

In the second part of this chapter I review selected studies that employed CDA in ways that informed my own data collection and analysis. Finally, in the last section, I outline in detail the assemblage of procedures I drew from this review to form the method that I consider best suited to the nature of my study and data. These procedures include the steps and criteria for sampling, and for content and discourse analysis. The samples (published texts) I collected are presented in the final section, with quantitative and qualitative descriptions of the unit of analysis.

2.1 Critical Discourse Analysis (CDA)

This research is a critical discourse analysis of scholarly texts focused on the topic of new media art education and media artists training at the university. The data of this study are textual descriptions of views, theories and approaches in media art teaching, learning, curriculum development, and media art practices in higher education.

CDA is a methodology predominantly used in the social sciences, namely in educational research to examine teaching-learning interactions as social contexts. This is attributed to the fact that teaching and learning are seen primarily as communicative events (Rogers, 2011). While several other research approaches in the social sciences explore a social system through the understanding, meaning, and dynamics of that context as described by participants or observed by the researcher, CDA investigates the 'objects' of those dynamics: the constructs, the statements, expressed ideologies, arguments, and rhetoric; it analyzes the discourses over a determined period of time to discern the ideas and associated values that are advanced and maintained by the actors, as well as the rules that shape the discourses of those contexts (Phillips & Hardy, 2002). What makes discourse analysis critical is precisely the unveiling of the most predominant ideologies, rules, and power structures enacted in written and spoken discursive practices (Gee, 2011; Rogers, 2011). Power structures, to take Davis' (2004) definition, are means by which sensibilities are established and maintained, largely manifested in the prevalence of a normative discourse. He adds, "power structures are both subtle and blatant, both covert and overt, both non-conscious and conscious, both accidental and deliberate" (p. 142).

Hence, CDA involves a set of assumptions that stem from constructivism about the nature of language and discourse in relation to the experience of social life within those power structures. The main assumption is that discourses are not merely a representation of social relations and practice, but reflect and affect the social dynamics. They are therefore simultaneously constituted by, and constitutive of ideologies (Fairclough, 2011). The rhetoric and the statements in the discourses of speakers or writers carry values and beliefs, and they are motivated by pre-existing intentions. These intentions may or not be explicit in the discourse but they affect the nature of actions and social relations throughout the exchanges; as discourses are perpetuated by repetition over time within a community, its effects are likely to also persist.

In addition to being a methodology particularly suitable to investigate teaching-learning contexts, another strong reason I found for using CDA in this study is that it lends itself to the analysis of ephemeral and changing organizational structures and phenomena. As Phillips and Hardy (2002) explain:

> It is increasingly difficult to study organizations as if they were solid, fixed material objects when we are aware of their fluid and contradictory dynamics. As a result, we search for the stories, narratives and symbols – the discourses – that hold together these contradictory flows and make them "real" for us. (p. 15)

Although I return several times in this dissertation to the idea that university organizational structures and academic disciplinary cultures are rather stable, manifesting long waves of change, there are also several dynamic forces that come into play in the discourses of new media art education, namely factors of socio-economic order, and the changing technological landscape of the past 30 years. Both are important dimensions of higher education and curriculum development in media art. Paradoxically, to introduce another important premise on which I will also progressively elaborate, media art is described as intrinsically fluid and defined by constant, rapid change.

2.1.1 Foucault's archaeology and genealogy of discourse

Contemporary discourse analysis methodologies, especially those adopting a historical and critical perspective, are indebted to Michel Foucault's theories on the archaeology and genealogy of discourse. His approach is more often applied in studies in the fields of sociology, literary and cultural studies, education, history, and anthropology. Foucault first outlined his approach in *The Archaeology of Knowledge* (1972), where he proposes a method to identify in fragments of discourse and references within the discourse, the rules and dynamics of power at work in the context where a body of texts exists. These rules determine why specific discourses, and not others, are stabilized and become accepted, perpetuated premises. Early in the findings of this study I demonstrate that stability and institutionalization of discourses and practices are important conditions for the development of curriculum in higher education. I employed Foucault's archaeological approach to identify the prevalent statements and to draw the

predominant discursive formations across texts about new media art education at the university, and where possible, to reveal the influences that operate within these discourses.

Before I proceed, I find important to point out that two fundamental concepts of a Foucauldian analysis (also at the core of CDA), “power” and “knowledge” in English, are limited to signify exactly that which Foucault expressed in his original French writing. As such, these terms do not always convey the nuances that the original French terms encompass. “Power” is used as equivalent of the French words “*pouvoir*” and “*puissance*”. Yet, the French words refer to “the ability” and “the means” to act, and are used in expressions that indicate agency, as opposed to the narrow connotations of “power” as “force” and “strength” that acts upon. For example, I found that expressions referring to “power structures” as used by Gee (2011), Rogers (2011), Fairclough (2015), and to some extent Davis (2004) lend themselves to an image of power as something that is stable, strong, and inert, which frames social action, whereas in the Foucauldian definition “power” is a dynamic, distributed force enacted in, and exerted through the social interactions of individuals and groups. Similarly, the word “knowledge” is also limited to express the subtle distinctions that the French words “connaissances” and “savoir” afford in the original writings. The former refers to the object or topic with which one is acquainted or familiar, while the latter refers to that which one is informed and is knowledgeable of, in more substantiated ways. Formal education is primarily concerned with “savoir”. I hope my reader will be mindful of these nuances encompassed in the English terms as translations of the French, which is how I have employed them throughout this dissertation.

The most basic unit of the Foucauldian archaeological method is the construct (key-concept) and the discursive propositions (*énoncé*, translated as “statement”) that contain or refer to that construct. As happens in traditional material archaeological methods, this method begins with how fragments are articulated. In the case of language, concepts are articulated by means of the syntax rules and semantic structure. When connected in patterns and analyzed in their context, they reveal the prevalent arguments and ideologies that reflect the social world in which they occur. As important as the analogy of archaeology is that of genealogy, which refers to the parentage of discursive propositions with a lineage of other statements that precede and surround them. The rules and patterns of relations that link statements make for what Foucault (1972) calls discursive formations:

> Whenever, between objects, types of statement, concepts, or thematic choices, one can define a regularity (an order, correlations, positions and functionings,

> transformations), we will say, for the sake of convenience, that we are dealing with a discursive formation. (p. 42)

In the chapter titled "The Unities of Discourse*"* (1972, p. 21), Foucault elaborates on the principles that have traditionally been used to link dispersed statements into large cohesive unities. These are the principles of tradition, influence, evolution and collective consciousness. He advises to carefully question these assumed principles of continuity and causality:

> We must be ready to receive every moment of discourse in its sudden irruption; in that punctuality in which it appears, and in that temporal dispersion that enables it to be repeated, known, forgotten, transformed, utterly erased, and hidden, far from all view in the dust of books. Discourse must not be referred to the distant presence of the origin, but treated as and when it occurs. (p. 25)

Foucault's discourse analysis thus begins with statements addressing the constructs or issues of interest as and when they appear, and proceeds to identify similar or connected statements to then understand the relations in the network of statements. The meaning of statements at any given time and place is dependent on conditions of many different possible orders (historical, socio-economic, institutional), and on relations of power, which are themselves fluid. When, in a period of time and/or in a specific context, the historian-researcher has identified the most important statements (those with a long and demonstrated chain of relations), but detects the absence of concepts in new statements, or mutating meanings of concepts, she treats these as discursive shifts. An example of mutating meaning of statements was detected in this study concerning the construct of *creativity*. The shift is noticeable roughly in publications post-2000, as creativity became associated with the economic designation of "creative industries", with innovation and productivity. I analyze this discursive shift in the field of media art education in chapters 4 and 7.

The influences that affect discourse arrive from numerous fronts, sometimes as interrelated forces, the origins of which might not be explicit. It can be difficult to trace the moment these forces begin to bring about new statements and concepts, and often, only in retrospect it is possible to identify a discursive shift as such. Foucault (1980) advises that, because the distribution of powers changes continuously, instead of looking to identify the origins of dominant discourses (*where* power stems from), we should look for *how* power

circulates in patterns of modifications in the distribution of influences latent in the discourses. He further explained, in a statement that is most representative of what I found in the process of analyzing the written discourses of several sources:

> Power must be analyzed as something which circulates, or rather as something which only functions in the form of a chain. It is never localized here or there, never in anybody's hands … Individuals are the vehicles of power, not its points of application. (1980, p. 98)

Patterns of statements, or discursive formations, are manifestations of individual agency within groups: they are adopted and repeated until they become recurrent in the discursive practices of entire communities, and sometimes become deeply rooted in the social nexus of a group. In the academic context, for example, recurrent discursive formations that are evidence of ideologies, and correspond to group behaviors, are latent in disciplinary cultures (McWilliam, Hearn & Haseman, 2008). These cultures are characterized by research paradigms, methods and epistemologies of the fields of study, which frame the objects of study, intellectual tools and approaches the community uses for research, as well as for teaching and learning. Researchers, scientists, historians, and educators perpetuate their disciplinary cultures. As students arrive into their programs in their department, they are very quick to assimilate the constructs, read the theory, and repeat statements as a way to begin to integrate into the community. The discourses carry the theories but also the shared values and beliefs that in many ways connect the practices with the social interactions of the community.

This conception of the culture of a community of practitioners affiliated to a discipline is also indebted to Latour's (1986) anthropological essay about a community of scientists in *Laboratory Life*. His notion of culture refers to a "set of arguments and beliefs to which there is constant appeal in daily life and which is the object of all passions, fears, and respect" (p. 55). Yet, the practices and discussions of daily life do not always bring forward the history, the foundational values and assumptions of the culture, that underlie said beliefs and arguments. For those, Latour uses the suitable expression "the mythology of a culture" (p. 54), which refers to the revolutions, distortions and the myths that accumulated through the development of a culture and crystallized in the ways it represents itself. The mythology is to the community, "noncontroversial and taken for granted" (p. 54) and therefore is rarely discussed in the day-to-day activities. Textual discourses, as well as oral discourses, are powerful vehicles through which myths (whether true or not) are transmitted and perpetuated. The premise of my study is

that written discourse, particularly descriptions that lay the practices within the framework of beliefs and orientations of the field, are the best source of evidence of the "mythologies" of a culture. It is partly why discourses are difficult to suddenly displace: old discourses are used to address new constructs, thus reproducing patterns. Such patterns and norms must be analyzed, questioned, and investigated, as they speak of the history, structure and ideologies of a discipline.

2.1.2 Analysis of written discourse

There are four major methods that can be used to gather data for critical discourse analysis: observation, interviews, focus groups, and selecting a body of texts (Kuper, Whitehead & Hodges, 2013). Observation is naturally unfit for studies with a historical focus, as it is limited to events occurring in the present. Interviews and focus groups are somewhat more flexible and effective to gather perspectives on occurrences from the recent past. However, the discourse about past events is affected by the subjectivity intrinsic to personal recollections and memories. Current interviews about the distant past may not reflect the discourses that were in circulation at the time of those events. Kuper et al. (2013) explain:

> Individual opinions and understandings shift over time. These shifts are often slow and subtle enough to be imperceptible but may, over a prolonged period, become quite radical. As different discourses become dominant, different ways of thinking about the same questions become natural and obvious. (p. 91)

In addition to similar limitations as interviews when it comes to recollections of past events, the dynamic intrinsic to focus groups hinders the repetition of ideas by different individuals, which is an important dimension of discourse analysis: individuals in the same focus groups will tend to not repeat ideas already expressed by others, rendering statements hard to rank in order of predominance.

Written texts are the most commonly available contemporary discourses to a particular period in the past. In CDA approaches that examine social contexts based on their written texts, researchers must refer to a body of texts, as texts are rarely meaningful individually. They must be analyzed in their discursive as well as technical interconnections with other texts, accounting

for the nature and intention of their production, dissemination, and consumption (i.e. common publishers) to identify the different discourses on which they draw (Krippendorff, 2013). There are three additional principles that establish the validity of a body of texts as a cohesive unit of analysis for CDA: coherence, acceptability, and situationality. Coherence refers to the mutual cognitive relations between readers and writers. These relations, as explained by Bloor and Bloor (2007), define discursive communities; acceptability refers to the appropriateness of the discourse to the cultural setting; and situationality refers to factors that make a text relevant to where it occurs. If all these principles can be verified in samples from a specific domain, analyzing such body of texts is likely to demonstrate which ideas were major, which were minor and which were, at some point or over time, deemed not worthy of being considered further.

As my interest is in the ideas shaping the discourses, as well as in tracing discursive changes over time, the texts that serve as data of this research are academic and policy texts published since the 80s about new media art education and curriculum development in the university. The domain of this study is the modern university, more precisely the communities that have been concerned with the teaching and learning of new media art. The domain is laid out in the following chapter, with an introduction to its historical evolution, descriptions of its culture, structure, and its discursive communities.

Within any domain, texts are produced according to social, as well as technological systems that frame the ways they are published and accessed. I selected published texts that were intentionally written to be read by large audiences belonging or related to the same context. The allegiance of most authors to the field of media art practice and education makes for a discourse community that shares a disciplinary culture, and therefore shares goals, interests and discourses (Bloor & Bloor, 2007). The authors often assume the familiarity of their readers with the field they are writing from or about. The majority of the selected texts are accounts of experience and reflective theory on curriculum development and teaching and learning for the training of media artists. The unit of analysis also includes reports of empirical studies and policy texts. It can be said that the texts I analyzed are self-referential in the sense that they refer to (and sometimes critically analyze) practices and discourses from within a system of creation and dissemination of knowledge that their very existence reinforces.

Additionally, the texts I collected are considered (by their authors and publishers) authoritative in the topic of new media art education and, as widely available published works, such texts are likely to have influenced other educators or instructors. Authority can be conferred by the status of the author or the publication source, such as prestigious journals and

proceedings of conferences in the field. The authority of policy texts is conferred by the institutions or government agency producing them. In the case of most samples I collected, which are scholarly texts, authority is granted by the peer review system used in most fields in academia as a method to ensure standards and credibility of production and dissemination of ideas.

Published texts and journals have an important place and role in the discourse of their field. Continuing with the notion of disciplinary cultures, William Pinar (1999, p. xxv) notes the place of publications in field formation. The unity of a field of study and practices, he explains, implies a minimum level of consensus, with researchers and practitioners sharing ideas on the advancement of the field. Journals gather these ideas. A shared sense of what their work is and how it is to be conducted makes for a dominant paradigm within which specific discourses exist. Even when established paradigms are questioned, and change begins to take effect through the emergence of new theories, Pinar (1999) maintains that change in a field will rarely manifest suddenly in its publications:

> A journal must remain faithful to the field, and its points of view, for if it strays too far from mainstream perspectives, or even from the tradition that is in decline, it will not have a readership. (…) Even in times of considerable fluidity, a journal remains, if it is to survive, a servant of the field. (p. xxvii).

Pinar (1999) acknowledges that the publicly expressed views of authors do not evolve only according to a rationalist logic following the strength of the expressed arguments. There are also political, individual, and social agendas and mechanisms that dictate why certain ideas are advanced over others, which are not always expressed in the text, and may or may not be deduced. For example, since the institution of the annual *Journal Citation Report* in 1975, journals have been ranked based on the average yearly number of citations of the articles in the journal, known as impact scores. This score is used as a measure to assess the impact (the prestige) of journals in their field. Critics of this quantitative measure to rank journals argue that this evaluation affects the behaviour of scholars, who are more likely to cite from journals with high impact factor (Brembs, Button & Munafo, 2013). Publications or publishers to which influential experts regularly contribute are likely to be more read and referenced. Such texts circulate more broadly, and more efficiently advance their theories and views. In a body of texts such as that which I have assembled in the unit of analysis of my study, some authors and publishers return throughout the years, sometimes to reiterate ideas or to further the same

argument. This results in the predominance and duration of specific discourses relatively to other discourses published in less prestigious journals that feature less influential voices.

Digitization and hyperlinking have increased the circulation of publications, and software has optimized the counting methods; with easier access to sources, the quantity of citations and references rises, while automated systems that keep track of citations and references allow these records to be systematically compiled. It is worth pointing out that Lozano, Larivière and Gingras (2012) suggest that as a result of digital access to papers, the overall proportion of highly cited papers coming from highly cited journal is decreasing. As they are no longer physically bound to the journal in which they were published, papers can now be accessed on their own. They predict this might bring an end to the relevance of the use of the impact factor as a way to assess the quality and influence of journals. In my opinion, while the impact of journals may loose relevance, the rise in popularity of platforms such as academia.edu nevertheless offer continuation to (and to some extent emphasizes) the competition between individual authors as influential voices in specific fields and communities of academia, by offering day-to-day analytics and tools to boost the impact and outreach of one's writings. This introduces the idea that will be developed in the next section that rules intrinsic to the material and procedural conditions of technological media rule the processes of production and dissemination of texts, which are also factors that determined the characteristics of the unit of analysis of this study.

2.1.3 The material and procedural conditions of discourse

In this section, continuing with the conditions of existence of discursive formations (statements of knowledge and claims of truth, or ideologies), I extend the Foucauldian framework with Kittler's (1990) theory of material media, which highlights the importance of the processes of media systems and technological features in shaping discourses. What Foucault and Kittler have in common is that they both analyze underlying principles of knowledge and power dynamics. According to Kittler (1990), the Foucauldian method fails to address the technical processes through which discourses arise and circulate, namely the influence of the mechanisms involved in the production, dissemination, and consumption of texts. Based on Kittler's theories I account for the materiality of the media and networks through which

discourses circulate as important factors in the processes for collecting the data of this study, and also affecting its analysis.

Kittler drew from several media theorists in addition to Foucault's conditions for knowledge and relations of power in *Archaeology of Knowledge* (1972). He references Marshall McLuhan's (1965) theories developed at the dawn of the paradigmatic shift from the book and print media to early types of electric media. In *Understanding Media* (1965), McLuhan focused on the biases media operate on the messages and on individuals, by altering our sensory and cognitive abilities. Jean Baudrillard, another reference for Kittler, in turn, also extended McLuhan's theory. In *Requiem for the Media*, Baudrillard (1972) proposed that media are not neutral technological systems but rather, through their form and operation, induce social relations and shape social organization. Kittler built on all these theories to develop his seminal works *Discourse Networks 1800/1900* (1990) followed by *Gramophone, Film, Typewriter* (1999), in which he proposes that the conditions for discursive formations to come into existence and be sustained in specific contexts are not exclusively institutional or social relations of power and rules. Conditions of knowledge are also not exclusively tied to the cognitive processes of coding and decoding of messages. They are equally inextricably linked to the technical mechanisms of the instruments used to collect, store, and pass knowledge on to others. For Kittler, all media, from Gutenberg's moveable type print, to Edison's electrical and Turing's universal computation machine, are both socially and materially constructed. Kittler is critical of Foucault for not reflecting on the mediality of language/speech and text/hand of talking and writing. In *Discourse Networks 1800* (1990) he explained that even language is a constructed medium that is tied to intellectual and formal operations and habits. Language operates on, and configures individual experiences and intellectual mechanisms. Depending on which medium it is conveyed through, it affects how we understand and associate theoretical concepts, process information, and how we learn. A simple example of this is in the clarifications I make throughout this dissertation of French to English translations, specifically of Foucauldian theories, namely of the concept of "power" of which the connotations in each language bear differences that affect interpretation of the authors' theories.

According to the examples provided by Kittler (1990), the transition from spoken language to the introduction of the written symbol transformed language in itself: the word-object was stripped out of the embodied performance that language required, and it became possible to engage with ideas without engaging with individuals. The relation changed again in the 1900's with the introduction of phonography, a medium that reintroduced the physiology of

the voice and additionally allowed manipulating the spoken word, without both the human performance or writing technologies.

The emergence of other mechanical tools throughout history marked periods of qualitative developments in the ability of civilization to produce and share knowledge and reinforce ideologies (Zielinski, 2006). Kittler explored these developments of the post-age of print, in regards to the transition from analogue to digital media in *Gramophone, Film, Typewriter* (1999). The semantic and syntax, as well as the electronic mechanisms and mathematical rules intrinsic to a given medium (e.g. computational media) act on the message. These processes dictate the affordances of the medium for reproduction, storage, and transmission, as well as the modes of human-technology engagement. In the process of habituation to new media, individuals internalize the rules and become receptive to the new forms of messages. Kittler (1990) asserts:

> Even such seemingly non-technical regimes of 'media' as hand-writing, or for that matter fine arts, are technological because they involve techniques of regulating the body and teaching it certain patterns and institutional relations, but also engage more with effects and affects of the body rather than producing meanings. (p. 71)

Kittler's media theory thus includes the ecology of objects, processes of transmission and storage, and how their laws of operation come into play in shaping social dynamics including discursive practices. To further illustrate this idea, the materiality of digital media encompasses the hardware and the interactions it demands, the operations afforded and allowed by the software, which are mathematical and computation processes built into the machine. The software, screen interface, and hand-mouse command of the computer induce the action-perception patterns of humans to be ready for, and attentive to interact with computational media. Humans learn, assimilate and adapt to the subtle changes in media and devices that are passed on through the successive generations of technologies made available to us by developers and designers. In this adaptation, for example, we have noted that ethical and social rules that were in place in written interactions through one medium no longer stand in newer media, as can be publicly witnessed in open discussion platforms on the web. Nicholas Carr (2010) brilliantly depicts another such phenomenon when he describes how his thought processes have changed with the ease of supply of information from the Internet.

> I now have almost totally lost the ability to read and absorb a longish article on the web or in print (…) My mind now expects to take in information the way the Net distributes it: in a swiftly moving stream of particles… I can't read *War and Peace* anymore. I've lost the ability to do that. Even a blog post of more than three or four paragraphs is too much to absorb. I skim it. (p. 67)

Carr's example, like many other accounts of such phenomena, has become prevalent in the discourse about what new media does to our abilities, more often than not alarmingly expressed with a sense of loss. I found similar ideas evoked several times in the analysis of the data of my study. In many instances, the statements deplored the colonization of the human mind by media and technological processes. I interpreted the prevalence of such statements in relation and comparison to other statements and determined them to be a relevant discursive formation within the discourses of the new, the analysis of which is part of chapter 5 and chapter 6. Such examples testify to the importance of, in my critical discourse analysis, accounting for the materiality of the media and for how it operates on the processes and qualities of individual cognition and social interactions. Be it written and spoken language, or any new technological regimes introduced by media such as the typewriter, the computer, and hand-held communication devices, humans have, to some extent, been colonized by media.

Kittler (1990) is thus seminal in the methodology of this study for understanding that discourse is not reducible to the historic and sociological conditions influencing the producers and distributors of texts. He goes beyond the perceptive and cognitive processes of communication and effects of media in these processes, to reflect on the mechanisms of entire networks of machines, media and social groups. He broadens the Foucauldian notion of discourse formations with that of discourse networks, which he defines as "the network of technologies and institutions that allow a given culture to select, store and process relevant data" (p. 369). Based on Kittler, I realized I must also understand the material conditions by which intertextuality happens to form cohesive bodies of texts. Particularly, I must take into consideration how the modern technologies of the decades this study pertains to construct and condition the systems for channeling, transmitting, linking, and institutionalizing information and knowledge. This is an idea I found too briefly mentioned in the literature on CDA, and to my surprise, never expressed in my review of studies that employ this method to analyze discourses extracted from a body of texts.

The technical-material construction of communication networks comes into play in the continuity and discontinuity of discursive formations. I pointed out earlier that Foucault (1972) advises caution in assuming principles of continuity and causality in the relations between statements and of discursive formations, but fails to consider the instruments of discourse. In Kittler's logic, the coherence of a unit of analysis and the dis/continuity of discourses may also be attached to the processes of the media. Technologies determine the systematic relations of senders, receivers, and messages, and the procedures in which individuals have to participate for efficiency of the exchanges. This is illustrated in Kittler's (1990) famous assertion: "we do not speak languages, languages speak us" (p. 639). It follows that sudden moments of irruption or otherwise, rupture or shift in discourse may be associated with technological processes, just as they may be related to factors of socio-political or institutional order.

Yet a final important difference I will highlight between Foucault and Kittler is that Foucault offered a prescriptive method for discourse analysis, which proved most useful in the design of my study; Kittler proposes an epistemological framework that supported my reflections on the importance of acknowledging the material and technical components of media. Compared to Foucault, who dealt with discourse in its written/printed forms, it would be far too complex to propose a method linking physical, technological, and social systems, given the differentiation of media and communication technologies that were rapidly emerging as Kittler was developing his theories.

2.1.4 Implications of Kittlerian theories to the CDA of academic texts

The vast majority of the texts I collected and analyzed were sourced from online academic databases. These texts exist within a particular system of publishing, which I introduced in *Analysis of written discourse,* in regards to the place of journals in academic disciplinary cultures. To be considered for publication in such journals, each text must abide by specific language and rules of form. The texts I collected are connected by categories and keywords by which they are indexed. They share referencing norms and are hyperlinked to other texts. Some must follow policies of validation (such as the peer-review process) and distribution (copyright laws) in order to be entered into the databases I accessed. To access these journals and the databases that contain them, I must be an insider to the community that shares in this information and have an approved login that confirms my academic affiliation. I

must also be an insider to the mechanisms of this system, in that I must interact with the databases according to how they are designed in order to access pertinent results. I must partake in the academic disciplinary culture as well as in its technological structure and processes.

In the last decades great changes occurred in the production and dissemination of texts due to innovations in information technologies (Century, 1999). Desktop text editing and publishing software, as well as the emergence of digital databases which in the mid-1990's became digitally optimized and publicly accessible online, influenced and changed where and how texts are published. Information technologies (IT) increased the quantity and the speed of production of texts, how they were archived and how they circulated. This is demonstrated in the rise of pertinent samples through the early 80s to 2000s, and in evidences of intertextuality (citations and references) in the data. This affected the analysis, since the saturation of themes is stronger when supported by larger numbers of related statements. The technical processes thus impact the available data, and also manifest in the outcomes of the analysis. I further elaborate on this in sections 2.6 Procedures for data collection and 2.7 Procedures for data analysis.

Beyond how the technologies impact the unit of analysis of this research, advancements in IT play an essential role on the scale of dissemination of ideas and discourses. Global access to the sources, and technically facilitated exchanges translate into wider and more active discourse networks. The architecture of online information intermediaries like Google or Facebook determines how and what information circulates. Dissemination of information is mediated by personalization filters; algorithmic processes that expose individuals, and continue to feed them with information that meets their demographic characteristics, their personal interests and the political views they have already expressed in social media platforms or shown interest for online – an effect known as "the filter bubble" (Pariser, 2011). In the following chapter, I will elaborate on how the reach of global ideologies, namely via the new IT relates to the construct of the modern western university. I use this concept to refer to the majority of western higher education institutions that share structures, missions, and ideologies, which are in turn reflected in common discourses, governance, and research and teaching practices.

2.1.5 Limitations of CDA and implications for the generalizability of findings

Although CDA attempts to address the complexity of relations of power that come into play in constituting discursive practices and the effect discourses have on the social context being investigated, it is difficult (and perhaps unrealistic) to account for all the variables and forces at work. Some of the variables may not be expressed in the text, and may or may not be deduced (Pinar, 1999). Validity is implicated by where the researcher cuts off consideration of context. The problem that always remains is explained by Gee (2011):

> No matter how much of the context we have considered in offering an interpretation of an utterance, there is always the possibility of considering other and additional aspects of the context, and these new considerations may change how we interpret the utterance. (p. 27).

Furthermore, discourse analytical approaches often take as their starting point the poststructuralist principle that our access to reality is largely through language (Rogers, 2011). I build on this assumption that asserts the power of discourse for the design of my research. However, that is not to oversee the fact that social reality does not exclusively manifest at the level of how texts and language function (Gee, 2011). Fairclough (2006) advises precautions in overstating the causal effects of discourse, or even treating social practices as if they were purely discursive. Discourse is one angle of social phenomena which are also shaped by institutional structures and features, by the historical context, by the media, as well as attitudes, beliefs and values that are expressed in multiple other social interactions than linguistic and textual ones. This is indeed a constraint of textual discourse analysis. I take textual descriptions as a significant part, yet still parcel of the analysis of new media art education at the university. These descriptions do not allow investigating other aspects of the performance of teaching and learning, such as spontaneous exchanges and interactions in the physical spaces where they take place (the studio, the lab). I do so only as far as these are textually described in the samples. Similarly, in my study, the material or applied art making practices that employ new technological media are only described in text form. Admittedly, these descriptions may be limited to render the experiential and material engagement with the objects and processes of making. Nevertheless, I do consider textual discourse analysis to be the most efficient method for a historical analysis and for the general goals of my study.

2.2 Review of selected studies

As a strategy to develop and further validate the use of discourse analysis to achieve my research goals, I reviewed prior research employing critical discourse analysis (CDA), particularly empirical studies based on the analysis of discourses expressed in a body of literature. I found that this approach is most often applied in studies on institutional and government policy (Stich & Reeves, 2016; Burroughs, 2015), in technical, literary and media text analysis (Owens, 2015; Hough, 2015; Zulkifli, 2015; Hazaea, Ibrahim & Nor, 2014), and in education research at different levels and in different subjects (Bazzul, 2014; Greig & Holloway, 2016; Morén & Aldenmyr, 2015), with predominance in medical and nursing education (Whitehead, 2011; Kuper et al., 2013; Ireland, Belton & Saggers, 2015). Several studies I reviewed investigate specific historical timeframes, and review a body of texts published over time to identify changes or patterns in the discourses in relation to context. The timeframes varied significantly. I also found that CDA is frequently employed in the analysis of translations and translation methodologies, for research that pertains to the fields of language studies and linguistics. I chose to exclude these from my review because of the strong focus on semantics, rhetoric, and the analysis and comparisons of idiomatic expressions, as these focuses are outside the scope of my topic.

Some research questions focus on investigating discourses associated with constructs of interest to the researcher, and therefore depart from texts that address those constructs. For example, Whitehead (2011) examined the construct of the “good doctor” over a 100-year period in medical education. Morén and Aldenmyr (2015) investigated the definitions of Social Sciences and the topics taught under this designation, in the syllabi of secondary schools from 1965 to 2011. Burroughs (2015) analyzed the discursive representations and framing of “illegal immigration” by the Irish Parliament between 2002 and 2009, and Zulkifli (2015) examined the construct of the “career women” in articles in the popular magazine Cleo (Malaysian edition), published in 2007 and 2008.

As a no less valid approach to conduct CDA, there were also studies that sought to extract from the body of texts the most predominant constructs to understand how these are articulated in their social or institutional contexts. For example, Hazaea et al. (2014) identified expressed human values explicitly or implicitly discernable in repeated maxims, from the editions of Yemen Times between 2003 and 2010.

Similarly, sometimes CDA is used to better understand the rationale behind social phenomena and the logic of rules or protocols. Stich and Reeves (2016), for example, used CDA to deconstruct the discourse of American universities' mission statements in search of evidence of class stratification. Ireland et al. (2015) analyzed clinical practice manuals used to care for pregnant Aboriginal women in Australia's remote Northern Territory to understand where, how, and why planned birthplaces for Aboriginal women have changed over time. Owens (2015) investigated online community software and the architecture of the platforms based on the discourse analysis of how-to books as sources that describe particular tactics for designing online communities. He studied 28 guidebooks from 1988 to 2010 to analyze the discourses of developers and administrators about "how and why one should design and configure online communities toward particular ends" (p. 32), and to document the "values and tactics evident in an ongoing discourse between the designers and managers of online communities" (p. 33). Of particular interest to my own critical discourse analysis is that his method also departs from the assumption that the texts selected provide direct access to values and approaches that have influenced other developers and managers of online communities. Therefore, the ideas and approaches advanced in these guidebooks by individuals who have successfully developed and managed online communities and reflected on their experiences are likely to affect the architecture and management practices used by individuals of other online communities. Owens' (2015) account is a good example of how discourses are perpetuated in tandem with (online) practices.

Finally, Greig and Holloway (2016) combined textual with oral discourse analysis by complementing the data extracted from Ontario (Canada) school board policies with interviews with English teachers and department heads, in order to explain the decision-making factors used in the process of selecting texts for the English curriculum. They assert that discourse analysis based on data collected from interviews or oral conversations bears very different dimensions to textual analysis especially in historical research. As I stated earlier in this chapter, narrated memories and personal interpretations carry other forms of subjectivity and may express the influence of other forces acting upon the oral discourse, not always present in texts.

In the field of medical education, Kuper et al. (2013) claim that discourse and content analysis of texts can help researchers and educators question the assumptions and models in place in medical education organization and delivery, and understand powers at work in different contexts and historical periods. Ultimately, a better understanding of past and present discourses in relation to practices in education may improve the form and content of education

and training provided to physicians. An example of such study is Whitehead's (2011) dissertation titled *The good doctor in medical education 1910–2010: A critical discourse analysis*. In her study, Whitehead used textual discourse analysis as an effective way of illustrating the constructed and changing nature in the framing of the construct of "the good doctor*"* in medical education. Whitehead departed from a seminal text in the field, a report authored by Abraham Flexner in 1910 titled *Medical Education in the United States and Canada*, which promoted a specific and influential definition of the 'good doctor'. She was then able to identify discursive shifts in the framing of the construct associated to historical and social transformations in medical education. These changes in the dominant constructs of the good doctor bear implications and consequences in the context of the field and its practices.

In the course of her analysis of the construct she set out to investigate, Whitehead also identified a series of recurring claims for the improvement of medical education, i.e. need to avoid over-specialization, the importance of generalism, and the need to broaden approaches to medical student selection (Whitehead, Hodges & Austin, 2012). It was a valuable insight for the development of my own study and of my understanding of CDA methodologies to realize that the author had set out to analyze a specific construct and that, in addition to achieving her primary goal, the discourse analysis revealed other discursive formations. She recognized that "the discourses of 'tomorrow' and 'transformation', along with discourses of 'novelty', "collectively contributed to a futuristic discourse in medical education, one that positions the future as requiring a dramatic break from the present and past" (Whitehead et al., 2012, p. 764). These discourses put the construction of the 'future practitioner' as the object of concern. Yet, the author adds, prescriptions for change are shy and modest. From early on into my own analysis, I detected similar themes expressed in similar discursive formations. In this sense, Whitehead's study (2011) was instrumental as an initial reference for how to identify, categorize, and connect the discourses present in my data. As a researcher, I find this dimension of CDA engaging; even when aiming to investigate a specific construct, it is possible that other unexpected but related constructs and statements emerge, and one must stay attuned to detect them as they may also inform and be relevant to the scope and the question of the research. In the case of Whitehead et al. (2012) pointed out the cyclic nature of calls for change in medical education, which will certainly be instrumental when it comes to considering reforms.

Stich and Reeves (2016) study *Class, capital, and competing academic discourse: a critical analysis of the mission/s of American higher education* informed my research method in the following ways. The authors analyzed institutional mission statements as discursive texts in

order to better understand the ways in which the higher education system (in the US) contribute to and reinforce class stratification. They analyzed the mission statements of US National Universities and National Liberal Arts Colleges (N=60) ranked in different tiers to demonstrate how these differ in the discourses used to communicate their purpose, goals, values, and identities.

Although I am critical of their premise and findings because their study did not account for possible variables in the method used to demonstrate the correlation at which they arrived, their method included both quantitative and qualitative approaches as complementary ways of analyzing their data, which I found useful. The quantitative portion of the analysis allowed for a statistical, frequency-based overview of the most common themes that can be found in university mission statements. It was also meant to facilitate associating themes to ranking tiers. The authors intended to demonstrate that specific expressions and themes could be detected in specific ranking tiers, but a correlation could not be proven. Instead, the quantitative analysis substantiated that the frequency of themes put forward by universities in their mission statements was distributed across the ranking tiers. This was to be expected, I think, and their finding supports my argument of the next chapter in which I state that there is a normative rhetoric in how universities conceive of, and articulate their mission.

The qualitative critical discourse analysis that complemented the quantitative content analysis allowed for subtle discursive variations to be identified in the mission statements of universities ranked in different tiers. For example, within the theme “quality of education”, top-ranking institutions associate this theme to expressions such as *the highest quality scholarship*, and to the concept of *excellence*, and enumerate career prospects. Lower-ranking institutions, on the other hand, will highlight the *high quality teaching* (not highest) and vocational outcomes in terms of professions (Stich & Reeves, 2016). Their analysis reveals a (weak) link between the choice of expressions of mission statements and the interests of particular groups, and that discursive distinctions emphasize the intellectual climates of particular institutions within highly stratified systems. Most importantly to the design of my research, the complementarity of quantitative methods to demonstrate the frequency of predominant themes, along with the qualitative analysis of discursive formations and their relations as employed by Stich and Reeves (2016), were strategies I adopted for the analysis of the data in my study.

2.3. Procedures for data collection

Discourse analysts borrow techniques from many other research approaches, and may propose new assemblages of techniques for data collection, and for quantitative and qualitative data analysis. The breadth of techniques and the diversity of phenomena that can be investigated using CDA means that the analysis can be conducted using a course of procedures that varies from study to study (Rogers, 2011). For the data collection and analysis in this study I have drawn from procedures employed in some of the above-mentioned studies, which I sometimes adapted to the nature of my data. In this chapter, I present these procedures, and in instances where I developed adapted strategies I justify the directions I took, always in light of how these choices contributed to answering the research questions.

I begin by detailing the processes to delimit and form the corpus, also called the unit of analysis, which is a body of published texts (also referred to as samples) on new media art education and the training of new media artists since 1980. I include a quantitative and qualitative overview of the unit of analysis based on the content analysis of the publications collected. Finally, in the following sections I will describe the analysis procedures by which I extracted the most predominant concepts, statements, and discursive formations. At the end of this chapter, I introduce the four major discursive formations drawn, before proceeding to elaborate on each of them in the following chapters.

2.3.1 Identifying context units

The first step was to identify the “context units” (Krippendorff, 2013, p. 101) where pertinent texts could be found; the archives and databases where I would be more likely to find texts pertaining to new media art in higher education. I quickly realized that theory, literature and studies on the general theme of media art education are vast. However, this is mostly because of the prolific and well-established field of Education in academia, which is for the most part concerned with K-12 curriculum, best practices, and public education policy. Based on my preliminary searches, the most predominant topics in the last decade have been the use of new technologies to enhance teaching-learning approaches, and media or computer literacy in the arts curriculum. It was noticeable from the initial search results that significantly less has been written about the training and education of artists at the university, and less again on the specific

subject of art education focusing on new media art practices. Such texts are scattered in different databases focusing on education, higher education, art education, art and media.

With the help of the Concordia University librarian, I determined that the first step was to identify the databases most likely to contain full-text publications relevant to the study. In addition to these, I also searched Scopus – a bibliographic database containing only abstracts and citations – to find the references to the full texts. The following databases generated the majority of the samples. I have included their disciplinary focus and the managing entity.

- Education Resource Information Center (ERIC), Education, produced by the United States Department of Education;
- Journal Storage (JSTOR), Multidisciplinary, is a database born out of Princeton University
- Project Muse, Humanities and Social Sciences, was initiated at John Hopkins University
- Academic Search, Multidisciplinary (through EBSCO Publishing).

2.3.2 Purposive sampling – from scarcity to excess of results

Purposive sampling aims at selecting all textual units that contribute to answering a given research question. It is applied when the context units have a conceptual boundary, but no enumerate limits. Such context units include a rather diverse population of texts, which is the case of the context units I identified. In this type of sampling, the resulting samples are not meant to be representative of a population of texts; rather, they are the population of relevant texts, excluding textual units that do not possess relevant information (Krippendorf, 2013).

With the context units and the time frame (1980–2015) as the initial delimitations, I proceeded to define four non-mutually exclusive areas of focus that texts needed to address in order to qualify into the unit of analysis. I call these areas of focus, levels of analysis. This is prescribed in Foucault's (1972) method as the first step to discourse analysis. He explains that one must define initial reflexive categories, which are not intrinsic to the discourse; they are associated with events that the researcher chooses to analyze over others for their contribution as data to answer the research question. The initial levels of analysis may hold for the entire analysis, but they may be replaced or extended by levels of analysis that will emerge from the content (Foucault, 1972). I determined that each text needed to explicitly address at least one of

the following four levels of analysis, all of which had to be expressed in relation to new media art education at the university.

- Level 1: Pedagogical/training approaches and best practices, either existing or proposed, for new curricular models

- Level 2: Institutional (academic or governmental) policy and directions

- Level 3: Socio-economic factors

- Level 4: Techno-scientific factors

I did not set geographical boundaries to the origin of the publications in my search options. I let these be determined by the search results in the context units available to me. Although it is likely that the sample size would have remained manageable if I had searched terms in English, French, Portuguese and Spanish – all of which I can read, I decided to use only English keywords as search terms, and thus let the English language also delimit the scope of this study. Hence, I must acknowledge that the use of English language, as a feature of the search engines of the databases available to me is also a determinant quality of the *corpus* of data, and delimits the domain of this study to a corridor of discourses about new media art education that is predominantly shared by Anglo-Saxon contexts.

My choice of keywords for the initial round of searches was applied to titles and abstracts only. These terms immediately proved to be much too broad, as they brought up too many irrelevant results, especially in the multidisciplinary databases. Even on ERIC, which focuses on education, search terms such as “media art” + “curriculum” resulted in an unmanageable quantity of texts, a vast majority of which were about k-12 education, as already mentioned. I refined my search strategy by attempting combinations of key terms in a systematic way that guaranteed not repeating searches, as well as different combinations of Boolean searches on the content of titles and abstracts. I refined the results using variations of the following expressions:

- AB (“*media”) AND (art*) AND (“higher education”) y: [1980- …]

- AB (“*media art”) AND (“higher education”, education) y: [1980- …]

- AB (“*media art”) AND (“higher education”) OR (university) y: [1980- …]

Variations would include the condition “NOT: elementary; secondary” or “NOT: social media” as strategies to eliminate the most common unrelated results. The search of abstracts

using these conditions significantly filtered the search results. I applied the same searches to the content of the body of the texts. I excluded references when full texts could not be found on the databases, on the available publications at the Concordia libraries and inter-library loan services, or through the libraries' article delivery services.

When I searched for texts published in the span of three and a half decades I dealt with both problems of scarcity and excess of valid samples for this study. As I proceeded through the search chronologically, I found few results in the 80s' decade but a sharp increase in numbers of valid samples from the 90s onwards. This did not come as a surprise as I was aware that certain terms, like 'new media art' were not yet common at the time to refer to art practices and artistic education focused on the emerging digital and electronic media of that decade. However, including searches of texts published in the 80s allowed me to detect the very beginnings and emergence of the use of this and related terms in texts about curriculum development for art education programs at the university. As a way to elucidate on the keywords likely to generate pertinent results in database search engines, I accessed past editions of the *Leonardo* journal through the JSTOR database, where they are conveniently archived by decades. In the 80s, *Leonardo* was the journal containing more articles dedicated to emerging media arts, and topics relevant to the interrelationships between art, technology and science (Topper & Holloway, 1985). In the very early 80s the journal was still called *The International Journal of Contemporary Visual Artists* but was renamed from the first issue of 1983 as the official *Journal of the International Society for the Arts, Science and Technology*. The new name reflected a reorientation of the editorial procedures to "match the broader needs of contemporary artists and the science/technology community affiliated with the arts" (Malina, 1983, p. i). Given the prestige and the specialization of this journal I trusted it would inform me on the terms used in the discourses about emerging/new technological media art, and see if they were in use in publications about programs for the education of artists. Until the early 90s, *Leonardo* included a terminology section at the end of each issue to elucidate its diverse readership of scientists and artists, amongst others, who might not always have been up-to-date on the jargon of fast evolving practices.

Multiple search strategies using alternative keywords such as "multi-media", "multimedia", "hypermedia", and "digital media", continued to mostly result in texts describing artistic practices that explored emerging technologies and new media, but few results addressed the levels of analysis defined as selection criteria for sampling, related to artist

training and pedagogy in higher education. A total of seven articles published between 1980 and 1989 are part of the final sample, four of which were published in *Leonardo*. I posit that the scarcity of relevant texts published in the 80s is due to several factors, in addition to the terminology issue. The modern western university, which I describe in the following chapter, is notably averse to systemic change in spite of being considered a hub for the advancement of knowledge. It is reported several times throughout this dissertation that the institution is rather slow in developing new programs for the emerging media, with art education traditional models prevailing, which validated established practices, genres, and disciplines. This means that even though artistic experimentation that explored new and emerging technologies, and collaborations between artists, scientists and engineers were already commonplace in the art world of the 80s, these practices and discourses had not yet translated into the curriculum, or even entered the academic institutionary complex.

Finally, the low number of texts published in the 80s valid as samples for the unit of analysis did not come as a surprise considering the technologies of production, the processes of publication and dissemination available at the time. While some writing about the changes occurring in the education of artists and in art schools as a result of the use of new technologies were published, the processes of production and dissemination were not yet digital, hence significantly slower. It was only throughout the 90s that desktop text editing and publishing software was used, and that digital databases were made available, which most definitely influenced and changed where and how the texts were published. As I progressed through the sampling chronologically, the number of results greatly increased from the 90s onwards, so I reduced my searches to five-year intervals from 1990 to 2005, and from there by year, as a way to keep my screening of search results systematic and manageable.

2.3.3 Snowball sampling

In this study, snowball sampling is based on the “network like organization of a universe of texts” (Krippendorff, 2013, p. 119). Because scholarly texts often draw on earlier ones, intertextuality is likely to occur. According to Bloor and Bloor (2007), intertextuality can be detected in “the intrusion (or adoption by the speaker/author) of aspects of previous texts into a new text either through citation, attribution or reference, and also the hybridization of one genre

of text type with another" (p. 52). These are attributes of a text that CDA researchers must stay attuned to.

This second sampling approach unfolded in two ways and at two different moments in the process of data collection. The initial purposive sampling had revealed the most influential publishers and journals in the subject. I then accessed online archives of past issues and publications by these publishers and authors to search for additional relevant texts. At a later stage, as I proceeded with the content analysis, I also examined the references and cited works to find other texts that fit the criteria for inclusion. I searched and reviewed these referenced texts for their pertinence according to the four analytical focuses, to be included in the unit of analysis. I kept records of the links between the initial texts, and took note of samples added to the unit of analysis by reference as these may offer valuable evidences of how discursive formations emerge. Bloor and Bloor (2007) explain that these evidences of intertextuality "may reveal traces of the dominant ideologies, writers' strategies in reinforcing or reformulating specific ideas, or instances of cultural change" (p. 54).

Even when referenced texts did not meet the inclusion criteria to be added to the primary sample, I took note of the most influential references to the thesis of the author. The fields of study and ideas in these referenced texts speak of the influential theoretical perspectives and discourses to which the authors of the sample texts drawn. Such references are most informative to the genealogies of discourses shaping those of new media art education at the university. In doing this, I followed Kuper et al.'s (2013) advice that sometimes the researcher needs to look beyond the originally chosen documents in order to analyze how these discourses are being legitimized and made possible, and how they are reinforced by specific practices, institutions and relations of power.

As I stated in the previous chapter regarding the implications of Kittler's (1990) theories to the CDA for this study, the increasing number of references and narrowing gap between the texts published and the references they contain can be attributed to the technical innovation in information and communication technologies throughout the decades of this study. This increase in references and bibliography in the sample texts reflects the speed in the processes of publication, the increased number of available pertinent texts, and overall accessibility to more sources. By keeping track of the links between texts, as I progressed chronologically through the content analysis of the samples, I was able to notice that the time gap between the date of publication of the sample text, the date of publication of the references, and citations the authors used to support their ideas, were narrowing. The number of references also grew

significantly, although many journals limit the number of allowed references when submitting a document for publication. I also observed in the referenced texts that certain references persist. Some are even carried from discourses from long before the 80s. This is the case, for example, of the transcription of C.P. Snow's famous address from 1959, later published under the title *The Two Cultures and The Scientific Revolution* (1963). As I explain in Chapter 6, this text is one of the most cited and referenced texts. Influential ideas and expressions (i.e. *the two cultures*) re-emerged in texts of the unit of analysis, sometimes not referenced to its original source, in text published several decades after Snow's address.

Sampling was complete when purposive sampling and snowball sampling generated no new relevant texts that contributed data to the study. The procedures for data collection were labour intensive. Defining and delimiting the corpus required careful (re)considerations, new samples and exclusions, revising criteria, and continuously making decisions in an iterative way throughout the process. When the unit of analysis finally included all valid texts found, I was able to assert that the corpus was representative of the search results according to the criteria, and therefore constituted the available data for this study.

2.3.4 A word on ethics

For reasons of methodological rigour I determined to limit my analysis to publicly available texts, the vast majority of which are accessible online. Given the public nature of all the data and documents used for this research, formal ethics approval from the authors was not necessary and this research did not need to be subjected to the university's ethics committee for approval. Although I sometimes highlight specific authors and mention their professional backgrounds for their contributions to the field, no biographical information was included beyond professional affiliations and achievements that are publicly available.

2.4 Procedures for content analysis

The analysis of the content of texts served to assert the validity of each text within the corpus, to complete the corpus, and to simultaneously conduct a preliminary analysis of discourse. The content analysis referred to the four initial levels of analysis and allowed carefully categorizing each sample according to how informative it is within which level. This involved identifying the excerpts that were particularly informative to each level, which is indicated in Table 1. ranked from 0 (indicating that the level of analysis is non-existent in the sample) to 3 (primary thesis of the sample pertains to the level of analysis, and the sample is rich in relevant statements associated to this level).

The Foucauldian approach to text analysis requires bi-directionality (Foucault, 1972), meaning that the researcher does not just determine the set of texts and move from content to discourse; rather, there is a process of back and forth between the two. Given the volume of texts and my four levels of analytical interest, I dedicated many weeks to the content analysis of the sample, while the discourse analysis was starting in tandem with this process. I took initial notes about the emergence and reoccurrence of key-concepts, statements, expressions, and shifts in terminology and language. The differentiation between these elements in the text that pertain to discourse analysis, and other elements such as identifying the thesis, the arguments, and theoretical references (which are found in the content analysis) was sometimes difficult to exercise. I created a sheet for each sample that presented the nature of the sample, the thesis, with a grid divided into the four analytical levels, where I transcribed quotes pertinent to those levels, with highlights and notes on the qualities of the discourse. I proceeded in two rounds adding to those sheets: the first focused on content but did not exclude preliminary notes on discourse, the second round was dedicated to discourse analysis exclusively.

The content analysis reported on the following questions for each sample:

- When was the text written?
- Who wrote the text?
- Where was it published?
- What is the text?
- Which levels of interpretation are addressed?

- What other texts are referenced or cited?

In the process of content analysis, two changes occurred in the levels of interpretation: Level 3 and level 4 merged (forming level 3) to encompass all factors external to the university expressed in relation to definitions and approaches of new media art education. Hence, Level 3 now refers to the socio-economic and the techno-scientific factors affecting the systemic or curricular conditions for the education of new media artists at the university. In the analysis of content, I found that many texts included long excerpts on definitions of new media and new media art and of the role(s) of artists, in expressed relations to the education/training of new media artists. Therefore this became level 4. In section 2.4.3 *Qualitative overview of the unit of analysis*, I elaborate on each of the levels of interpretation, and on the predominant themes (categories) found in each level. These themes were associated to excerpts of texts in each sample.

2.4.1 Exclusion criteria

Using the key search terms combined with the boolean conditions applied to searches in the content of abstracts and then full texts resulted in a high percentage of relevant results. In the process of content analysis, I withdrew only 12 texts of a total of 105 from the primary sample derived from search results. Excluded texts fell within two categories:

1. Texts that, upon close reading, were concerned with new media technologies employed as pedagogical tools, and not directly used in the creative practices of the student-artists. For example, some of these texts described best practices in using social media or digital media (video conferencing) to enhance teaching approaches and learning experiences. Even if new technological media were used in teaching-learning approaches for the education of artists, it was important for relevancy that the artistic practices focus on the aesthetic and material exploration of the media.

2. Several texts were excluded because they focused on the infusion of STEM curriculum with topics and skills attributed to an artistic education, as complementary skills to the training of scientists and engineers, or for improving learning in their disciplines. Some of these texts were about the benefits of training computer scientists in digital media aesthetics and graphic experimentation. Again, the focus not being on the education of artists, these texts were left out.

The search results also included texts with content I considered of questionable validity, for poor use of key-concepts as I understand them, or poor arguments in support of the thesis stated by the author. I refrained from my personal critical assessment of the quality of ideas expressed, and let the content and discourse analysis of the entire body of texts in the unit of analysis reveal whether the claims expressed in such publications were to be found more often, and whether there were significant connections to be established (if any) between the statements found in those texts and the overall discursive formations.

2.4.2 Overview of the unit of analysis

Table 1.

Sample #	YEAR	CODE	Type of Publication	Publisher	Author	Title	Level 1 - Curriculum / pedagogies	Level 2 - Systemic	Level 3 - External factors	Level 4 - media art definitions and roles of artists
1	1980	1980_1_Gregory	article	Leonardo	Gregory, M. S.	The Science-Humanities Program (NEXA) at San Francisco State University : The 'Two Cultures' reconsidered	1	2	1	0
2	1983	1983_1_Sheridan	article	Leonardo	Sheridan, S. L.	Generative Art versus Copy Art : A clarification of terms and ideas	2	0	3	2
3	1985	1985_1_Adams & Fuchs	article	Art Education	Adams, D. & Fuchs, M.	The fusion of artistic and scientific thinking	0	0	3	2
4	1986	1986_1_Pinkel	article (editorial)	Leonardo	Pinkel, S.	The necessity for Synthetic Art Education	2	0	1	1
5	1987	1987_1_Dohn & Wagner	article / research report	Higher Education	Dohn, H. & Wagner, K. D.	Learning Problems : When arts students encounter computer science	3	0	1	0
6	1987	1987_2_Hudson	article	Journal of Art & Design Ed.	Hudson, T.	Current issues in Art and Design Education : Art, Science and Technology; Some initiatives for change	3	0	2	3
7	1990	1990_1_Loveless	article	Leonardo	Loveless, R. L.	The electric media conspiracy : Myths, models and metaphors for learning through Art at the University of South Florida	3	0	1	3
8	1990	1990_2_West	article	Leonardo	West, E.	Perception and notation: A Core Curriculum in the Arts	3	0	0	0
9	1990	1990_3_Hagebolling	article	Leonardo	Hagebolling, H.	The Academy of Media Arts Cologne	3	3	1	2
10	1990	1990_4_Sheridan	article (editorial)	Leonardo	Sheridan, S. L.	Why New Foundations?	3	0	0	3
11	1990	1990_5_Sheridan	article	Leonardo	Sheridan, S. L.	Mind/Senses/Hand: The generative systems program at the Art Institute of Chicago 1970-1980	3	0	3	2
12	1991	1991_1_Kitson	article	Leonardo	Kitson, M.	Computer graphics in Art-and-Design Education : The problem of Planning for Change.	3	3	1	1
13	1993	1993_1_Fabo	article / symposium report	Leonardo	Sabine Fabo	Arts and Media: Towards a Universal Understanding? The Myth of Babel Revisited: An International UNESCO symposium	0	1	3	3
14	1993	1993_2_Brown	article	T H E Journal	Brown, P.	An interdisciplinary approach to art and design education : computational design	3	2	0	1
15	1994	1994_1_Iskin	article/ round table transcripts	Leonardo	Iskin, R. E. (ed)	Design and Entertainment in the Electronic Age	1	0	0	3
16	1995	1995_1_Penny	book chapter	SUNY Press	Penny, S.	Consumer Culture and the Technological Imperative: The artist in dataspace.	1	0	3	3
17	1996	1996_1_Wennberg	article	Computer Graphics	Wennberg, T.	Our shrinking planet : A bird's eye perspective on computer graphics and art education.	1	2	1	0
18	1996	1996_2_Hansmann	article	Computer Graphics	Hansmann, W.	Germany : Computer Graphics in Computer Science and Art Education	3	2	0	0
19	1996	1996_3_Henderson	article	Computer Graphics	Henderson, M.	United States : Technology in Art Education	1	1	1	0
20	1998	1998_1_Haynes et al.	article	Leonardo	Haynes, D; Mandel, M; Robillard, R.	Curriculum Revolution. The infusion and diffusion of media art	3	0	0	0
21	1998	1998_2_Schreiber.docx	article	New Art Examiner	Schreiber, R.	New! Newer! Newest! Teaching New Media	2	3	0	1
22	2001	2001_2_Bumgarner Gee	Symposium Proceedings	Arts Education Policy Review	Bumgarner Gee, C.	Introduction (to the issue on Technology and Trends in the Arts)	0	2	0	0
23	2001	2001_3_Gigliotti	Symposium Proceedings	Arts Education Policy Review	Gigliotti, C.	The Challenge of the Technological Future and the Arts	0	3	0	1
24	2001	2001_4_Ascott	Symposium Proceedings	Arts Education Policy Review	Ascott, R.	Arts Education @ the edge of the net : the future will be moist!	2	2	1	2
25	2001	2001_5_Wilson	Symposium Proceedings	Arts Education Policy Review	Wilson, M.	Our creations re-creating us.	3	0	0	1
26	2001	2001_6_Blythe	article	Journal of Art & Design Ed.	Blythe, M.	The work of art in the age of digital reproduction : The significance of the creative industries	0	1	2	0
27	2001	2001_7_Kirschenmann	article	Journal of Art & Design Ed.	Kirschenmann, J.	The Electronic prometheus and its consequences for art education	3	0	0	1
28	2002	2002_1_Fishwick	article	Leonardo	Fishwick, P. A.	Aesthetic programming : crafting personalized Software	3	0	0	2
29	2002	2002_2_Buss	article	Journal of Art & Design Ed.	Buss, D.	Benchmarking Art and Design	3	0	0	1
30	2002	2002_3_Lovink et al.	article	Afterimage	Lovink, G., Poster, M., Bro	Voiceover	0	1	2	3
31	2003	2003_1_Danvers	article	Journal of Art & Design Ed.	Danvers, J.	Towards a radical pedagogy : provisional notes on learning and teaching in art and design	3	2	0	0
32	2004	2004_1_Averns	article / research report	Artichoke	Averns, D.	Canada's art and design schools : A critical survey	0	3	1	0
33	2004	2004_2_Rutenbeck	article	iDMA Journal	Jeff Rutenbeck	Digital Media Studies	3	2	0	0
34	2004	2004_3_Rappaport	article	iDMA Journal	Mat Rappaport	Thoughts on the Launch of a Digital Media BFA Program	3	1	0	3
35	2004	2004_5_Blair&Rutenbeck	article	iDMA Journal	Blair, C.A. & Rutenbeck, J.	Digital Media and Arts Education : A First Look	0	2	0	0
36	2004	2004_4_Rubini&Gleber	article	iDMA Journal	Rubini, G. & Gleber, C.	Fitting Digital Media Arts into the Academy	1	2	0	1
37	2005	2005_1_Mateas	article	ETC Press	Mateas, M.	Procedural literacy : Educating the New Media Practitioner	3	0	2	2
38	2005	2005_2_Pritchard	article / study report	Art, Design & Communicatio n in Higher Ed.	Pritchard, T., Heatly, R. &	How art, media and design students conceive of the relation between the dissertation and practice	3	0	0	0
39	2005	2005_3_Evans	article	iDMA Journal	Evans, M.	Games for the Thinking Person : Teaching computer game development in an academic environment	3	0	0	2
40	2005	2005_4_Bogost	article	iDMA Journal	Bogost, I., Mateas, M., Murray, J. & Nitsche, M.	Asking what is possible : The Georgia Tech approach to game research and education	3	2	0	0
41	2005	2005_5_Scholz	article	art journal	Scholz, T.	New-Media Art Education and its Discontents	3	2	1	3

Sample #	YEAR	CODE	Type of Publication	Publisher	Author	Title	Level 1 - Curriculum / pedagogies	Level 2 - Systemic	Level 3 - External factors	Level 4 - media art definitions and roles of artists
42	2005	2005_6_Hazelkorn	article	Higher Education Management and Policy	Hazelkorn, E.	Art Schools for tomorrow: Challenges and opportunities	2	3	0	0
43	2005	2005_7_Blair	article	iDMA Journal	Blair, C.	Digital Media and Arts Curriculum development : defining digital	0	3	0	3
44	2005	2005_8_Shanken	article	Leonardo	Shanken, E.	Artists in industry and the academy: Collaborative Research, Interdisciplinary scholarship and the creation and interpretation of hybrid forms.	0	3	2	1
45	2006	2006_1_Ritchie	article	iDMA Journal	Ritchie, J.	A Media in its infancy and 'plaintext' in the ivory tower	2	0	0	2
46	2006	2006_2_Rutenbeck	article	iDMA Journal	Rutenbeck, J.	Bit by Bit by Bit : Hypercomplexity, Digital Media, Studies and Higher Education	3	3	0	3
47	2006	2006_3_Moriyama	article	SIGGRAPH	Moriyama, T.	Next generation in digital art- current situation and student works in Japan	1	1	1	1
48	2006	2006_4_Legrady	article	Leonardo	Legrady, G.	Perspectives on Collaborative Research and Education in Media Arts	3	0	3	2
49	2007	2007_1_Shreeve	article / Editorial	Art, Design & Communication in Higher Ed.	Shreeve, A. & Austerlitz, N	Editorial for ADCHE special	1	0	1	0
50	2007	2007_2_Srinivasan	Conference proceedings	11th International Conference Information Visualization	Srinivasan, V., Saslow, M, LaFayette, C	Basic training for digital artists in the Texas A & M visualization program	3	0	0	0
51	2007	2007_3_Sonvilla Weiss	Conference proceedings	Media Art Histories conference	Sonvilla Weiss, S.	Art/Science and Education : We have to know what we want before we start looking for it	3	3	3	3
52	2007	2007_4_Eber	article	iDMA Journal	Eber, D. E.	The state of the arts of Digital	2	1	0	3
53	2008	2008_1_McWilliam	article	Innovations in Education and Teaching International	McWilliam, E., Hearn, G. &	Transdisciplinarity for creative futures : what barriers and opportunities	0	2	3	0
54	2008	2008_2_Brown	Conference Proceedings	Jill Rogers Ass. Publishers	Bruce Brown	The student experience in Art and Design Higher education : Drivers for Change - PREFACE	0	1	1	0
55	2008	2008_3_Bichard	Conference Proceedings	Jill Rogers Ass. Publishers	Bichard, Michael	Keynote: Confident, connected but never complacent	0	2	0	0
56	2008	2008_4_Blair et al.	Conference Proceedings	Jill Rogers Ass. Publishers	Blair, B., Cummings, A., Dunbar, T., Hayward, D. & Woodman, J.	BAU-WOW! A model for creative practice, thinking, learning, research and innovation in the 21st century	3	2	0	0
57	2008	2008_5_Burg	article	iDMA Journal	Burg, J.	Teaching programming to students of digital media and arts	2	0	0	3
58	2008	2008_6_Emma	article	iDMA Journal	Emma, T.	Artistic exploration in game development education	0	2	0	2
59	2008	2008_7.1_Wilson	book chapter		Wilson, S.	Beyond the Digital : Preparing Artists to Work at the Frontiers of Technoculture.	3	1	1	1
60	2008	2008_7.2_Ascott	book chapter		Ascott, R.	Pixels and particles : The path to syncretism	3	1	0	3
61	2008	2008_7.3_Gigliotti	book chapter		Gigliotti, C.	Sustaining Creativity and Losing the Wild	1	0	0	3
62	2008	2008_7.4_Sweeny	book chapter		Sweeny, R.	Unthinkable Complexity: Art Education in Networked Times	2	0	1	3
63	2008	2008_7.5_Burnett	book chapter		Burnett, R.	Learning, Education, and the Arts in a digital World	2	2	2	3
64	2008	2008_7.6_Bielicky	book chapter		Michael Bielicky	Media Golem : Between Prague and ZKM	2	1	0	0
65	2008	2008_7.7_Yashir	book chapter		Yacov Sharir	Learning through the re-embodiment of the digital self	3	0	0	0
66	2008	2008_7.8_Shanken	book chapter		Edward Shanken	Entwined Histories : Reflections on teaching art, science, and technological media	3	1	0	0
67	2008	2008_7.9_Seaman	book chapter		Bill Seaman	A generative emergent approach to graduate education	3	0	0	0
68	2008	2008_7.10_Leao.docx	book chapter		Lucia Leao	The creative spirit in the age of digital technologies : Seven tactical Exercises	3	0	0	0
69	2009	2009_1_Ashton	article	Journal of Media Practice	Ashton, D.	Thinking with games : exploring digital gaming imaginaries and values in higher education	2	1	0	0
70	2009	2009_2_Burg et al	article	iDMA Journal	Burg, J., Romney, J. & Cart	Integrating Sound into a digital media Course	1	0	0	1
71	2009	2009_5_Garcia	Conference Proceedings	SIGGRAPH	Garcia, A. L., et al	Physics for animation artists	1	0	0	2
72	2009	2009_4_Ariga	Conference Proceedings	SIGGRAPH	Ariga, T. & Mori, K.	Learning course for sensory interaction	3	0	0	2
73	2009	2009_3_Schnapp&Shanks	book chapter	MIT PRESS	Schnapp,J. & Shanks, M.	Artereality : Rethinking craft in a knowledge economy	3	2	1	3
74	2010	2010_1_Ashton	article (study report)		Ashton, D.	Productive passions and everyday pedagogies : exploring the industry-ready agenda in higher education	3	2	0	0
75	2011	2011_1_Berrett	article	Art, Design & Communication in Higher Ed.	Berrett, D.	Art schools build new 'foundation' across disciplines	3	0	0	0
76	2011	2011_2_Amiri	article	Journal of Art & Design Ed.	Amiri, F.	programming as design : the role of programming in interactive media curriculum in Art and Design	3	1	0	3
77	2011	2011_3_Farbrook	article	Leonardo	Farbrook, J.	Teaching video production in virtual reality	2	0	0	3
78	2011	2011_4_Rappaport	article	iDMA Journal	Rappaport, M. & Burns, C.	(Revisiting) Thoughts on the launch of a Digital media BFA Program	3	0	0	2
79	2011	2011_5_Bogost	article	iDMA Journal	Bogost, I. et al	Asking what is possible : The Georgia Tech approach to game research and education (revisited)	1	1	0	0

Sample #	YEAR	CODE	Type of Publication	Publisher	Author	Title	Level 1 - Curriculum / pedagogies	Level 2 - Systemic	Level 3 - External factors	Level 4 - media art definitions and roles of artists
80	2011	2011_6_Melles	article	Research in Post-Compulsory educ	Melles, G.	Art, media and design research and practice: views of educators in a 'new' Australian university	1	3	1	0
81	2012	2012_1_McGill	article	ACM Transactions on Computing Education	McGill, M.	The curriculum planning process for undergraduate Game Degree Programs in the UK and United States	3	0	0	0
82	2012	2012_2_Bunt	article	Leonardo	Bunt, B.	Media Art, Mediality and Art Generally	1	0	0	3
83	2012	2012_3_Budge	article	Art, Design & Communication in Higher Ed.	Budge_K	A question of values: why we need Art and Design in Higher Education	3	2	0	0
84	2012	2012_4.1_Meta Bauer	book chapter		Meta Bauer, U.	Under Pressure	1	1	3	2
85	2012	2012_4.2_Schiesser&Brunn	book Forword			Research and Teaching in the Arts Today	3	1	0	3
86	2013	2013_1_Baldacchino		Journal of Art & Design Ed.			3	2	3	0
87	2013	2013_2_Rikakis et al.	Conference proceedings	IEEE : Frontiers in Education	Rikakis, T., Tinapple, D. & Olson, L.		3	1	1	0
88	2013	2013_3_Barnett & Smith	article	The Steam Journal	Barnett, H. & Smith, J. R. A	Broad Vision: The Art & Science of looking.	2	2	0	1
89	2014	2014_1_Doherty & Bristow	article	Technoetic Arts: A journal of speculative Research	Doherty, C. & Bristow, T.	Technology Arts Education in South Africa: Mutant collaborations	2	3	0	0
90	2014	2014_Malina & Evans	white paper		Malina, R. & Evans, K.	Breaking down the silos: Curriculum development as a tool for crossing disciplines…	3	3	0	0
91	2015	2015_Malina	Policy Research doc	MIT Press	Malina, R., Strohecker, C.	Steps to an ecology of networked knowledge and innovation	1	3	0	1
92	2015	2015_1_Jagodzinski	article	International Journal of Art & Design Ed.	Jagodzinski, J.	The challenges of Art Education in Designer capitalism: Collaborative practices in the New Media Arts	3	2	1	0
93	2015	2015_2_Ursyn	article	Teaching artist journal	Ursyn, A.	Criticism and assessment applied to New Media art education	3	0	0	1

2.4.3 Descriptors of the unit of analysis

The content analysis was instrumental in helping me better understand the sort of data I had collected, to ensure every sample was indeed valid according to the criteria established, and that each sample would contribute to my research goals and inform the answer to my question: What is new in new media art education? It also allowed for a rigorous overview of the evidences of intertextuality within my unit of analysis. In the course of the content analysis I developed a preliminary sense of the most recurrent utterances across samples within each level of analysis, at different periods in time.

To identify the predominant themes expressed in the data within each level of analysis, I used four steps outlined by Barbara M. Wildemuth (2009) for data analysis. Wildemuth's procedures are a concise and simplified version of the analytical procedures outlined by Charmaz (2006), commonly used in grounded theory analytical methods. The content analysis in my study differs from grounded theory in that it is not the point at which the interpretation culminates. The analysis in this study is first and foremost of the discourse that delivers the content. I elaborate on the steps for discourse analysis in the next section. The procedures for content analysis are: 1) Identifying the levels of analysis expressed in the texts; 2) defining categories within each level; 3) associating excerpts of texts to those categories; and 4) establishing relations between categories.

I first divided texts from the primary unit of analysis into broad thematic excerpts, which corresponded to the levels of interpretation present. The text had to address at least one level to qualify into the final unit of analysis, and these had to be explicitly expressed in the thesis, in the arguments or descriptions by the author, as opposed to derived inductively from my own interpretation. Within each level, I identified the most predominant themes as a way to later facilitate framing the concepts and statements. These themes were often identified by keywords, which always remained associated with excerpts of texts. It was sometimes the case that the same concept was found framed by different levels of interpretation. This is the case, for example, of the concept and ideas associated with *interdisciplinarity*, which has both curricular (level 1) and systemic implications (level 2). The analysis of discourse later investigated whether the meaning and significance of a predominant concept or statement was stable, or if it was caught in conflicting discourses associated with different levels of analysis.

The following is a summary description of each level of analysis and the most recurrent themes (codes) extracted:

Level 1. Curriculum and Pedagogies

Almost every sample addressed this theme, sometimes overlapping with one of the other three levels. Hence, this level is the most predominant, which was to be expected as it is the most directly aligned with the goals of this study. Excerpts associated with this level of analysis exposed the most recurrent and most influential ideas concerning pedagogies for the education of new media artists. Within this level, I examined excerpts describing existing and proposed new curriculum structure, best practices, skills and literacies at work in the education of new media artists. Level 1 also exposes the traditional models, assumptions, and values that underpin pedagogical practices for the education of new media artists at the university. It generated the following sub-themes:

TABLE 2: Themes of Level 1 Curriculum and pedagogies

1.1	Values and assumptions traditionally associated with art education
1.2	New pedagogies [Expressions of the new]
1.2.1	Art Education is slow to address change
1.3	Transferable or Meta Skills
1.3.1	Critical analysis and inquiry
1.3.2	New literacies [Expressions of the new]
1.3.3	Creativity
1.3.4	Collaboration between students and instructors in related as well as different disciplines, within or across institutions
1.4	Media specific skills
1.5	Vocational skills (also called competencies in policy documents)
1.5.1	Collaboration with industries or the cultural sectors outside the university
1.6	Interdisciplinary learning
1.6.1	Art *versus* science pedagogies
1.6.2	The authority of science

1.7	Teaching and learning challenges associated to the new pedagogies

Level 2. Systemic structure, policy, and directions for new media art education at the university

It was often the case that texts containing excerpts associated with Level 1 described above also included information about the institutional forces motivating, interfering, and shaping the pedagogical approaches proposed or implemented for the education of artists in new media art-related programs. The most recurrent themes were the following:

TABLE 3: Themes of level 2 Systemic

2.1	Institutional policy and procedures
2.1.1	Structure and bureaucracies of the institution in place
2.1.2	Status / place of the discipline or program
2.1.3	Reluctance to adopt change and emphasis on precedents
2.2	Resources
2.2.1	Available new technologies
2.2.2	Available, competent faculty
2.2.3	Courses offered / updated curriculum
2.3	Strategic interests of the institution
2.3.1	Interdisciplinarity
2.3.2	Collaboration with other sectors (outside the university)
2.3.3	Evidences of neoliberal ideologies

Level 3. External factors.

This level of analysis compiles the socio-economic and techno-scientific factors reported by authors as related to the education/training of new media artists at the university.

TABLE 4: Themes of level of analysis 3 External factors

3.1	Techno-scientific evolution [Expressions of the new]
3.1.1	Statements about innovation, progress, change
3.1.2	Innovation related to Art, Science and Technology (AST)
3.1.3	Innovation related to other configurations of interdisciplinarity
3.1.4	Complexity theories
3.2	Socio-economic factors
3.2.1	Convergence of sectors—including the creative industries

Level 4. Definitions of new media art and roles of artists in expressed relation to the education/training of new media artists

Excerpts coded within this level of analysis contained most references to influential media theories, which included definitions for key-concepts such as “new media” and “new media art”. Relatedly, excerpts in this level also expressed ideas on societal roles attributed to, or expected from artists working with these media. In the discourse analysis I was able to later associate or contrast expressed definitions of new media artists and their role in society with the skills discussed in new media art education curriculum excerpts associated with Level 1.

In the same way that, in Level 1, new pedagogies (code 1.2) were often described in comparison to values and assumptions traditionally associated with art education (which generated code 1.1), the definitions of new media and new media artists (level 4) also are often described in comparison to old/modernist conceptions of art and artists (code 4.2). It was in such instances that the discourse analysis was starting in tandem with the content analysis.

TABLE 5: themes of level of analysis 4

4.1	New media art definition [Expressions of the new]

4.1.1	Computational and digital media
4.1.2	Interactivity and hypermedia
4.1.3	Material media / Post-screen (robotics, machines and bio materials)
4.2	Traditional construct of the artist
4.3	Roles of new media artists [Expressions of new]
4.4	Collaboration

Another interpretative methodology like grounded theory would have proceeded from the content analysis to describe the theoretical properties of each category, and establish relationships between categories to form a map of relations between texts, with the ultimately goal of depicting the emergence of the grand theory that is the answer to the research question (Wildemuth, 2009). However, Critical Discourse Analysis took me back to Foucault (1972) and to his most basic elements of discourse: the statement and the concepts it contains.

2.5 Procedures for CDA

Authors I reviewed begin explaining their procedures for CDA by asserting that there are no standardized methods or "recipes" to conduct it. Therefore, one needs to customize procedures to better suit the type of data (Rogers, 2011; Whitehead, 2011). Although influential discourse analysts have developed and proposed approaches to conduct CDA, some of which I drew from to develop my own approach (Fairclough, 2011; Gee, 2011), according to Rogers (2011) most researchers admit "that their methods are drawn from a wide range of scholarship, and that they adopt and adapt analytical methods according to the needs of a particular inquiry" (p. 11). In order to develop rigorous discourse analysis procedures suited to the contextual and interpretive sensitivities of this study, I reviewed studies that relied on a CDA methodology which directed me to important further literature on CDA methods.

Since my interest is in the changes and influences of the discourses of new in the education of new media artists, I found that Fairclough's (2015) approach informs my own. Specifically, his writings on the relationships between discourse, ideologies, and institutions echo my own interest. He explains that "the way in which orders of discourse are structured, and the ideologies which they embody are determined by relationships of power in particular social institutions, and in society as a whole" (p. 63). He makes an important distinction between power *in* discourse and power *behind* discourse. The former concerns itself with discourse as a place where relations of power are exercised and enacted; the latter with how discourse is shaped by social and institutional relations of power. In Fairclough's (2015) chapter 6, *Critical discourse analysis in practice* (p. 155), he outlines a three-step procedure for CDA, beginning with the description of a text based on predominance of concepts and statements, followed by the interpretation of the relationship between text and its purpose based on the predominant rhetoric, and finally proposing an explanation of the relationship between the discourse embedded in the texts and its social context. The CDA procedures I have adopted, which I proceed to summarize, combine Fairclough's (2015) and Foucault's (1972) methods.

2.5.1 Analysis of concepts and statements

The goal of Foucault's (1972) method of investigating the genealogy of discursive formations is to discern a regularity in the dispersion of statements and the types of

relationships between statements. The most evident link between statements is when they refer to the same object. However, unlike fields that treat a unique and relatively permanent and stable object (biology 'speaks' of forms of natural life, or psychopathology 'treats' of psychosis, to use Foucault's examples), this study is based on the discourse about new media art education over time, expressed in texts from different sources. This study is far from referring to one single object, formed once and for all. The fluidity of the constructs central to media art and art education is explained in section 3.4 *New media art as an arena for discursive struggle*.

I began the analysis of the discourses of new media art education by identifying the most important concepts within each level of analysis, and accounting for the persistence of these concepts. I assumed the definitions of the concepts as expressed by the authors in the statements that contain them. After understanding the definitions that had been attributed to a concept in the discourse over time, concepts functioned as links in the map of discursive formations. Following Foucault's (1972) prescription, I treated concepts as events that emerge, and sometimes fade, merge, or morph to take on different significations. The emergence and predominance of related and similar ideas surrounding these concepts is critical when analyzed in relation to theoretical or philosophical developments, as they indicate moments of change. The structural organization of this dissertation reflects the most predominant discourses, which I divided into sections corresponding to the branches of those discourses.

To determine how concepts were used and to understand the links between statements that contain them, I took on Fairclough's (2015) first step for CDA. He contends that the analysis of vocabulary (concepts), grammar and textual structures are a good place to start because these "formal features of text can have experiential, expressive or connective value" (p. 154). He proposes a number of questions that the researcher can use to begin analyzing texts, which include: What words are used? What metaphors are used? Are there ideologically contested words? What relational and expressive values do words have? What logical connectors are used? These questions will reveal the background assumptions and ideologies embedded in the discourse expressed in the text.

2.5.2 Analysis of discursive formations

The analysis based on Fairclough's (2015) questions allowed me to identify the types of statements that contained the most prevalent concepts within the four levels of analysis.

According to the principles of intertextuality, it was likely (but not granted) that these statements be connected to other statements already present in the discourses of the field or related areas of study (Jorgensen and Phillips, 2002). To identify the types of relations between statements, Foucault (1972) proposed:

> What one must characterize and individualize is the coexistence of these dispersed and heterogenous statements; the system that governs their division, the degree upon which they depend on one another, the way in which they interlock or exclude one another, the transformation that they undergo, and the play of their location, arrangement and replacement (p. 38).

Discursive formations were not necessarily confined within each of the four analytical levels defined for the content analysis. As discussed before, discourse analysis is a bi-directional, iterative process between the elements of discourse (concepts, statements, and expressions) and the content of texts. While some links between statements were presented by the author in the form of references and citations, many were implicit and required careful and critical interpretation of the discourses in their "situational context" (Fairclough, 2015, p. 159). This calls upon the researcher to be mindful of the characteristics of the discourse community within which the text exists, as well as the institutional setting, its social order and the dynamic between individuals in the context, in order to identify which presuppositions and assumptions may be at work, and how the concept is framed by larger ideologies. This corresponds to Fairclough's (2015) second step: Interpretation.

In analyzing discursive statements across levels of analysis, I was also able to investigate how predominant concepts were sometimes framed by different perspectives, and occasionally caught in conflicting discourses. This step also revealed that sometimes the emphasis on specific statements and discourses hinders alternative perspectives or only allows partial uptake for rather complex issues. In doing so it silences other discourses, be they legacies, historical or emerging narratives. In CDA, researchers may therefore also account for points of view (statements) that are not predominant, and sometimes manifest in discourse that Bloor and Bloor (2007) call hedging: the textual equivalent of "linguistic avoidances of full commitment or precision" (p. 103).

In grounded theory methodology, for example, such points of view would likely not be included as relevant to the grand theory elaborated by the researchers. However, in CDA –

especially the analysis of discourses evolving over time –instances of hedging can be worthy of note: such statements are often expressed (too) briefly, without the support of an argument. They may constitute evidence of a marginal discourse, of a controversial perspective that was going against the predominant discourses of the time, and was therefore silenced. Otherwise, these statements may be evidence of assumptions ingrained in the community's shared discourse that are perceived as not needing clarification to the reader, and are rarely discussed or critically analyzed by the members of the community – the 'mythologies' of the culture, as suggested by Latour (1986).

Fairclough's (2015) final step: proposing an explanation of the relationship between the discourse and social context, is what the reader will find in the analysis of the most predominant discourses from chapters 4 to 7. The objective of this final step is:

> To portray a discourse as part of a social process, as a social practice, showing how it is determined by social structures, and what reproductive effects discourses can cumulatively have on those structures, sustaining them or changing them. (p. 172)

In those four chapters, I frame the most dominant discourses of new media art education in the ideological and systemic context of their time, always with the modern western university as the institutional-social background. The modern western university is the context in which the texts, the discourse community, their social interactions and practices occur (teaching-learning and art making). As mentioned above, it is crucial that the researcher be mindful of the characteristics of this context in order to proceed to interpret and analyze its discourses. Hence, chapter 3 is dedicated to a review of literature about this important construct that is the modern western university, and to an introduction of how the discipline here under focus – new media art, and relatedly, new media art education, exists within the institution.

CHAPTER 3. The domain of the study

This chapter lays out the domain of the study, meaning the "socially recognized context within which the discourse takes place" (Bloor & Bloor, 2007, p. 7). I provide a brief historical background leading to the contemporary idea and general characteristics of the modern university as a social and institutional body, responsible for the provision and administration of knowledge and teaching. I proceed with an exposé of the socio-economic ideologies that have come to shape and orient the three fundamental missions of the university. In doing so, I invite the reader to see through the lens I used when designing and defining the goals, and in the process of this research.

After laying out the overarching institutionary structure and its predominant ideologies, I zoom in into the specific constructs that are under examination in this thesis. A very brief overview of the uneven introduction of new media art programs at western universities and the scarcity of samples of text from that decade are useful to explain why and how I identified my anchor point in the body of literature as a first stepping stone for my analysis. Given the absence of one determinant moment in the rise of new media art programs at the university, the departing point of this research was an influential program that is several times reported as a pioneering model for the education of artists in practices that explore the new techno-scientific tools.

The final part of this chapter will demonstrate the (discursive) challenges to define new media art as a discipline and, relatedly, how new media art education is planned and conceived at the university.

3.1 The contemporary, global construct of the modern university

The roles and purposes of the contemporary university are the result of philosophical and socio-economic orientations that have historically shaped the institution. Kerr (1982) traces the teaching and research missions of the university to two fundamental principles instituted by Wilhem von Humboldt at the University of Berlin founded in 1810. Humboldt's concepts of *Buildung* (educational development) and *Wissenschaft* (the pursuit of knowledge) are the pillars of the contemporary teaching-learning and research missions of the modern university. Humboldt's model afforded professors and students academic freedom in teaching and learning by introducing the seminar method, the specialists' lectures, and elective courses that professors developed within their interests and expertise, and from which students could choose. The two core missions of the university were traditionally performed in tandem, with students learning the discipline as the mentor taught the fundamentals while also pursuing new horizons beyond those known in the field (Kerr, 1982).

In addition to the teaching and research missions, the service mission refers to the university's engagement with external socio-political structures, such as the church, the nation, the government, or industries. Although framed by different socio-political contexts, the first universities dating back to the 1300s in Western Europe nurtured a commitment to build their nation. This mission was transmitted to Latin American, Western and South African, some Southeast Asian universities, and to some extent brought to the North American New World, as it served to strengthen allegiance to the mother-nations (Scott, 2006). However, unlike their European counterparts, American higher education institutions created soon after the foundation of the United States of America in 1776 were never nationalized, but instead remained state or private institutions (Kerr, 1982). In the US, after the Civil War (1861–1865), the federal Land Grant Movement encouraged universities to assist the country in its industrial and agricultural development. This represented a major shift affecting all three primary missions of the European model: the focus shifted from the education of gentlemen, preachers, teachers, lawyers and doctors and turned towards the industrial development of the nation. As a result, the higher education that had been centred on the classic disciplines of grammar, rhetoric, law, logic, arithmetic, astronomy and later medicine and physics broadened to include the *artes mechanichae*. Technical skills were, since Aristotle and through the first medieval universities, perceived as of lesser value in the hierarchy of forms of knowledge and had therefore been kept separate from academia, which was reserved to the *artes liberales* (Elkins, 2001). The extended

mission meant that makers, manufacturers and guilds became actors of the academe. Federal support of American universities for industrial research further intensified during World War II, and into the Cold War, with research geared towards governmental interests in defense, energy development, and science (Kerr, 1982).

Today, the three missions can still be found articulated in the mission statements of contemporary universities. Although my study is particularly concerned with the teaching-learning mission, I found all three evoked in the textual discourses I analyzed. This brief introduction of the pillars, the emergence and expansion of a predominant model of the university allows me to contextualize in the following sections the changes that have been unfolding in regards to the core values of the modern university.

Several authors have written about how the traditional roles of the university as producer and perpetuator of knowledge, and protector of the national culture are ceasing to be central values of the university (Collini, 2012; Readings, 1996; Rolfe, 2013; Scott, 2006; Taylor, 2009). This shift is sometimes expressed with dismay, under titles such as *The University in Ruins* (Readings, 1996), *The University in Chains* (Giroux, 2007), "The End of the University as we know it" (Taylor, 2009), and *The University in Dissent* (Rolfe, 2013). This last volume includes chapters titled "The academy in peril" (p. 3) and "The demise of scholarship" (p. 17). Readings (1996) and Rolfe (2013) adopt a humanities perspective of the institutions of academia by looking at their history and lamenting the loss of their traditions. I adopted more sociological perspectives of authors such as Scott (2006), Collini (2012) and Taylor (2009), and the socio-economic arguments of Mirowski (2011) and Clarke (2015), who better contextualize the issues I wished to explore through this study of the discourses of new media art education at the university.

According to Scott (2006), the service and research missions of the university shifted from national socio-political interests to the economic interests of international corporate research and development at the end of the Cold War. This research was predominantly in the civil techno-scientific sectors that fed the global communications and information age. These sectors have grown relentlessly since the early 80s and intensified in the 90s. Before Scott (2006), and even before the advent of the age of the new information technologies, in the first edition of *The Uses of the University* (1963/1982), Kerr foresaw the internationalization of the university and the influence of corporate business industries on the university's structure and policies. As Kerr predicted – and as Readings (1996), Giroux (2007) and Collini (2012) later

reported, one of many consequences of the university's alignment with industrial and commercial interests was that research in certain disciplines would be privileged over others. These and many other authors have stated that this shift has been most threatening for the humanities.

In *What are Universities For*, Collini (2012) presented the results of a study comparing the forces at work in higher education systems in the mid-twentieth century with those at work today. He spoke of inevitable transformations, not only in the pedagogy and knowledge sharing models, but also in the financial and organizational structure of higher education "in almost all 'developed' (and some 'developing') countries" (p. 14). His study confirmed the intensification of the directions identified by Kerr (1982), namely the growing international adoption of a common higher education model that includes international accreditation and quality review standards. He also pointed to the general decline of government subsidization, resulting in higher student fees, increasing diversity of funding sources, and stronger presence of for-profit sectors within institutions.

These renewed interest and organizational structures of the university do not occur in an institutional vacuum. The present direction of higher education is driven by a larger, complex socio-economic context. I will elaborate in Chapters 6 and 7 on the qualities of that direction as it pertains to new media art education. For now, to further contextualize the construct of the modern western university and the changes described by the authors mentioned above, I reviewed literature on the socio-economic context and ideologies of the decades to which this study pertains, which I proceed to present.

3.2 New liberalism and the knowledge economy

The socio-economic context of the last thirty-five years in the west is characterized by the decline of industrial economies dependent on manufacturing and gross production of goods and the rise of techno-scientific progress and technological innovation. The new context saw the rise of social and economic activities that deal with data, information, and knowledge as goods, and with management services to produce, retrieve and disseminate those goods. This has been branded as "the new information society" and "the new knowledge economy" (Drucker, 1969)[2]. These two concepts are directly related to the growth of digital infrastructure, the widespread availability of consumer commodity electronics and the formation of decentralized networks of information on the world wide web. From this resulted the increased individual access to more diverse sources through both formal and informal learning channels, "affecting how knowledge is technically produced and distributed" (Century, 1999, pp. 12–13). In this context, information and knowledge are structurally and qualitatively dispersed, which is to say that there is no single source, or a unique set of rules for accessing, disseminating and using available resources. It follows that it is seemingly impossible for one person or even one institution to choose and access the best resources in constantly evolving and self-organizing structures, or develop flexible systems that would adapt to the continuous and difficult to predict changes.

New Liberalism was the economic and philosophical model that first proposed, and from the onset, acclaimed the idea of political and socio-economic organization that embraced decentralized structures for distribution of resources, and self-regulating supply-demand and determination of value (prices) based on free competition (Dardot & Laval, 2013), also known as the free market economies. The 1938 Walter Lippmann Colloquium (Paris) is largely viewed as having marked the birth of new liberal currents after which the pioneers of neoliberalism would evolve different schools of thought. The influential thinkers who attended had in common the concern with the limits of the power of the state and of governance, namely over market processes and the economic machine. The gathering announced the collapse of socialism and the need for new programs, geared towards the restitution of individual liberty, to be placed above, but not necessarily to replace, the rules and ideologies of the state. At the centre of most debates were guiding themes drawn from Lippman's 1937 book *An Enquiry into the Principles*

[2] In *The Age of Discontinuity*, Chapter 12. The Knowledge Economy, Peter F. Drucker attributes the term to economist Fritz Machlup.

of the Good Society (title translated in French as *La Cité Libre*), including how society produces, distributes and exchanges goods and services. Of the several schools of thought that evolved from this think-tank there were the influential political philosophy and economic theories proposed by Austrian philosopher and economist Friedrich A. Hayek. At the core of Hayek's theories is the individual liberty to propose and engage in new social roles and dynamics. In his book *The Road to Serfdom*, Hayek (1944) stated:

> The liberal argument is in favour of making the best possible use of the forces of competition as a means of co-ordinating human efforts, not an argument for leaving things just as they are. It is based on the conviction that where effective competition can be created, it is a better way of guiding individual efforts than any other. (p. 24)

The new liberal ideal was spelled out as highly humanistic in that it would empower every individual to access information and knowledge to become as enterprising as possible. They could engage, learn, and make the best use of available resources to construct innovative means-end systems. These could be introduced and tried in the real world, where competition would 'naturally' eliminate weaker systems, with minimal coercion from the state. In a later seminal text, *The Constitution of Liberty* (1959), when Hayek was steering away from economics into political theory, he reiterated in relation to access and utilization of knowledge that "competition is one of the most powerful instruments for the dissemination of knowledge and that it will usually demonstrate the value of knowledge to those who do not possess it" (p. 376). According to Hayek, by supporting the institutions that offer resources and knowledge, that educate and afford credence to entrepreneurs, individuals will be empowered to introduce new ideas, and organize the means by which these ideas be socially adopted. He posited that a free competitive system was the ideal mechanism that would coordinate economic as well as other activities, and sift ideas and systems that are viable and valuable from those that are not.

Aligned with Hayek's ideologies arose widespread beliefs such as the importance of higher education and specialization for individuals to attain middle-class status. The quantity of university graduates is, in line with this belief, considered an indicator of national prosperity. Not only higher education institutions, but also government agendas benefit from these beliefs and contribute to perpetuate them, as they propel a line of political rhetoric about economic and social empowerment. Lyon-Callo (2015) attests to this belief:

> The development of excellent public schools and universities producing highly educated population and cutting-edge research and innovations within the universities has often been credited with helping to produce the dominant economic position of the U.S.A globally during the last half of the twentieth century (pp. 82–83).

Between 1950 and 1962, Hayek lived in the United States and lectured at the University of Chicago. There he met enthusiasts of his proposals on the liberal economy, including Frank Knight, Milton Friedman, and George Stigler. The group's theories are today referred to as the Austro-American new liberalism. This new liberal rationality not only deployed the market logic of competition of goods and services to individual conduct, but it sought to more broadly apply it to the dynamics of all social interactions (Dardot & Laval, 2013). To achieve new individual goals, to propose and perfect new systems in all spheres of human endeavour, individuals must learn to engage or *entreprendre* (Hayek, 1959).

In the 70s and 80s, the term neoliberalism was widely used with a pejorative connotation of *laissez-faire*, in relation to the economic and social policies introduced by Margaret Tatcher (UK) and Ronald Reagan (USA). Publicly run hospitals, schools, and universities were subject to pressures to operate according to commercial interests and compete with each other to demonstrate value, profitability, and compete in the allocation of public resources (Bloor & Bloor, 2007). It was in these decades that the ideology intensified and became a global rationality, with the anthropological notion of the man-enterprise at its centre. Its main principle was the generalization of competition as a behavioural norm aligning social relations, processes of producing and sharing information, knowledge and all forms of innovation with the mechanisms of the market (Dardot & Laval, 2013). The focus shifted from the specific role of the entrepreneur in the economy and the ability to accumulate financial capital, to the 'nature' of the entrepreneurial faculty and how it can be nurtured in each individual, subjected to competitive relations with others to stand out for their acquired knowledge, innovative ideas, and for their influence. As a result of the spreading of this ideology, today we speak of acquiring economic capital as much as of cultural and political capital. Clarke (2015) reinforces the pervasiveness of the neoliberal ideologies beyond the economic sphere, and prefers the expression "market mimicking devices" (p. 131) to refer to the "market-like relations, practices and calculations (…) which are then effected at the individual, and different systems level" (p. 133). For Clarke, these principles are global, economic, political, and cultural ideologies, and they are pervasive through social exchanges and organizational systems to the point that they are seldom critically

recognized as acquired or inculcated schools of thought. These organizational systems include the university (his analysis is centred on British higher education), as he explains:

> Higher education is grasped as a national system, framed and ordered by central government policy, funding and forms of regulation. It is also (…) a multinational system within the devolved U.K., and is –in some ways– an international system (in terms of collaboration, competition and the attraction of students and other valued resources). (pp. 133–134)

He proceeds :

> This conception of a system is not unique to higher education (…), but it is a powerful way of framing the internal worlds of universities, demanding their adaptation to compelling external enterprise. (p. 135)

Neoliberalism has provided a grand integrative narrative to which the university is inextricably linked. Lyon-Callo (2015) explains that “schools and universities are sources of knowledge production, which both help to craft material and ideological relations and are themselves a product of those conditions. Educational institutions reflect, reinforce and produce particular ways of thinking and being” (p. 82). These ways of thinking and being can be detected in the prevalence of specific discourses within the academic communities, which is the fundamental premise for the methodology of this research. The ongoing introduction of new systems and resources into the socio-political-economic fabric results in the constant reorganization of the power and influence according to the logic of free-competition. This resonates with Foucault’s (1980) principle that individuals are the vehicles of the dynamics of that power as well as its points of application.

Formal higher education systems and policy in western countries have been instrumental in the diffusion of this model of the individual-enterprise as the norm. This is expressed in the research, teaching, and service missions of higher education institutions. The authors reviewed in the two following sections elaborate on the manifestations of the neoliberal doctrines on the organization, administration, and missions of the university, and further expose the ways in which the university as a social entity enacts and perpetuates neoliberal ideologies.

3.2.1 Neoliberalism in the university / the university in neoliberalism

Mirowski (2011) lists the many repercussions of the competitive, market-based systems of organization in the production and dissemination of research at American universities. Similar arguments are presented and extended by several authors not only in relation to changes the neoliberal logic effects on research, but also on teaching-learning and university governance (Shear & Zontine, 2015; Clarke, 2015; Collini, 2012; Taylor, 2009; Kerr, 1982). The following presents some of the ways universities are discursively and structurally caught up in the neoliberal ideologies and socio-economic context introduced in the previous section.

I begin with Mirowski's critique of the logic of neoliberalism, which he claims to be directly associated with the commodification of all three missions of the university. However, his argument places greater emphasis on the commercialization of the goals and products of scientific research. Mirowski (2011) maintains that since the 1980s we have assisted profound transformations at the level of the social practices, institutional rules, and formats of conveyance of information, ultimately affecting the very meaning of knowledge. The fallacies of the neoliberal logic conceived by Hayek, when applied to knowledge production and distribution, are exposed by Mirowski (2011) in a provocative argument in the chapter titled "The New Production of Ignorance: The Dirty Secret of the New Knowledge Economy*"* (p. 315).

The primal neoliberal premise is that when applied to all spheres of society, competition produces a self-organizing dynamic that affects the environment in which subjects develop. It requires constant adaptation, discovery and learning, and instigates competitive relations (Dardot & Laval, 2013). In the contemporary knowledge economy, data, information, and knowledge are perceived as commodities (goods) available for all individuals to access, assemble, and use. If these goods follow the logic of the free-markets as proposed by the neoliberal agenda, then some forms of information and knowledge will be of lower value than the rest. The mechanisms that determine the competitive advantages of knowledge and which knowledge is advanced are often dictated by forces external to the field that produced that knowledge (i.e. demands and preferences of consumers or of those with specific interests and power). For example, research into sustainable technological solutions is "of less value" in terms of profitability than research and constant re-development of new technological features and design that are deployed in ignorance of, or plain disregard for, their environmental consequences. The real long-term impact of production and consumption of technologies that are quickly rendered obsolete or not reparable is silenced, in favour of the rhetoric of innovation that brings forward individual and social overoptimistic benefits of these technologies (Penny,

1995; Marien,1996). In this case, the market logic trumps the environmental impact and long-term cost of the perceived need of the new. In the case of research, this logic disregards the possibility of misinformation or misguided research when external forces act upon what knowledge is pursued and to what end. This leads Mirowski to conclude that in this logic, "there is putatively no such thing as negative information" (2011, p. 318).

Mirowski's argument is geared towards disproving this principle, as he names instances in which the idea of advancing knowledge that is highly regarded by academia, becomes corrupted by having a price attached to it. The neoliberal logic assumes, based on Hayek's principle of competition, that knowledge will naturally be directed to its most efficient uses and users, which omits the likelihood that the quality of, and access to, the product (knowledge) may be corrupted by being attached to a system of exchange value, and engulfed in competitive systems of production (research) and dissemination (teaching-learning and publication). The commodification of knowledge supposes the devalorization of knowledge that is not easily commodifiable, therefore it is possible that the most significant and valid new knowledge is not the more highly valued knowledge.

Mirowski (2011) asks whether the commodification of knowledge is inevitable given the association of education and research with for-profit interest. This manifests in corporate-like mechanisms for the production and dissemination of knowledge such as generating revenues from licensing intellectual property (research findings) and from commercializing prototypes, investing in marketing campaigns for the outreach of research(ers), and funding academic research clusters to become branches of corporate research and development. Academic-corporate partnering is not restricted to research. It also occurs in program and curriculum development, which increasingly targets the acquisition of 'real work life competencies' that are perceived as leading to better employment opportunities for graduates, and therefore benefit the university's enrollment campaigns. These collaborations, however, clearly privilege certain disciplines over others and create an imbalance in the support of different disciplines, often considerably less incentives are offered for research and curriculum development in non-STEM subjects (the Arts, Humanities and Social Sciences) (Readings, 1996; Rolfe, 2013; Clarke, 2015).

One of the most problematic issues associated with the corporatization of the university is the conception of students as consumers or clients. Education is perceived as a service dealt in a market transaction, with the university as the service provider and the instructor as the clerk (Shear & Zontine, 2015). It has become commonplace to see economics experts appointed to

leading positions at higher education institutions. Assessments are regularly conducted using methods and tools of accounting and auditing at the most minute level. Teaching is subjected to a variety of evaluative instruments for benchmarking and to rank courses, instructors and programs. In the fashion of customer satisfaction surveys, students are asked their opinion about the quality of both the teaching services provided, and their overall university experience (Clarke, 2015). University spaces and services are being privatized. Administrators, faculty members and students are adopting a market-oriented and entrepreneurial language and habits of thought (Lyon-Callo, 2015). Overall, more contributions to the economy are being demanded from universities. At the same time, they continue to be expected to fulfill the service mission and to grant prestige to their nations for the level of education and research they provide and produce (Hazelkorn, 2005). I elaborate on several of these instances as they affect new media art education in chapter 7.

It is important to note that the Western model of the modern university, which I have been describing, does not manifest as a universal and coherent project only. The present various crises of the university are not solely a product of neoliberalism, for which there are also many different hues tied to nationalistic and institutionary contrivances. There are other ingredients heterogeneously affecting the policies and practices across institutions, and within institutions. They manifest differently across disciplines. In the previous sections, I reviewed authors whose arguments contributed to lay the overarching socio-economic context in which the construct of 'the modern western university' can be described, to arrive at an operational definition I will be using throughout this dissertation.

The literature reviewed demonstrates that it is valid to say that modern higher education institutions in most Western societies are presently affected by a global ideology, driven by shared interests, and structured along a common organizational model. In this review I introduced and contextualized some key-concepts that are found in the common discourses surrounding institutional and pedagogical directions, especially within the same field of study. The literature further supported the time-frame delimitation I have set for the study, which begins in 1980. Several authors refer to this decade as the time when the present economic, social, and techno-scientific paradigm began to intensify (Century, 1999; Mirowski, 2011; Collini, 2012; Dardot & Laval, 2013). This literature also informed the methodological procedures thoroughly described in Chapter 2, namely the data collection procedures and criteria I employed to collect the samples of texts. All samples of texts in the unit of analysis were

published between 1980 and today, and refer to new media art education and curriculum development in western higher education institutions.

In addition to portraying the background context of the modern institutions of higher education, from the critiques of the neoliberal doctrine in academia such as Mirowski's (2011) *Science-Mart* and Hyatt, Shear and Wright's (2015) editorial *Learning Under Liberalism* I drew another important conclusion: even though the logic and manifestations of neoliberalism are exposed and criticized in valid arguments, as a strong power dynamic that is solidly implanted in society, its mechanisms, ready-made ideas, and discourses have become normalized worldviews manifesting within and across communities. In the academic world, Mirowski (2011) points out, it remains difficult to understand this modern predicament due to the fragmentation of perspectives, isolation of critical, self-observatory arguments in disciplines and institutions. This realization triggered my curiosity to explore the influences of neoliberalism on the culture of new media art education at the university. I extract several notes on this question throughout the initial analytical chapter, and I will address and conclude about these notes in chapter 7.

3.3 Media art education at the university. Where to begin?

Framed by the time span of the sample and by the geographical provenance of the texts and the contexts they referred to, I had to combine other literature to understand when and how new media art emerged as an academic discipline of study and practice at the university. Media art programs in higher education, like other art programs, have been largely tied to national higher education and institutional policies and contexts. The European context, where the history of arts, craft, and design, and of the education of these disciplines is well documented, continues to hold an irrefutable influence over contemporary media art education models.

To better understand how art education adapted to, and adopted new media it is worth revisiting the rise of the modern art academies, starting at the time of the Industrial Revolution in Britain, and with industrialization, the rise of value attached to manufacturing and craftsmanship. Elkins (2001) explained that educators who believed in the prime importance of the Fine Arts, determined that its principles "needed to be applied to the decorative and applied arts" (p. 31). Responding to this belief, as well as to the economic demand of industry for craftsmen and of students for employment, art schools added printing, jewelry, goldsmithing and embroidery to their curricula. This kind of utilitarian art education also made its way to the North American academies. The mid-nineteenth century represents a major shift in the history of art and art education, and marks the beginning of an unresolved tension between the fine arts, new technologies, and utilitarian art.

The training of artists from the mid-nineteenth century remained based on apprenticeships in technical skills in the workshop, and did not include study in the liberal arts. It would take several decades for a general structured curricular model to be proposed across artistic genres and media that was orientated towards the integration of the new industrial techniques and products, and the fine arts. According to several authors I reviewed as data in this research, and according to Elkins (2001), "the Bauhaus is by far the most important influence in current art education" (p. 32). The Bauhaus curriculum encouraged students to develop individual practices and learn new disciplines, but at the outcome they were still expected to specialize in one of the areas offered at the school. Arguably – this is demonstrated in this thesis – the Bauhaus curriculum did not abolish boundaries between the different disciplinary clusters based on media and communities of practice. Nevertheless, as Elkins (2001) explains in detail, the ideological legacy, as well as very practical curriculum structures and sequences of exercises that were initiated by instructors of the Weimar Bauhaus, even

notes and books, are still referenced today, or have been unwittingly transmitted in a chain reaction from teachers to learners. To briefly introduce some of its precepts, the Bauhaus established a linear and almost chronological curricular path that departed from what was considered to be the general foundations of art (and of the artistic mind) and evolved in a sequence of increasingly complex exercises (e.g. from 2-D media, to 3-D and 4-D). The curriculum was designed to lead into specialization in a given medium. Additionally, current educational beliefs about the interconnection of learning about and from theory and material practice are also remnants of the Bauhaus pedagogy, itself akin to learning theories by John Dewey (1916), on which I elaborate ahead.

Dewey's principles of education were also most influential in the short-lived Black Mountain College (1933–1957) in North Carolina, the US. Several educators and students of the Weimar Bauhaus fled nazi-ruled Germany and either attended or taught at Black Mountain, namely Walter Gropius, and Josef and Anni Albers. The focus there was on a broader liberal arts curriculum, with students determining their individual course of study with advisors through a range of theoretical and applied disciplines. The long-lasting influence of the pedagogies experimented at Black Mountain College is unclear, other than it reflected and attempted to put in practice very influential theories of its time and beyond about teaching and learning. The list of notable American avant-garde artists, critics and theoreticians who attended, taught or lectured at Black Mountain College speak of its importance at the time.

Fast forward to the early decades of this study, in the United States in the early 80s, professional art training either took place in colleges that were funded by regional governments and local patronage, or in the few university programs that offered Bachelor's of Fine Arts. Although art degrees had been granted since the early 20th century, degrees generally had little significance for practicing artists. Art schools maintained a certain independence from the requirements and standards of higher education institutions, even if they were affiliated to one. Throughout the 80s and into the 90s, however, ties became increasingly tight between art colleges and universities. Many independent colleges merged with universities to become schools or faculties of Art and Design (Hazelkorn, 2005). In Canada, four of the five major independent Art and Design public colleges that granted higher education degrees associated with or became universities from the mid-90s. The Alberta College of Art + Design was granted accreditation in 1995 to award bachelors of Fine Arts degrees, the Ontario College of Art and Design (OCAD) added "-University" to its designation in 2002, thus becoming OCAD-U. The

Nova Scotia College of Art and Design added University to its name in 2003 and the Emily Carr institute became a university in 2008. In Québec, as an exception, L'école des Beaux Arts de Montréal was one of five schools that, in 1969, merged to form L'université du Québec à Montréal. [3]

During the 90s, programs that concentrated on creative practices and explored the new technological media were also instituted in European art schools, with different orientations in France (Wennberg, 1996), Germany (Hansmann, 1996), and the United Kingdom (Blythe, 2001). In France, where many art schools remain until today under the Ministry of Culture, Le Fresnoy – the prestigious school/artist residence center that pioneered French contemporary media art creation was established in 1991. While in the UK, the socio-economic policies affecting the cultural sector under the Blair government provided again a unique context for art education in Britain. With the policy intervention of 1998, the aggregate of sectors under the designation "creative industries", of which Art and Design are a part, were promoted as vital sectors in the UK economy (Blythe, 2001). Consequently, higher education in these sectors was heavily supported, albeit predominantly for programs that were vocational in character, initially offered at polytechnics and colleges, with some departments and courses offered at universities (Steers, 1989; Brown, 1993). Twelve samples of texts in the final unit of analysis address the UK context. Many of these contain very specific discourses, concerned with the systemic implications and the place of new technological art at the university, with the vocational and professional education of artists, as well as relations with industries.

The institution of media art programs of study cannot be traced to a moment or institution of origin, or outlined as a linear narrative. It occurred at different paces, and in different contexts with different orientations. Computation and digital art programs are the oldest and stronger branch in the genealogy of media art programs, and the most common designations in the early publications I analyzed. The widespread establishment of such program in universities intensified in the first half of the 90s. As more programs were created and communities of practice and discourse formed within the field, it became possible to discern similarities across contexts. Lev Manovich (2001) explains that it was in this decade that the term *digital media* came to be used. He adds: "At the same time, along with existing cultural forms, during the 1990s computers came to host an array of new forms: Web sites and

[3] https://archives.uqam.ca/histoire-uqam/albums-photos-capsules-historiques/15-histoire-uqam/72-ecole-des-beaux-arts-de-montreal.html

computer games, hypermedia CD-ROMs and interactive installations – in short, “new media” (p. 31). Consequently, specializations related to the field multiplied, new programming and facilities were implemented, geared to accommodate to the new technological media (Averns, 2004). Zielinski (2006) adds, still referring to the 90s:

> If you didn’t engage with what was then baptized as *media*, you were definitely passé. By adding media to their curriculum, institutes, faculties, academies, and universities all hoped to gain access to more staff and new equipment. In the majority of cases, they actually received it – particularly after, in association with the magic word digital, media systems were established that the decision makers did not understand. (p. 32).

In addition to further describing the domain of this study, this overview of the arrival of art schools, and the introduction of media art programs at the university contributes to explain the scarcity of relevant texts published in the 80s. It further validated my timeframe for this study, as it indicated that significant changes were taking place around that decade in the domain of my study, in tandem with, and likely related to, the larger socio-economic conjuncture. In spite of these contributions, this overview did not reveal an explicit starting point from which to begin identifying the key-concepts of the field and extracting statements.

3.3.1 An anchor point: the Generative Systems program

In my review of studies that employed CDA, I drew several tactics from Whitehead’s (2011) approach to examine the construct of “the good doctor”. She departed from a definition that was promoted in 1910 in an influential report and became ingrained in the discourses of medical education. The discourses drawn from this text provided Whitehead with a “chronological starting point” that “anchored [the] research” (p. 32). From these discourses, she was able to compare statements in later texts that addressed the same construct and related themes. It was then possible to identify and characterize shifts in the discourses of the good doctor.

The anchor point of my study was found not in one document or one concept, but in a small number of texts that referred to a common subject. In my initial readings about new media art education, descriptions of programs of study and best practices to introduce artists to the

tools of techno-scientific innovation, I found several texts about the Generative Systems program. This was a higher education art program of study founded in 1970 by Sonia Landy Sheridan at the School of the Art Institute of Chicago. In the writings by Sheridan herself and in texts by other authors (Kirkpatrick, 2007; Farley & Brittan, 2007; Wilson, 2008), I discovered that the Generative Systems program had a seminal influence in the design of programs for the education of media artists in higher education. After completing the content analysis of a subset of texts of the unit of analysis, it became evident that this program still carries great currency in its ideologies and approaches for the training of artists in new technological media. The program was referenced by several authors, and I noticed that ideas expressed by Sheridan herself and approaches she described influenced the attitude of many educators towards new technological media.

Farley and Brittan (2007) offer a comprehensive account of the program's founding ideology, core curriculum, and organizational structure. Kirkpatrick (2006) takes on a biographical narrative of Sheridan's professional life, through which he describes the machines, techniques, and projects by Sheridan and her student-collaborators. Wilson (2008) draws a genealogy between three historical programs that "addressed the challenge of preparing artists for a technological age" (p. 31): the Bauhaus (1919), Generative Systems (1970) and his own Conceptual Design program at the San Francisco State University (1980). These authors chart the ways in which Sheridan's unique pedagogical framework and methods of instruction became an influential model from which to explore the implications of emerging technologies on art production. Their texts contain discursive elements that informed on the ideologies carried through from the program. My goal, in providing a brief overview of the program, is to introduce the reader to some of the statements and ideas I recognized in similar statements in texts of the unit of analysis, which I linked and interpreted using discourse analysis procedures. This section is of relevance in two ways: to depict the domain of the study at the early decades of the timeframe, and to introduce the reader to the first stepping stone of the approach I developed to pull apart the threads of discursive formations in new media art education. This subset of texts is not to be understood as the origin of the discursive formations. It is the anchor point of the discourse analysis.

Generative Systems, Sheridan (1983) explained, brought artists and scientists together. The program was "an effort at turning the artists' passive role into an active one by promoting the investigation of contemporary scientific-technological systems and their relationship to art and life" (p. 103). The fundamental ideology was not to train artists in specific techniques or

machines, but to develop teaching-learning and research approaches for mastering the future tools of science and industry (Kirkpatrick, 2006). Through hands-on experimentation students investigated the capacity of the technologies for creating new art that commented on the function, and changes the tools brought about in society (Sheridan, 1983).

Kirkpatrick (2006) details Sheridan's path as an artist and an educator. In doing so, he offers thorough descriptions of her techniques and the machines she used. In the 1950s, copy machines were new image reproducing technologies commonly used in business. Colour was introduced in the 70s. Sheridan introduced copiers (3M's Thermo Fax and Xerox copy machines) and other communication machines such as tele-copiers (fax), video recorders and eventually computers (Kirkpatrick, 2006). The cooperation of businesses involved in the creation of new communications tools designed for commercial use was integral to the development and success of Generative Systems classes. By making industrial instruments, personnel, and techniques available to students at the School of the Art Institute of Chicago, the program offered a viable model of education/industry collaboration, and a partnership that challenged traditional approaches to art instruction (Farley and Brittan, 2007).

In spite of these collaborations and of Sheridan's efforts to source new tools, her innovative pedagogical and artistic experiments were often questioned and interrupted for reasons pertaining to the profitability and interests of the institution. In at least one instance, the program administration reportedly announced it would not continue to provide funds for the maintenance and purchase of machines, "because the projected cost was proportionately too high for the number of students officially enrolled in the Generative Systems program" (Kirkpatrick, 2006, p. 354). I found similar institutional constraints frequently expressed by artist-educators throughout the decades of my study, which generated analytical themes pertaining to the systemic conditions (Level of analysis 2) such as 2.2 *Resources* and 2.3 *Strategic interests of the university*.

Yet another theme expressed in Sheridan's (1983; 1990a) writing about the program, which has re-emerged in my analysis of later texts, is the collaboration between student-artists, and scientists, industry executives and other artists, sometimes internationally. Sheridan established the "Inter-University Tele-linkup", an inter-city conference call system between the SAIC, and other educators and their students at the University of Iowa, the University of South Florida and the University of Pittsburg (Kirkpatrick, 2006).

Sheridan shared ideals with Walter Gropius's German Bauhaus, namely that artists must embrace new technological and industrial developments, and the importance to foster

interdisciplinary education and collaboration with industrial sectors. She used several texts produced for and about the Bauhaus in her teaching. Her beliefs about the connections between creativity and art and science, and her notion of the artist as a creative social agent was informed by the media theories, art theories, and technological art practices that emerged throughout the 60s. The 60s saw the formation of many collaborative initiatives between artists and scientists, some in which Sheridan participated. Century (1999) reported that between the 60s and 70s “artist centres, networks, university-based institutes and public sector labs were established to support open-ended exploration of new and emerging technologies by artists” (p. 9). It was in 1966 that Billy Kluver and Robert Rauschenberg founded Experiments in Art and Technology (E.A.T.). In 67 Gyorgy Kepes founded the Center for Advanced Visual Studies at Massachusetts Institute of Technology (MIT), and in 1970 France Pierre Boulez founded IRCAM (Institut de Recherche et Coordination en Accoustique et Musique) in Paris. The year of 1979 was the first edition of Ars Electronica in Linz. Throughout these decades, the Bell Labs were engaged in ongoing collaborative research with artists in the fields of computer graphics, vision, music, and acoustics (Century, 1999). Sheridan was herself an artist-in-residence at 3M’s Colour Research Laboratory in 1969, and in 1976 at 3M’s Central Research Laboratories in Saint Paul, Minnesota (Sheridan, 1990a).

The textual descriptions and references to the Generative systems program as a ground breaking instructional program in the new technological arts provided an anchor point from which I developed paths of connections with statements in later texts addressing the same issues. Like Whitehead et al. (2012) in their study on medical education, I was struck by the repetition of ideas expressed in literature up to the most recent texts describing programs and teaching-learning approaches. In fact, when I completed the discourse analysis of, and across all samples, I returned to these initial notes about the Generative Systems program to realize that from this first stepping-stone I had already encountered evidence of the most predominant discursive formations.

3.4 'New media art' as an arena for discursive struggle

When following Foucault's (1972) and Fairclough's (2011) discourse analysis procedures, key-concepts are the initial starting point and the most evident link between statements. Definitions of several concepts of this study are plural and unstable, beginning with two key-concepts in the title of this dissertation: 'new media art' and 'education'. What is the object of study of new media art education? What qualifies and exemplifies new media art? What is new about the new media and new media art? These questions are not resolved. As stated previously, new media art does not treat of a unique and permanent object, with a stable definition over time. The field emerged at the confluence of different practices and disciplines, it encompasses genres that explore new technological media but borrow from previous media, as well as genres that explore unprecedented aesthetic approaches. The new practices branched into multiple designations and the evolution is ongoing.

In a previous study about curricula design and teaching strategies for new media art (Freire, 2009) I encountered the problem of negotiating and circumscribing the definitions of 'new media', and necessarily, of 'new media art' and 'new media art education'. These central concepts of my research are wide-scope concepts (Neuman, 2006, p. 57), which means that for the breadth of definitions they encompass, the same terms can be found framed differently and attributed different meanings. As students do, at the time of that research I resorted to the textbooks I had used throughout my own education and my early readings in the field. The definition of 'new media' I used was based on Janet Murray's in *The New Media Reader* (Wardrip-Fruin & Monfort, 2003). According to Murray (2003) new media is a field of study and practice influenced by many different disciplines, and largely revolving around the computational medium and information structures.

Lev Manovich's (2001) Principles of New Media (p. 49) were also most instrumental to begin to determine what makes media "new". For Manovich (2001) the most fundamental quality of new media is the loss of material specificity and the fluidity resulting of digitization, which he argued, revolutionized the ways media became programmable and manipulable. At the time of my first study, as I grappled with overlapping perspectives from which the concept can be defined, as to not be caught in a taxonomy that does not settle, I took a safer approach and reframed the object of that study to a specific sub-set of media art, and focused on computation-digital art programs (Freire, 2009). I exclusively investigated pedagogical approaches used in digital and computer-based art, and I excluded new practices that explore mechanisms,

materials, and matter, post-screen, and hybrid digital-material-bio media. It was nevertheless a foundational research upon which to delve further in the topic, as it allowed me to concentrate on a very important and thick branch of new media art. I found that Manovich's propositions held relevancy and were directly expressed, or implied in, the structure, pedagogy, and creative practices of the courses I analyzed (Freire, 2009). At the time I am writing this dissertation, his proposed principles are still referenced in Wikipedia (n.d) to define New Media.

Ten years after *The Language of New Media* (Manovich, 2001), Galloway (2011) pointed out that "many of [Manovich's] concepts and claims are now taken for granted in the various debates that make up today's discourse on new media" (p. 379). He added that several other points of view for understanding new media have been proposed since Manovich's original publication, which he credits for fuelling the rich debates. (New) media theorists took on different disciplinary stances, including historical (Paul, 2003), the social effects of media (Lovink, Poster & Broeckmann, 2011), political (Hall, 2008), and archaeological (Zielinski, 2006; Parikka, 2012), to name only a few. To use Foucault's (1969) definition, authors like Manovich are "founders of discursivity" (p. 217) because their seminal theories generated possibilities and rules for the formation of other texts and other discursive avenues, both in accordance and in difference with those of the founder.

New media art, Burnett (2008) proposes, "is a convenient way to develop a nomenclature that designates in a part for whole kind of way, that entire field that has been created" (p. 128). The term encompasses the sum of theory and creative practices within fluid boundaries, and the field carries the biases, jargon, and assumptions from all the disciplinary backgrounds of those producing scholarly and artistic work. The concept of 'new media art', and relatedly that of 'new media art education' are, to use a Foucauldian expression:

> (…) constituted by all the statements that named it, divided it up, described it, explained it, traced its developments, indicated its various correlations, judged it, and possibly gave it speech by articulating, in its name, discourses that were to be taken as its own" (1972, p. 35).

Hence, rather than grounded on a defined construct, it is more accurate to say that in the present study I examine an arena where connected objects emerge and are continuously under transformation. I analyze the interplay of the ideological forces of this space (the powers of agency) that make possible the appearance of, and changes in, the most predominant concepts

and statements in the discourses of new media art education at the university over three and a half decades.

Since my initial study, I did not give up on harnessing a broader understanding of “new media art”. I am interested in how it has been applied in the last few decades to justify or motivate the creation and constant renewal of an entire field of study and practice, with artist training and research programs attached to it. This study is designed to analyze the construct of new media art in its fluid definitions and described practices, in a delimited and relatively stable institutional context and mission: the training of new media artists at the university. I will identify and interpret the meanings that emerge in the discourse about new media art education and the training of artists according to the significations and relations they have been attributed by the authors in the original texts. As prescribed by Foucault (1972), rather than adopt a pre-existing taxonomy (i.e. assuming that the term new media art encompasses sets of defined technologies and genres), this study draws the “schemata of dependence, of order, and of successions” (p. 57) of concepts and statements as they emerge in the texts. I will extract the most prominent concepts and definitions, media, and descriptions of practices as expressed by the authors. This will allow me to discern the most predominantly shared ideologies, influences and patterns in these discourses, and finally to identify nuances and discursive shifts over time at all these levels.

3.5 Sensitivities in the terminology of education

I initiated this research project expecting challenges related to the fluidity of the construct of new media art. In fact, it is precisely the plurality inherent to this field of study and practice that has greatly stimulated my interest for it. My initial rationale in asking the question *What is new in new media art education?* was that the concept of *higher education* and its institutional context would anchor the construct of new media art, and thus frame this research. I developed this study on the assumption that modern conceptions of education have been relatively stable within disciplines, since disciplinary cultures exhibit inertial tendencies (Barry & Born, 2013). At the onset of this research, I anticipated that delimiting this study to such specific cultures in the university, and specifically to communities in this context concerned with the education-training mission, would situate the construct of new media art within a set of boundaries and force stability onto it. I assumed that these communities shared in relatively stable meanings, understanding, and goals of learning and teaching. However, in a research methodology that departs from the analysis of concepts and statements, one has to remain aware of the meanings attributed to the fundamental terms, even if tempted to assume, at the onset, a shared understanding. This is the act of "making strange" Bloor and Bloor (2007) refer to that the researcher must constantly exercise.

Early in the discourse analysis I realized that authors were more judicious in their use of terminology pertaining to new media and art than of the terminology of education they used to elaborate on ideas regarding curriculum and pedagogies of new media art. With exceptions found in policy texts, most authors of texts in the unit of analysis are not education specialist but artist-educators reflecting on their teaching practice. For that reason, terms such as education and training, curriculum and pedagogies, teacher and instructor, are often used interchangeably, along with a wide array of synonyms to describe the act of teaching: mentoring, guiding, instructing, facilitating, … In most cases it is questionable whether the authors are aware of the philosophical foundations of these terms and of their ideas about teaching, or if they are critical of the institutionalized teaching-learning approaches they use. Additionally, when using expressions such as "new pedagogies", it is often unclear as to where these differ with the so-called old ones, besides the content of the curriculum.

The critical analysis of the discourses of pedagogies of new media art education throughout this dissertation is guided by the genealogical critique of the rhetoric of education through different paradigms outlined by Davis (2004) in *Inventions of Teaching*. According to

Davis (2004), western conceptions of teaching are derived from successive philosophical theories since the Greeks, through the Enlightenment and the birth of the modern scientific paradigm into contemporary philosophical theories. All these theories have accumulated, bifurcated, diverged, returned, and overall shaped the structure of curriculum, the goals of teaching, teaching approaches, and the very idea of the learner. Instead of offering a linear historical narrative of how different conceptions of teaching came to prominence at specific times, his account unravels "the conceptual commitments that are spun into a few strands of thought while underscoring that even the most disparate ideas are usually connected to one another" (p. 5). Throughout this dissertation I seek to identify the philosophical theories that shaped the assumptions and theoretical commitment implicit in the most predominant discourses of new media art education. Influenced by Davis, my analysis of statements about teaching and learning (Chapter 6) acknowledges that there is not one reigning theoretical orthodoxy in higher education today. Hence, conceptions of the nature of knowledge and how it ought to be passed on differ across the disciplinary cultures that come into play in the education of media artists. Sometimes conflicting theoretical trends can be detected in the same texts.

Davis' (2004) work has been instrumental at three specific levels. First, it provided a framework through which I could discern which philosophical theories about education are characteristic to which field of study, and determine which were most predominant, converged or conflicted in the discourses of new media art education; secondly, it helped me to recognize discursive legacies about education and it allowed me to critically analyze the use of a rhetoric claiming "paradigm shift" and of "new pedagogies" (Chapters 4 and 5); Finally, I based myself on Davis (2004) to ensure that in my own writing I used terms such as education, pedagogies, teaching, instructing, training in ways that are representative of the contexts and ideologies to which they refer.

CHAPTER 4. The discourses of the new

As a first step to understand What is new in New Media Art Education, I present a birds-eye view of the rhetoric of the *new* as it is employed in the discourse of new media art education across the timeframe of this study. I compiled the excerpts associated to the code *Expressions of the New* in all levels of analysis across the body of selected texts, and analyzed the statements containing these expressions, the objects of newness, the rhetoric and metaphors used. I found that the language used in discourses of the new is generally celebratory, but also vague and ideological. Discourses of the new are also often juxtaposed to calls for change, expressed with a sense of urgency.

The large number of similar statements associated with *Expressions of the New* is evidence of a very prominent rhetoric in the discourses of media art education at the university. To be concise, I try to illustrate the predominant expressions using examples from the years in which they manifest at their strongest. This, however, does not preclude the existence of alternative points of view at the same point in time, some of which will saturate at other points in the timeline of this study. It also does not preclude that expressions of newness prevail in publications from other decades.

The last sections of this chapter include my critical analysis of these discourses supported by additional literature. From this overview, in the following chapters I will elaborate on the recurrent arguments and propositions of change effected (or not) by that which is said to be *new* in the education and training of media artists at the university.

4.1 The 90s

The frequency of the code *Expressions of the New* peaks in the second half of the 90s, after which it slightly declines and changes in nature. The objects of newness of the 90s are the electronic media, the personal computer, user-friendly software and peripheral devices introduced into the market and made accessible to consumers throughout the 80s and 90s. The terms *digital media* as well as *digital art* appeared in those decades to refer to the wide array of new computational media (Manovich, 2001). The rapid succession of electronic and digital technologies, and the perception of the immense possibilities they afforded, generated a certain sense of chaos. In the samples published in the 80s and 90s, variants of the idea of novelty are expressed in recurrent terms such as *unprecedented*, *radical*, *emerging*, and *innovative*. In the discourse analysis, I noted that some authors identify which media are new, but few texts describe specific properties, such as the design, technical features, or unprecedented modes of engagement that illustrate the newness they bring about. In place of describing the characteristics of that which is new with examples of the state-of-the-art objects and practices, I found that authors focused on predicting the general directions of the social and pedagogical implications of change.

The prevalent rhetoric of *new* is expressed in calls for change, usually in alluring and celebratory tones. Pleas for change and metaphors of change often contextualize the authors' thesis, as to validate the pertinence and urgency of the ensuing argument. Sheridan (1983) talked of the changes brought about by a number of revolutions including the "computer-robot revolution" (p. 103) and the overall "technological revolution" (p. 108). Pinkel (1986) talked of the (then) current times of "technological explosion" (p. 183), and Hagebolling (1990) of the "background of rapid developments in the field of media technologies" (p. 319). Kitson (1991) began his article titled *Computer Graphics in Art-and-Design Education: The problem of Planning for Change* by stating: "The change wrought by the introduction of electronic media and computer graphics is profound" (p. 541). Iskin (1994) begins her report by introducing "the current revolution engendered by the wide use of electronic technologies and their new applications" (p. 347). Burnett (2008) would later assert that the term "*digital technologies*, has now become a trope for change itself" (p. 117).

For the majority of authors it seems that it suffices to say that *new* and *change* are technological, as they assume a shared understanding with their readership of the properties of *new* implied in the terms 'the new technologies' and 'the new media'. This is an instance of

hedging (Bloor & Bloor, 2007): faced with the complexity of pointing out the indexical qualities of newness in the technologies, and of affirming the ever-shifting attributes of that which is said to be new, the authors assume a common, general understanding of novelty. This begs the question: how much of the nature of new really is understood? Schreiber (1998) brought up this question in the article *New! Newer! Newest! Teaching new media* when she asked:

> New genres, new media, electronic media; these are the hot terms. Is it clear what, exactly, they define? The term "new genres" seems to belong more to the '80s, "new media" to the '90s. What does "new" mean? (…) Perhaps these ruminations are tautological, perhaps even pedantic. But they are questions that circulate in the minds of those of us who teach what I will broadly call, for simplicity's sake, "new media. (p. 1)

In contrast with the properties of new that are rarely elaborated on, I noted that statements of *new* are often juxtaposed to elaborate descriptions of that which is no longer new and justifications of why we must move on. This is observable in relation to expressions of *new* found in texts from the 1980s until today, even as the object of newness changes (new technologies and media, new pedagogical approaches, or new institutional systems, new systems of knowledge). The not-new is that which has been assimilated into the social fabric. It has become familiar, even obsolete, and is now perceived as in need of change. As I explain ahead, this process is characteristic of techno-scientific innovation and is cyclic: a cycle that is observed to accelerate throughout the decades of this study. In contrast to the new, that which is familiar lends itself to richer textual descriptions, with concrete examples of objects, practices and modes of engagement. So, descriptions of that which we must move on from in order to embrace the *new* often represent a large part of the authors' arguments. The predominance of these rhetorical strategies that elaborate on the not-new juxtaposed to expressions of the new at different levels of analysis led me to define coding themes such as (1.1) *Values and assumptions traditionally associated with art education*; (2.1.1) *Structure and bureaucracies of the institution*; and (4.2) *Traditional construct of the artist*.

Yet another important attribute of *new* and *change* associated with media and technologies and with the changes they effect is that it is perceived as inevitable. Consequently, adaptation – in the context of my study the adaptation of art, artists and art educators – is expressed with urgency, as mandatory and crucial. Loveless (1990) claimed that artists should "acknowledge the dominance of newer media technologies and the irreversible effect on social and cultural change that will occur in the next century and beyond" (p. 201) and that "the

evolution of new media technologies is inevitable" (p. 202). For Hagebolling (1990) "the media artist and designer is confronted with new visual expressions, aesthetics and tools that are beginning to replace common forms of information exchange and design" (p. 319). Kitson (1991) reiterated that art and design schools must update, otherwise risk becoming irrelevant:

> In the world of electronic media and particularly in computer graphics today there is no evidence to suggest that this process of change is finite. It is much more likely to be experienced as an accelerating, continuous sequence of changes. Therefore, if art-and-design schools wish to have a meaningful role, they must adopt strategies to meet rapid change (p. 542).

Finally, Brown (1993) stated that a new class of tools/process enabled by computational processing would "initiate fundamental and major changes in the disciplines involved" (p. 1), and Ascott (2001) went as far as claiming that, in the face of the changes engendered by new media technologies, "arts education will adapt or die" (p. 9).

Still referring to expressions predominantly found in the 90s, I detected a shared sense of anticipation and speculation about the future based on the imagined affordances of the not yet accessible, or not yet existing technologies. I also found expressions of great expectations in regards to announced technical and social allowances of the new machines. The following quote by Adams and Fuchs (1985) illustrates this type of rhetoric:

> Computers, like the Apple Macintosh, are beginning to make use of skills drawn from a broad band of the visual arts. Yet another type of human skill will enter computing as we, by the end of the decade, start communicating with these machines through speech. The intellectual tools required for multiple technological styles are those that must integrate many visions. New computers will allow for a wider range of sensory input and output, with technology going hand-in-hand with our humanness (p. 22).

Fabo (1993) reported on the discussions at the 1992 *International Symposium on Arts and Media* (UNESCO) about the potential of the new means of communication. Participants discussed the imminent emancipation from traditional roles of addressor-addressee, new processes of participation and collaboration, and foresaw the new communication media would

bridge the gap between continents and cultures. At the peak of the hype surrounding networked communications media, Bumgarner Gee (2001) spoke enthusiastically of the “interactive, non-hierarchical nature of computer technologies” (p. 3), of the “celebration of worldwide connectivity and multicultural interaction”, and of the “global availability for real and virtual engagement with the arts coupled with enormous employment opportunity in a technologically exciting arts industry” (p. 4).

In the same way that descriptions of that which is not new entail expressions of urgency to move on from obsolete techniques and media directly into speculative futures, I found many alarming statements claiming that compared to other fields, art education is too slow in addressing technological change. These ideas are expressed in codes (1.2.1) *Art education is slow to address change*, and (2.1.3) *Reluctance in adopting change and emphasis on precedents*. Statements in these themes emphasize the urgency to develop pedagogical strategies and adapt institutional structures necessary for art education to keep up with the new, even though the new is seldom described in detail that supports said strategies. Sheridan (1990b), the pioneer technological art educator, stated this problem quite early and eloquently in her writings:

> In less than a decade we will enter the twenty-first century, yet art education is creeping along as though this were still the nineteenth. While our planet is going through a communications revolution, much of art education is geared to the past. (…) For the most part, art-educational changes are occurring in layered increments. Although new areas of interface between art, science and technology are sprouting up all over the world, the vast majority of institutions are only adding new media to old structures. (1990b, p. 165)

This is restated in publications from year to year, in expressions of slowness, delays, and barriers. The reluctance to embrace the new technological media and the changes these bring about are from all the individuals with interests in the powers in place; these include the artists (Loveless, 1990; Hansmann, 1996; Wilson, 2008; Berrett, 2011), art educators (Henderson, 1996; Ascott, 2008), as well as institution bureaucrats (Kitson, 1991; Wennberg, 1996; Henderson, 1996; Gigliotti, 2001; Lovink et al., 2002; Bogost, Mateas, Murray & Nitsche,

2005). The following chapters bring up the roles and interests of each of these groups respectively, which are then summarized in chapter 7.

In the midst of the technological hype of the 90s, Simon Penny delivered a critical analysis of this rhetoric surrounding new technologies and media. He linked the new discourses adopted by artists to the "techno-utopian rhetoric of the consumer commodity marketplace" (1995, p. 62), which he traced back to the beginning of the Industrial Revolution. This rhetoric hails the numerous alleged virtues of scientific and technological innovation, and is fuelled by the relentless imperative of new. He explained that the celebration and urgency of the new is not a cultural or societal need. This condition is promoted in discursive formulas that are meant to strike consumers not only as appealing, but as necessary, when the only need is, in fact, profitability. To explain how this rhetoric affects artists, Penny (1995) observed:

> There is an argument bandied almost in certain circles that art practice that uses emergent technology is of value because it is future oriented: by virtue of its tools, it is progressive. This implicitly puts the artwork in a position subservient to the technology, which by virtue of the fact that it already exists, must be more "advanced". (p. 53)

He continued by asserting that artists cannot engage technology without becoming complicit in consumer commodity economy, as they enter the cycles to continually adapt and retrain in the successive generations of new tools. Two decades later, artists – as individuals invested in professional and social interactions – are indeed still engaged in the constant technological innovation, with no slowing down in sight. However, from the vantage point of time, I would argue in disagreement with Penny (1995) that they are not necessarily subjected to these cycles and the field has developed and contributed critical ways of engaging techno-scientific innovation.

The constant chase of *new*, Penny (1995) further argued, comes at the expense of time and opportunity to exercise the "creative analysis and questioning of the relationship between culture and technology" (p. 50), which he contends, ought to be the first role of the artist. In this sense, the imperative of new reifies a value system that precludes art practice. The pressure to update and retrain was often expressed by artist-educators in my analysis of teaching and learning challenges (code 1.7), a topic I return to in chapter 6.

Richard Wright (1995) reinforces Penny's (1995) idea when he explained that the idea of the computer as the universal machine that hosts a wide array of media forms, is a notion nurtured by computer manufacturers that promotes an artistic desire for ongoing renewal of formal exploration through computational media, occurring not only across artistic genres, but across disciplines. He claimed that "artists who were previously experts in separate disciplines and distinguished for their independent skills, now find themselves working at the same machines as a wide "range" of users, and their skills and tools are now encoded down to a list of menu options" (p. 76). This announced Manovich's (2001) principle of material fluidity, which he would later claim to be one of the defining principles of new media. The loss of the material specificity of media resulting of digitization, as well as the convergence of skills and disciplines to the computational medium emerges as a salient characteristic of technoculture in texts published throughout the decades of my study (Loveless, 1990; Kitson, 1991; Brown, 1993; Rappaport, 2004; Blair, 2005; Rutenbeck, 2006; Eber, 2007; Sonvilla-Weiss, 2007).

At this stage, in the 90s, the focus of the authors is predominantly on how the computer can also be a tool of experimental creation and expression, and hence how it can (must) be incorporated into the training of future artists. Erkki Kurenniemi (1972/1982) offered very early, almost ahead of his time, what is in my view, one of the most compelling points on the processes of emergence of digital art, which he calls "the stages of computerification of art" (p. 98). His argument was informed by his thorough understanding of the developments as he was writing, and by his speculative views of the future possibilities of the computer and how these will change art. What I particularly appreciate in Kurenniemi's writing is his abstinence for complying with the over-enthusiastic rhetoric of the new, while also resisting technophobic discourses.

The first stage of computerification of art, he calls the stage of 'fluctuation', which designates a phase of processes of exploration of the computer as a tool, but still within the "classic" disciplines of art: literature, music, ballet and visual arts. He demonstrates how the convergence of both the machinery and content of old media reduced to equal data was revolutionary for art. As Nicholas Negroponte's (1995) would later assert: "bits are bits", meaning that in the (then) new digital medium there is an equivalence between the fundamental building blocks of all data that ignores qualities of the material, technical and physical manifestations that produce the content. Kurenniemi (1982) described this phenomenon and how it affected art, as follows:

> The computer does not abolish the principal bind with materiality, but it renders all other matter besides itself redundant. On a hard drive, an image, a piece of music, and a poem are conjoined by a binary structure. The central processor processes all this information as equal data. Because the computer is a “Turing universal machine”, it can do anything that is computable to this data. (p. 98)

Kurenniemi’s other two “stages of computerification of art” (p. 98), the stages he designates respectively as “new forms” and that of “consolidation”, give away the orientation of the discourses that unfolded in post-2000 publications. They are the following:

> In the second stage the computer invigorates the art scene by creating new art forms, such as interactive fiction. In the third stage the different genres of art are fused together into an all-encompassing and pure computer art, from which the old genres are only obscurely distinguishable as strands in history (p. 98).

In fact his theories informed my analysis of texts until the most recent publications. I return with a more in-depth review of Kurinniemi’s described processes of computerification of art in the last chapter of this dissertation. Towards the conclusion of my analysis, it appeared to me that the evolution of art towards computer media as he conceived it, can bear a direct relation with the processes of learning and creating with many other new media. His work provided me with a framework to think about new media art, and relatedly of teaching and learning, as relational and contingent situated practices, that constantly adapt and negotiate with the present context of ever-widening and interconnected range of media, materials/matter, objects of study, and theories that the field encompasses.

4.2 The shift at the turn of the century

Past the peak of the mid-nineties, the enthusiastic and celebratory tone of the discourses of the new surrounding the electronic digital technologies fades, but never completely vanishes. This tone continues to colour the discourses of new media art education and manifests until the most recent publications. However, I identified a discursive shift based on the statements associated with or juxtaposed to *new*. The rhetoric of new progressively moves from being concerned with the latest technological machines and software, and with the urgency of mastering their techniques, to overseeing the impact of techno-scientific innovation in shaping unprecedented social interactions, new modes of cultural production and of knowledge construction.

In statements about change in the years post-2000, the new technologies are discussed for more than their technical attributes; the discourses focus on their place and roles in increasingly intricate social conjunctures. An important number of texts offer evidence of the emergence of a critical discourse regarding the politics, the economics and the symbolic dimensions of the hype surrounding 'newness' of the media of the 90s. Based on content and discourse analysis of the samples, and on frequency and genealogy of statements, I associate two major themes to this discursive shift in the discourses of the new, both of which took place at the turn of the decade. In CDA, an event manifests in the saturation of statements, and their predominance from a certain point in time. These statements might refer to the same object or term, occurrence or ideology, that testifies to a discursive shift. The first evidence of this discursive shift towards more critical discourses of the new is related to a socio-economic event. The second is a seminal publication in the field of media theory.

In the midst of all the speculative dramatic changes announced for the turn of the century, one of the defining socio-economic events that occurred was the collapse of the dotcom bubble. The dotcom bubble is an economic expression that refers to the over-confidence of investors in the numerous technology-related, internet-based start-up companies founded between 1995 and 2000 (hence with .com in their domain name). This was based purely on speculation in regards to the possibilities of technological advancements that were developing fast. It is relevant to note that the formation of this bubble not surprisingly corresponds to the peak in enthusiastic statements in the discourses of the new. When the profit of most of these companies failed the expectations, and a majority of them folded, millions of investment capital was lost, leading to an economic recession. From an economic perspective

the excitement surrounding the new technological media seemed to have failed, and the discourses across sectors began to reflect this failure. Lovink et al. (2002) claimed that the hype on the rise of new media did not materialize. In the art world, this motivated the intensification of a critical discourse attempting to bring to light how the technological advancements that were deeply affecting not only economic but all spheres of social life were ruled by capitalist interests, while creative and truly emancipatory uses of the media and technologies lagged far behind. Lovink et al. (2002) rightly predicted that a whole generation of students would feed on the critical responses and debates about new media that emerged after the rise and fall of the "speculative heyday of media culture of the nineties" (p. 1).

This economic crash and the rise of critical voices coincide in time with the second occurrence that I associate with the shift in the discourses of *new* in new media art education: the publication of the seminal text by Lev Manovich (2001) *The Language of New Media*, which many claim to be the most influential text in media studies (Galloway, 2011; Rossiter, 2006) has arguably influenced even more than the previous event a whole generation of students. In Manovich's (2001) famous account, the language of new media refers to the conventions of the new cultural forms that emerged from the computerization of culture. Manovich investigates the traditions that shaped the development of new cultural objects, and points out the new aesthetic possibilities of these forms. He refers to "new media objects" and not "new media art" since his work is concerned with all media types and "the culture at large rather than new media art alone" (p. 39). Nevertheless, his account of the ways in which the use of computers to record, store, create, and distribute media makes it new, became a seminal reference to the theories of media art that followed, responded, criticized or complemented his propositions. As discussed in the previous chapter, this text prompted several other points of view for understanding new media, which were put forward by authors writing from different disciplinary stances. It is, not surprisingly, the most referenced and quoted text in my unit of analysis.

Following these two events, the enthusiastic and celebratory rhetoric of expressions of *new* fades to give place to more nuanced critical positions. The objects of *new* in the discourse about the education of media artists become the dynamics and changes in the socio-cultural context that affect art and education, of which the new digital machines and processes are the artists' main focus. In spite of this shift in nature, post-2000 *newness* in the discourses of new media art education continues to be expressed in equally broad statements, and to be

perceived as an “inevitable flux of change and constant reinvention” (Wilson, 2008, p. 40), which artists and art educators must address.

Metaphors abound to characterize the new and complex social, techno-cultural conjunctures that new media artists navigate. Ascott (2001) spoke of “a new interspace of potentiality and promise for the creative mind, one that will demand a total revision of pedagogies and practices of arts education” (p. 9). For Sonvilla-Weiss (2007) artists are navigating “new territories in which the role [of artists] and their scope of action have not yet been fully explored” (p. 4) and for which artists will have to develop “new contextual abilities” (p. 6). Sweeny (2008) associated the continuous developments in new technologies to the complexification of social systems, which he claims “inevitably push beyond their initial boundaries, into new conceptual and physical territories” (p. 93). McWilliam et al. (2008) also referred to “new borderlands” and “new dialects and capacities for translating across discursive boundaries” (p. 251).

The expression “paradigm shift” is the most frequently used expression to characterize the socio-cultural changes brought about by technological innovation, especially but not exclusively after the turn of the century (Hazelkorn, 2005; Sonvilla-Weiss, 2007; Ritchie, 2006; Wilson, 2008; Schnapp & Shanks, 2009, McGill, 2012). This expression is sometimes, but not always referenced to Thomas Kuhn’s (1962/1996) *The Structure of Scientific Revolution*. In his chapter “The priority of paradigms” (p. 43) the concept of paradigm is used to refer to the theoretical commitments and assumptions that frame research models of fields of study at specific times. Paradigms encompass sets of agreed-upon theories, conceptual definitions, methods, as well as “observational and instrumental application of those theories” (p. 41). These are, he further explains, inscribed within a disciplinary community’s agreed upon approaches for knowledge production, and in the pedagogies of the field. Traditionally, students have been taught to solve problems that serve to demonstrate and learn the accepted theory, laws, concepts and techniques of the discipline. Kuhn calls these the "intellectual tools" (p. 46) of a field. Discourse is one of these tools, and carries the habits of association of concepts and interpretations that are most predominantly accepted in the field. Nevertheless, it is essential for the evolution of knowledge to which the community is committed that questions continue to emerge around new phenomena, as well as phenomena that has already been investigated. When legitimate questions are found that cannot be answered within the existing paradigm, a paradigm shift, or a revolution occurs. Discourses will reflect these shifts.

Latour (1986) pointed out the affinity of the terms ‘paradigm’ and ‘culture’. The former is

predominantly used by scientists to refer to a set of systematized knowledge, beliefs, and assumptions reflected in the practices and techniques of groups of scientists at a specific point in time. The foundations of these beliefs, knowledge, acquired and transmitted within the group sometimes remain unquestioned, which is why Latour refers to these as *mythologies*. This definition of 'paradigm' is indeed difficult to distinguish from the set of attributes that define a 'culture' in the social sciences and anthropology. Throughout this dissertation I use the expression 'disciplinary cultures' to refer to all these aspects that have crystallized and define the clusters according to which the organizational architecture of the university is built.

In Kuhn's (1962/1996) account, paradigms and revolutions took hold in the academy, and pertained to shifts within disciplines. Universities were then considered to be the epicentre of knowledge production and dissemination, where the outside world was examined and discussed. Balsamo (2011) contends that this no longer holds in the present times, since "the academy is now one site among many others where learning and knowledge production happens" (p. 136), largely because of the communication technologies available today. I have elaborated in Chapter 3 on some of the institutional as well as socio-technological conditions for knowledge production and dissemination, and will further describe the present complexity of systems of knowledge in the last chapter. It is important to further deconstruct the discourses about the current cultural shift, which is broader than the academic context, but certainly includes it, hence that is a point I will arrive at towards the end of this dissertation. Has there been, indeed, a paradigmatic shift in art education when it comes to new media? How are artist-educators, and the communities concerned with new media art education at the university conceiving and addressing the proclaimed shift? These were questions that I carried from this initial discourse analysis of discourses of the new.

4.3 The relativity of newness

In the process of analyzing the discourses of the *new*, I entered memos of my reflections about this rhetoric. The concepts and statements drawn from the expressions of new and the calls for change offer evidence of a dominant and persistent rhetoric. Although the objects of newness change over time, the sense of urgency, the need for change, and the imperative to embrace the new, persist, even when the affordances, conventions, and impact of that which is in emergence are not yet fully understood. Such repetitive rhetoric undermines the very notion of new altogether. Brown et al. (2008) contend: "interpreting a new situation within known or assumed paradigms can be an effective, if implicit, method of resisting change" (p. 31). It is not truly change, nor a paradigm shift or revolution, if the discourses and rhetoric remain the same. The paradox is that it is through the intellectual tools and the technical infrastructure in place that we assimilate the new. In this section, I propose taking on alternative or complementary perspectives to critically analyze the rhetoric of urgency and imperative that persistently characterizes the discourses of the new. Contemplating such perspectives will be most useful for the critical analysis of these discourses, as well as for the subsequent analysis of the roles of artists and of new pedagogies.

Economic theories explain that technologies are more likely to evolve in modest increments of 'newness' and in small, cumulative improvements of successive generations that form long threads of innovation (Rosenberg & Frischtak, 1983). Few technologies emerge suddenly, in an outburst that holds significant 'revolutionary' importance. This is because most technologies need foundations in place in order to be implemented: they must build on some familiar modes of engagements that user-consumers will be able to appropriate, and new technologies most likely are associated to, even dependent on technological infrastructure that is already in place. Additionally, the investment for the research and development to be carried on that supports techno-scientific innovation depends on its predetermined possibilities for further development, in terms of opening to other new techno-scientific possibilities. These theories explain the synchronization of production and dissemination paths of new technologies along one mainstream trajectory. It is to be noted that in processes of technological innovation, that which is technologically feasible is not necessarily economically attractive, and therefore many possibilities for technological advancements are not considered. The hype of 'newness' is in many ways a discursive tactic that greatly serves the dissemination of new techno-scientific

innovation to be released into mainstream publics. The enthusiasm for the new goes hand in hand with the perceived obsolescence of the preceding technologies.

Penny's (1995) critique analyzed the hype of newness in technology from this economic, and corporate marketing perspective, where new consistently points, in an enthusiastic rhetoric, towards 'progress', improvement, better performance, and more speed. According to Penny (1995) and Wright (1995), this consumer-commodity rhetoric imposed on artists, and by extension also on educators and institutions concerned with the training of artists, the constant renewal of tools, skills, and approaches to keep up with the corporate technological innovations.

In light of more recent theories, however, this consumer-commodity rhetoric is a very linear, hegemonic narrative of the evolution of technological media. Parikka (2012) argues that the hype of new surrounding digital culture in the 80s and the 90s can be deconstructed, and contextualized in many ways that will complexify the understanding of what is indeed *new* in new media. Hansen (2004) explains that amongst the multiplicity of theories and histories of new media, two predominant positions can be generally identified. On one hand, there are those who claim that new media has changed everything, and on the other, "those who remain skeptical that there is anything at all about new media that is, in the end, truly new" (p. 21). Somewhere along this spectrum, the relativity of 'newness' and the multiple perspectives from which it can be analyzed are of interest to media archaeologists, who suggest that alternative discourses are possible and desirable (Zielinski, 2006; Huhtamo & Parikka, 2011). Past new as well as future new media ought to be understood in light of the histories of science, of the social, and cultural events, in relation to, but not strictly centered on, the economic systems that shape(d) their evolution.

Media archaeologists tend to propose that technology is neither old nor new, but assembled from pieces of both. Opposed to accepting a radical new-versus-obsolete dichotomy, their propositions open investigation into pre-digital media to uncover the modes of engagement and technical aspects carried on through older media into the digital, as well as potential developments that were dismissed, and why. For example, Zielinski (2006) maintains: "In the Internet, all earlier media exist side by side. They also continue to exist independently of the networked machines and programs and, from time to time, come into contact with each other" (p. 31). The ideas he brings forward provide a framework to critically analyze the predominant discourses of the late 90s concerning the hype of new digital technologies. This approach is not foreign to Foucaults' archaeological and genealogical methods, which tie old discourses to new ones.

The dominant rhetoric surrounding the new is not unique to digital media. Technological advancements introduced in the nineteenth century were also imbued with the aura of newness, announced with comparable spectacle to the one that surrounds the new technological apparatus of today, and received by an equally (arguably much more) mesmerized audience. The cyclic history of mainstream discourses about the prospects of the new technologies, many times represented in, and perpetuated through literature and in visual images in film and advertising, has coded the mainstream reception of the new through generations of technological innovation.

Erkii Huhtamo (2011) proposed the idea of *topoi* to refer to recurrent patterns and discursive or visual clichés that "accompany and influence the development of media culture" (p. 28). *Topos* can be based on positive or negative images that often coexist; in the first case they are sometimes explored in promotional strategies that forward historical or cultural attraction value that will be familiar to the consumer. In the second, the rhetoric is of fear and of possible negative futures. In relation to the second, Lenoir (2004) explained (referring to the computer): "From the very beginning of critical engagement with computer technology, concern has been voiced about the potential, feared by many, celebrated by some, of the end of humanity" (p. xv). Some, like Balsamo (2011) claim that we are already living the realization of the science-fictional concept of "technological singularity", proposed by Vernor Vinge in 1993 at the NASA Lewis Research Center. Vinge (1993) described "singularity" as a moment in time when, as a result of constant creation of ever more intelligent entities, their capacities will exceed the human ability to keep pace with the changes. The narrative of dystopian futures resulting from technological developments in computation and artificial intelligence that succeeds in displacing humanity through an evolutionary process leading to an android capable of ruling human society has been the theme of numerous popular movies since the 80s. Such examples are *The Matrix* trilogy (Wachowski & Wachowski,1999; 2003; 2003) and of the movie *Blade Runner* (Ridley Scott, 1982) which announced this overwhelming threat for 2019. Clearly it will not have come true by then, and is therefore being postponed to 2049 in the soon to be released remake, by Canadian director Denis Villeneuve. The rhetoric of fear and of the negative future that awaits humanity can sometimes also be found in the discourses of new media art education as well. In the next chapter I outline and analyze these discourses of the (negative) effects of technology and the roles of the artists to counter these effects, with examples of statements found throughout the unit of analysis.

Zielinski's (1999/2006) concept of "*psychopathia medialis*" would also be a form of topoi (Huhtamo, 2011). He revisits this concept throughout his writings, to refer to the standardization processes by which new media is presented and introduced within our current capitalist condition; a condition by which consumers are overtaken by a sense of desire and need of the most recent technological devices. Of interest to the critical discourse analysis in this study is Zielinski's (2006) proposition that to interrupt cyclic discursive formations that are used to present new media, and recurrent attitudes towards new media, artists must be prepared to take risks and "turn around what is familiar" (p. 11). Artists ought to research and uncover alternative uses and perspectives of technology that defy the single-streamed rhetoric of future, high-speed progress and innovation. As artists reinvent and repurpose media, their approaches may encompass taking on different disciplinary views, and may refer to past historical epochs to re-interpret and intervene in the processes of media (re)development. According to Zielinski (2006) artists must be cognizant of the mainstream discourses and media practices, and understand how a given medium has been introduced and assimilated into a set of conventions, predetermined by its distributors, but not in thrall to it.

The analysis of expressions of the new allowed me to identify the statements and concepts immediately associated with new, such as the idea of change, and the objects that these expressions referred to throughout the decades of this study. In the 90s, these are the consumer-commodity technologies that entered the markets, namely the personal computer and peripheral devices. The computer remains until the most recent publications central to most media processing techniques. However, it progressively loses its centrality as the discourses of the new lose of their initial enthusiastic rhetoric in relation to the novelty in the machines, to become more nuanced and critical, and rather interested in the newness that new media bring at a broader level of socio-cultural dynamics. This shift in the discourse was largely due to the rise of several currents of media theory, and science, technology and society studies (STS) that shaped the meanings of the concept. The premises and influence of these currents are elaborated ahead, as they pertain to specific concepts that characterize other discursive formations.

My goal in this chapter was to begin to convey to the reader the prevalent claims, tone, and rhetoric – the discursive commonplaces, to use Huhtamo's (2011) terminology – of newness in media art education. As much as this analysis introduced a predominant discursive stream in the unit of analysis, it did not suffice to respond to more central questions of this

study. It does not clarify how the announced changes, revolutions and paradigm shifts manifest in the education of new media artists at the university. In the following chapters I will deconstruct how this dominant rhetoric relates to, whether it is reflected or not in specific propositions about/for curricular structures and pedagogical approaches. For that, I delved further into the themes of each level of analysis. Introduced by Zielinski's (2006) ideas about the role of artists in shaping new media discourses and practices, I proceeded with the discourse analysis procedures along level 4: *The identity and role of artists*.

CHAPTER 5. Roles of new media artists

While the nature of the discourses of the new and the objects of newness have shifted throughout the decades of this study, there is a dominant discursive strand attached to this rhetoric regarding the role of artists in the face of the new and of the calls for change. Whether new refers to the technologies and required skills to explore them, as is emphasized in the earlier decades of this study, or to socio-cultural contexts and systems of knowledge (paradigms), which are the predominant objects of newness post-2000, the unchanging discourse I describe here claims that the new media artist is affected by the new and must engage with the changes. Student-artists must therefore be prepared to engage with continuous 'newness'. As I progressed in the content analysis of the articles I noted that this construct of the artist comes hand-in-hand with three other dominant discourses: the discourse of the (mostly negative) effects of new technologies, the discourses of the artist as visionary, and of the artist as an intermediary.

Juxtaposed to the rhetoric of new described in chapter 4 are recurrent ideas that media artists must renew and expand their practices to keep up with the new technological and scientific advancements of their times. In accordance with Zielinski (2006), it is often expressed that artists must explore in critical ways the technologies developed for commercial and (in the earlier decades) for military purposes, and explore alternative uses that defy the corporate, consumer-driven culture. It is suggested that the artistic intervention takes hold from within, with the very tools and concepts of that culture. Artists are expected to be visionaries, which means to be at the forefront of the technological and social changes. They are also expected to act as intermediaries across cultures and disciplines, and therefore be able to reflect and work with the tools, materials, and concepts of many disciplines.

I demonstrate in this chapter that the predominant discourses of the roles of new media artists are sometimes interwoven with opposing discourses promoted by the systemic socio-economic and institutional context. I investigated the shifting meanings of the concept of *creativity* to make this point. This chapter will also lay the ground for the next one, where I demonstrate how the discourses of the roles of the artist are reflected in the discourses of new pedagogies.

5.1. Discourses of the (negative) effects of new media technologies

The very first article I analyzed introduced me to a powerful idea to which I remained sensitive in the subsequent discourse analysis. Gregory (1980) exposed the rationale behind the development of a program of studies integrating the sciences and humanities, within which he included the training of artists. He argued for both the need for humanistic perspectives in the training of scientists and, reversely, for humanists to revise and enlarge their mission to engage with the sciences. Writing in the context of the post-Vietnam war, Gregory deplored his present times of "sad and dangerous realities in a world threatened by unspeakably destructive armaments based on knowledge derived from basic and applied research" (p. 297). He summed up the (then) current predicament using the metaphor of the Faustian bargain: the cost of the blind embrace of science and technology and quest for material welfare was nuclear contamination, industrial carcinogens in the environment and food chain, and the loss of clean air and water. He also saw negative social repercussions such as individuals having "abandoned a sense of themselves as free, for a sense of themselves as bound by the same principles of mechanistic determinism that are the foundations of modern science" (p. 298).

Throughout the analysis of the textual discourses of this study I repeatedly encountered expressions of the dichotomy of technology versus humanity (for which the Arts stand) that echoed Gregory's (1980) Faustian compact. Such expressions are more prevalent in the 1980s and 1990s, but can also be found in the most recent decades. These expressions usually meet Gregory's sets of conflicting values, which he claims, qualify the opposing orientations of the sciences and humanities, which are: "quantities versus qualities; probability rather than principle; mechanism rather than existence; rational analysis rather than creative intuition; and, above all, predeterminism rather than free will" (1980, p. 298). Aligned with this machine versus humanity rhetoric, in another article from the 80s, Hudson (1987), intrigued by the computer, introduced the related and recurrent idea of the imperative of artists to appropriate and actively engage with advanced technologies. In the article he states:

> [The computer] is a child of science, produced by technology, but its future will be hopefully in the hands of artists, philosophers, linguistics and other creative people. It will be disastrous if we leave it to mathematics and science teachers and all other visually-illiterates. (p. 282)

I realized early on in the content and discourse analysis of the texts that ideas at the root of Gregory's (1980) and Hudson's (1987) arguments are very predominant themes that persist until the most recent publications, although not without discursive nuances: The art versus techno-science dichotomy is closely linked to the role of the new media artist to supersede the effect the new technological media have on individuals and social dynamics. Hence, I proceeded to further explore these themes, starting with the discourse of the effects of media technologies.

"We need to create at the same level as we destroy," said Gene Youngblood (1970) as quoted by Haynes, Mandel and Robillard (1998) in yet another text that provides evidence of the dominant discourse about the effects of technologies that artists (and therefore student artists) must be prepared to address. They warned that in the media-saturated world we live in, "information saturation cauterizes the imagination, artists (and all of us) must pay attention to the dangers of data overload and to the pleasures of electronic data manipulation" (p. 188). The authors spoke of the "computer illusionism that so sensually stimulates our imagination" (p. 189) adding that "if we remain passive observers and consumers of electronic illusions, we are annihilated by the corporate cyborg" (p. 189). Using the same rhetoric, Brown (1993) claimed as well that artists must be trained to overcome an attitude of subservience to technology, and Kirschenmann (2001) that they must counteract the increasing influence exerted by mainstream media. He provided as an example of this influence the widely available user-friendly graphics software that allow for standardized operations, which he claimed to have generated a uniform visual culture catering primarily to the global markets of graphics and images. Alarmingly, he warned that in such a state of mass media dominance, "art as such risks being swallowed by the new media-based aesthetics of communication" (p. 17), and that "originality, uniqueness, and the ability to intensively grasp things disappear with these 'oh-so-wonderful' images of the great new computer world." (p. 17). In Kirschenmann's argument, artists should be trained to counteract the commercial images' fleetingness and the tendency to "triviality in culture" (p. 17). Still in line with this rhetoric, Ascott (2008) was adamant about the role of the artist and the need to train the new generations of artists to become informed in "the critical sensibilities to new technologies, to complement their (no doubt) necessarily reductionist peers in science and engineering", without which "our current impoverished social order will persist" (p. 51).

The expressed negative effects are associated with the affordances of the technologies, and with the quantity, quality, and speed of dissemination of information, making it harder to

grasp and process. It is often pointed out that the threat stems from the centralized corporations that hold the technological and political powers (Sheridan, 1983; Henderson, 1996; Gigliotti, 2001). Mainstream new media are perceived as the uniform expression of a commercially oriented and trivial visual culture and – to use Ascott's (2008) expression – of the overall declining social order.

Haynes et al. (1998) claimed that making and distributing creative works that explore the new media technologies can be an effective manoeuver to shift the established power relations, to "create an antidote to the increasingly homogenized corporate/media culture", and "rival the seamlessness of the commercial world" (p. 201). Bumgarner Gee (2001) expressed a similar stance when she wrote that "serious engagement with the arts is viewed as offering a counterweight of critical inquiry and interpretation to a pervasive, persuasive, consumer-driven commercial culture" (p. 3). Gigliotti (2001) went further by calling for artists to engage directly with those media technologies. She stated that the arts ought to partner with interactive computer technology "if we wish to see technology develop from assumptions about what counts and what has value other than the prevailing consumerist world view" (p. 8). Finally, taking on a similar stance, Wilson (2008) contended:

> [The arts] can be an independent zone of research, pursuing agendas ignored by commercial interests and scientific disciplines and integrating critical commentary with the search for new knowledge and the elaboration of new technical possibilities (p. 30).

The statements above, which emphasize the negative effects of new media technologies and call for artists to counter these effects, are far from being unique to the discourses of new media art education at the university. The negative effects of media have taken centre stage in media, communication, social sciences, and art studies across levels of education. This discourse falls within "the tradition of media effects scholarship" (p. 19). Although this tradition does not exclusively address the negative impact of media, Scharrer (2007) argues that the negative effects on perception, judgment, and values have consistently been put forward in the field of education. The curricular model that she calls the 'interventionist media education curricula' encourages students to become aware of, challenge, and resist the effects of media on (presumably passive) individuals.

In art education, this rhetoric is salient in theories that associated the new digital media with passive interactions of questionable pedagogical value (Brown, 1993). Such theories have

justified ideals of pedagogies that foster critical engagement, participation, and empowerment through the learning and making of art. The prevalence of these theories was demonstrated in my initial searches for texts about new media art education. As I explained in section 2.3 *Procedures for data collection*, before I refined my choice of keywords and my search strategy to limit results to higher education, I came across large quantities of titles and abstracts concerned with visual and media literacy, falling within the stream of art education called Visual Culture Art Education (VCAE), and to some extent also Social Justice Art Education, both of which emerged in the late 90s. Proponents of these currents are interested in developing curricular approaches and art practices aimed at fostering students' critical understanding of the media processes, messages, and effects. They analyze the implicit and explicit values present in the media texts, and speak of power structures and discourses in society that such texts serve to reinforce.

5.2 Influential theories turned ideologies and discursive patterns

Explicit rhetoric holds embedded, sometimes implicit ideologies. This section is not an exhaustive review of the seminal theories and ideologies that underlie the discourses of the negative effects of technologies and, relatedly, of the roles of new media artists in the past three and half decades. That could be a research project in itself. To begin to demonstrate the genealogy of the theories influencing these discourses, I extracted the most referenced theories within level of analysis 4: *Definitions of new media art and roles of artists in expressed relation to the education/training of new media artists.*

At this level, ideas about the dichotomies between art and the commercial corporate powers that develop and distribute the new technological media are referenced in four sample texts to Gene Youngblood's text "Art, Entertainment, Entropy" (1970). Youngblood (1970) used examples of cinematic genres that were the main forms of entertainment of his time to explain how, driven by profit motive, commercial entertainers seek only to gratify the audience's preconditioned need for what it already expects, catering to the brain's habitual connections. He was influenced by Norbert Wiener's (1948) famous cybernetics theories about the notions of feedback, input, and output which have become common concepts in popular discourse about technologies, rarely attributed to their original author. He was also inspired by Wiener's (1954) less known writings about the social responsibility of scientific (and military) innovation (Wardrip-Fruin & Monfort, 2003). Youngblood (1970) explained that when the information is probable or redundant and the receiver is familiar with the medium, it induces in the receiver an entropy-like state. The receiver (the viewer, as he writes predominantly about cinema) remains passive and unresponsive. In this process, nothing is learned and change becomes unlikely. He claimed that art offers the potential to provoke change by confronting the viewer to the discovery of the unknown. Art prompts awareness and requires participation, which are necessary conditions for feedback and dialogue, and for countering the entropy caused by entertainment media.

Sonvilla-Weiss (2007) echoes Youngblood when he posits that 20th-century art theory has predominantly claimed that art is created by its viewers and users based on the economy of attentiveness. This is expressed in other texts from much earlier in the timeframe of this study, namely by Pinkel (1986) who writes that "artwork needs to be evaluated in terms of the extent to which it leads to growth on the part of the artist and viewer, the extent to which it plays a dynamic part in dialogue" (p. 184). Art cannot teach or be taught, if it is only from the perspective of producers who control art and its mediation in ways that will induce market-like

and consumption-like behaviors. A work of art presented in 2016 in the Biennale Internationale de l'Art Numérique (BIAN) 2016, in Montréal by Laurent Mignonneau and Christa Sommerer titled *The Value of Art* (2015) referenced the economy of attentiveness in relation to the value of a work of art. The piece consisted of an interactive painting equipped with sensors that measured the time viewers spent in front of the painting. A small thermal printer printed the added value (to the basic value of costs and expenses of the work) corresponding to the time viewers spent admiring the work (Figure 1).

 [4]

[4] The Value of Art, Christa Sommerer and Laurent Mignonneault (2015). Image credit : © Gridspace. Taken June 2016 at International Digital Art Biennale – Arsenal Art Contemporain, Montreal. With permission from the photographer and the curator.

Deleuze (1983) is also a "founder of discursivity" (Foucault, 1969, p.217) on the ideas related to the economy of attentiveness of art. He is referenced in several texts of the unit of analysis for his theories on perception, thoughts, and effect. Like Youngblood (1970), he used cinema – or to adopt the translation from his French writings, 'the movement-image' – to reflect on how media operates on the mind of the viewer. However he differs from Youngblood when he claims that cinema, as a medium/machine that writes directly onto the viewers' mind can lead to different, sometimes opposing effects. On the one hand, the individual can immerse himself[5] in the scene. In this case, the viewer steps into the world of the protagonists, and deliberately takes on a subjective state. Other times, the viewer has the freedom to extract himself from the first position to take on an objective mode of perception. In this case the viewer is an independent spectator, external to the scene, with a voyeuristic and possibly interpretative stance. Where Deleuze (1983) meets Youngblood (1970) is in suggesting that cinema can be purposely used for repressive ends, by means of alluring visual strategies that inhibit feedback and turn the viewer into a passive receiver of propaganda. Deleuze argued that emancipation from the mediated world is through an active use of the media. This proposition resonates with several statements above that call for new media artists to appropriate the new technologies and subvert their uses and effects. I find that claims for an "active use of media" point in the right direction but remain nevertheless embedded in a rhetoric that has been carried on for decades and is still very much attached to prevailing 'old' forms of discursivity that focus on the impact of media on humans and social dynamics, with less attention on its material mechanisms of operation.

Such old forms of discursivity are nevertheless predominant. They cannot be solely attributed to Deleuze (1983) and Youngblood (1970). Although neither reference Marshall McLuhan, both theories echo McLuhan's (1965) preoccupation with the effects of media, and his argument about the ability of the artist to counter them. The writings of Marshall McLuhan are referenced in 12 texts I analyzed. His theory in *Understanding Media* (1965) focuses on the mechanisms and properties of media (rather than the text) in order to evaluate how they organize information into formal structures that in turn affect social practices. He asserted that technologies "alter sense ratios and patterns of perception" (p. 19). Individuals and society, he added, "never know enough about [the media's] actions to develop immunity to its new extensions or technologies" (p. 77). However the artist, as the expert of change perception, is able to be aware of these actions and provide such immunity. The artist, writes McLuhan, "is

[5] The masculine form is always used is Deleuze's original writings.

indispensable in the shaping and analysis and understanding of the life of forms, and structures created by electric technology" (p. 77). He adds:

> The artist is the man in any field, scientific or humanistic, who grasps the implications of his actions and of new knowledge in his own time. He is the man of integral awareness (p. 78).

McLuhan's theories rose to prominence in the 1960s, and Youngblood's in the 70s. The media in *Understanding Media* (1965) were electronic media, mostly TV and radio. It is striking that almost fifty years later his insights about the effects of mass media on human perception and on the reorganization of social structures hold currency for theoreticians and educators discussing newer types of media.

But to what extent do these theories still hold currency? I posit, that the rhetoric surrounding new media art is evidence of a discursive legacy that may be keeping the very communities of the field from evolving in their understanding of it. For that, it might be helpful to investigate alternative, reflective discourses on more contemporary forms of mediality, which may not yet be embedded in the most predominant ideologies. As a case in point – since he directly addresses the Deleuzian theories of the movement-image and perception, Hansen (2004) points out that in the contemporary global, networked information age, the image has lost the privilege function it held in the 60s, 70s and early 80s and ought to be conceived in new ways.

As image production became automatized and autonomized in machines operating without the human eye and without mechanisms that mimic human vision, the result was a machinic vision that extended and differentiated from the physiological mechanisms of visuality. The contemporary production and perception of images are not only human; the new technologies introduced a "posthuman perceptual regime, [in which] the selection of information is no longer performed exclusively or primarily by the human component" (p. 99). In the new images, the human is not necessarily inside or outside the image, immersed and subdued, or external and able to take on a critical stance, as foregrounded by Deleuze. Before Hansen (2004), such conceptions of posthuman perception were advanced by cultural theorist John Johnston (1998) and Kittler (1999). As the media are emancipated from constraints correlating with human perception, it follows that the machine in turn reconfigures the human vision and perception, in that it accepts, recognizes and interprets visuality that it does not capture. This

principle echoes Kittler's assertion in *Gramophone, Film, Typewriter* (1999) that in the process of habituation to media, humans internalize the rules of the machine-production, and are thus disempowered and colonized by media. The human engagement with the new visual media is therefore more complex than one of immersion versus critical distance. Hansen (2004) asserts:

> A differentiation [from human capacities from hydrid-human machine assemblages] and an altogether different understanding of the automation of sight informs the aesthetic experimentation with computer vision and image digitization that today's new media artists can explore." And he adds: "Human perception takes place in a rich and evolving field to which other bodily modalities such as tactility, proprioception, memory and duration make an irreducible and constitutive contribution. (p. 101)

Hansen (2004) goes on to elaborate and demonstrate the qualities of these bodily modalities that are engaged as the result of the contemporary automation of vision and the aesthetic potential of experimentation for new media artists. My point here is not to explore these other bodily modalities in detail so much as to articulate how a persistent established rhetoric may be contributing to hold back a field that is still articulating the roles of the artist along the immersed-passive versus engaged-critical dichotomy. In many ways that I will further deconstruct in the following chapter, these discourses are still concerned with the power-disempowered dichotomy and with individual agency. My point here is to demonstrate that the terms and concepts Deleuze, McLuhan and Youngblood introduced have become embedded in the popular rhetoric about new media. Particularly, some of McLuhan's exhortations, like 'the medium is the message' and 'the global village' are now aphorisms that may or may not be credited to their author. These expressions have been repeated, used as slogans, and assimilated into popular as well as scholarly discourses. Wardrip-Fruin and Monfort (2003) assert that McLuhan's writings have influenced the subsequent patterns of discourses and ways of thinking (usually expressing simultaneously excitement and apprehension) in transitional times, especially in times of technological change.

Similarly, Grau (2011) points out the reoccurrence of "patterns of discourse surrounding early media revolutions" (p. 352). The twentieth-century theories about cinema and perception that I introduced above recall statements from the eighteenth century regarding the panorama, about the negative effects of technologies such as the loss of human faculties and of culture, which also re-emerged in the 1990s with virtual reality. In this sense, it can be said that these premises have become ideologies. I will continue to argue that it is difficult but important to

investigate what is genuinely new about new media art and about new media art education when they are engulfed in such cyclic patterns of discourse and ideologies.

My notes on this analysis also included reflection about the seminal texts and theories that return over decades, considered as the valid references to support arguments in regards to the roles of artists working with new technologies. In contrast, I observed that examples of practices, historic manifestations and the work of artists and collectives that were forerunners in the history of the engagement of artists with new technologies are much less referenced to support authors' arguments, even though such historical practices and manifestation were also often related to the media-theoretical approaches laid out in text form. For example, in the mid-60s, artists Robert Rauschenberg and engineer Billy Kluver presented the important Experiments in Art and Technology (E.A.T.) manifesto (1967): three simple principles clearly asserting the need for art to expand its scope in society by developing in tandem with, and taking responsibility for technological advancements. This text and the ideas it pronounced were directly applied in the research and making initiatives that brought artists to work with scientists and engineers. E.A.T. promoted artist residencies in technological research and development labs (namely at the Bell Labs), which resulted in historical manifestations such as the *9 Evenings: Theatre and Engineering* event in 1966 where performance art and technological innovation intersected (Shanken, 2005). E.A.T was an important organization in the establishment of art-engineering-science collaborations and a catalyst for the involvement of artists with new technologies, hence I was surprised to find it hardly ever referenced by educators. Other examples of practice-based institutions and manifestations of media arts abound today which, in my view, should inform the education of media artists, namely Ars Electronica in Linz (Austria), numerous initiatives at the Zentrum fur Kunst und Media (ZKM) in Karlsruhe (Germany), amongst several large-scale exhibitions that took place in recent decades and biennales that continue today to be dedicated to new media art practices and reflection.

Nevertheless the texts I analyzed indeed predominantly refer to theories rather than archives and descriptions of works, exhibitions and material manifestations, so my critical analysis necessarily bore on these theories. As I proceed with the analysis of predominant discourses of the role of artists in the face of the new and calls for change, the influence of the media theories I have summarized above about perception and affect are further demonstrated. I wish to remind the reader that in the discourse of new media art education, to emphasize the negative effects of new technologies and the pervasive corporate powers is a rhetorical strategy

that serves to stress the urgency to train artists to engage with these issues, and ultimately to emphasize the place and the value of new media art education in academia as well as in society.

5.3 Are artists slow to address technological change?

Juxtaposed to the recurrent call for artists to engage with mainstream and emerging technologies, and to counter the negative or pervasive effects of the consumer-culture technologies, I often found claims that artists are slow to embrace new media. This corresponds to the line of rhetoric I presented in the previous chapter, in which the authors describe the new in relation to that which is not so new, and describe change in relation to that which we must move on from. Such claims are also aligned with the attribute of the discourse of new described in that chapter: new and change are expressed with urgency, as mandatory and crucial – a type of rhetoric which I found from very early in my chronological review of the texts.

Pinkel (1986) deplored that students, who then become artists, were generally intimidated by equipment outside of standard art-making tools. As a result, he thought, "most artwork that utilizes sophisticated technologies is simplistic, remaining a formal exploration without strong poetic or cultural content" (p. 183). Hudson (1987) offers a cautionary tale about the reluctance of artists in embracing change and new media:

> The artists, contrary to scientists, are still known to adopt a medium, a technique and explore it throughout their practice, as opposed to incorporating the new technologies, therefore artists are slow in contributing with innovation, and late in adopting these into the curricula of fine and applied arts. (…) If the artist finds his tool effective for his own particular purpose, then he will have little reason to consider change, so there were many tools and processes developed during the mechanical industrial revolution which the artist tended to ignore. (p. 270)

Similar ideas are reiterated in later publications. For instance, Wilson (2008) asserted that "the arts in general have been confused and slow to address technological change" (p. 30). He added that artists have been reacting to a very limited pool of technologies and scope of disciplines. This idea resonates with Eber (2007) who claimed that most artists maintain identities in only one or maybe two disciplines, which helps define and distinguish aesthetics and methods acceptable to a given group of people. He suggested that the communities that form around artistic genres are attached to the material and aesthetic specificities of media, and I will add, to the discourses of their culture, which are as difficult to displace as the cultures of other fields.

However, media art defies this notion: the fast evolution of new technologies and the fluid nature of the construct of new media art are at odds with defining characteristics of disciplinary cultures. The theory, tools, jargon, and approaches that new media art encompasses does not cease to expand throughout the decades of this study, and the expansion is ongoing. These are borrowed from multiple disciplines and applied in very diverse genres of practices. In this sense, the new media art community is fragmented, and so is its culture. I introduce ideas that I will further develop when I say that, since the field did not advance as a cohesive movement, but rather in multiple fronts, the history of new media art is plural. The perception that artists have been confused and slow to address technological change can be explained by lack of a single, unified disciplinary formation.

Other examples of statements asserting the hesitations of artists and the reluctance of the field of art education in embracing technological change are further analyzed in the next chapter regarding the discourses of new pedagogies.

5.4 The new media artist as visionary

Paradoxically, some authors assert in the same texts the reluctance of artists in adopting new technological media for artistic practice, while also defining artists as forward-thinkers and visionaries. This is the case of Hudson (1987) who states: “The artist has always been providing a new psychological orientation, helping to negotiate the new unknowns which become apparent in a period of rapid change” (p. 269). In the same publication as the quote in the previous section, where he states that artists have been confused and slow to address technological change, Wilson (2008) also writes: “historically, the arts alerted people to emerging developments, examined unspoken implications, and explored alternative futures” (p. 30).

For Loveless (1990), a more optimistic view of the future depends on artists:

> The term ‘artistic mind’ implies a mind that through its unique imagination transforms experience and perceptions into artistic ideas. (…) We ought to look freshly at some of the characteristics of the emerging media technologies to see how these new mental environments affect our current experience and the resulting perceptions that ultimately excite art processes. (p. 204).

According to Galloway, when interviewed by Iskin (1994), “the role of the artist in a technological society is not about being a cultural animator but a visionary, designing environments we can habitate” (p. 348). Gigliotti (2001) equally suggested:

> The arts have always offered another way of seeing and knowing, one often at odds with, often critical of, the prevailing worldview. The arts have always offered a space in which aspects of that worldview could be worried into possible consequences, as well as imagined into alternative possibilities. (p. 8)

Schnapp and Shanks (2009) link the idea of the artist as visionary with the persistent legacy of the ‘auratic frame of the artist’. They contend that artists continue to be thought of in the tradition of the artists as “seer” (p. 145), endowed with a particular set of skills and genius. It can be said that this idea derives from the legacy of the artist as the romantic, solitary author who operates outside of, but critiques the social world that surrounds her. Whereas the artist

used to deliver her powerful message about the human condition in walls and canvas, the new media artist now does so by means of the new technological media.

The discourses of the artist as visionary intensified in the postmodern theories of art that since the 1960s have moved art away from the object and the medium, with critical discourses that theorize the power of art to comment on society, including but not restricted to the implications of technological innovation. It was in 1964, that philosopher and critic Arthur Danto concluded, upon pondering of Andy Warhol's Brillo Boxes, that a work of art cannot be dissociated of the theories of its time and context. Historical, social, and institutional contextualization of the work of art are necessary conditions for the audience to grasp its meanings. The work is the vehicle through which the artist invites the viewer into alternative ways of perceiving (new visions of) their shared culture and time period. To use Foucault's (1966) concept in *The order of Things*, meaning-making is contingent on the artist sharing with the viewers/users, the epistemes of his context and time, which are also shared with other intellectuals, philosophers and scientists. The "author function" that Foucault explained in the text, "What is an Author" (1969), helped me to better understand the persistent legacy of ideas surrounding the construct of the artist, as I found them expressed throughout the texts in the unit of analysis. In this essay, Foucault (1969) spoke mostly of authors of literary texts. Once again it is relevant to highlight that the word 'text' is translated from the French word *'écriture*', which in fact does not designate, as the English word does, writing as something completed. Rather it refers to the individual practice of developing a body of work over time "that goes beyond its own rules and transgresses its limits" (p. 206). In this sense, its original French meaning is closer to the practice of the artist-author. According to Foucault (1969), the notion of the author serves to identify and valorize texts and discourses as works, which are worthy of interpretation. The author function is not salient for all textual and discursive practices, in all types of social systems, but indeed it continues to play an important role in our view of literary work. It serves to assert the validity and relevance of texts and discourses of specific contexts and communities. This is also true of the influence of authors of theories, theorems, and literature in specific fields of study at certain points in time, as I explained in section 2.1.2 *Analysis of written discourse*. However, it is the author function in literary works and contexts that open to reflection, interpretation and debate that I find most pertinent as an analogy with the construct of the artist. Foucault (1969) himself extends his interpretation of the author-writer to the author-artist.

The preservation of the notion of the author-artist continues to regulate the discourse surrounding practices and objects of a community in a specific institutional and/or social systems. I interpret the expressions about the new media artist as visionary as evidence of the ideology that reaffirms her creative and critical character, which implies the relevance and value of what artists do, and of what is intended in the work. Even though contemporary art has sought to theoretically and interpretatively detach the work from the status of the author as endowed of particular gifts or attributes, my analysis demonstrates that historical discourses about the status of the artist persist.

5.5 The new media artist as intermediary

Yet another salient trait that is attributed to the new media artist is the role of the intermediary. Statements connected to this idea emerge in the late 90s and only saturate until the most recent publications. As I progressed in the content analysis of excerpts within level 4 of analysis, I noticed that statements seem to increasingly broaden the role and scope of intervention of new media artists. The description I introduce about this expressed role of the artist will be progressively built on and further deconstructed in the next two chapters, in the relation of these discourses to new media art pedagogies.

Postmodernism blending of high and low art marked a significant shift from traditional discourses of art. By advocating appropriation, pastiche, critical social commentary, and exploring practices based on conception, information, behaviour, and most of all a renewed understanding of communications based on the new technologies, the question changed from what art is to what art does, or what art is for. The discourses of the role of the artist naturally shifted along with these discourses. The affordances of the new telecommunication technologies have been placed at the centre of the transition from the Modern to the Postmodern, namely by Jean-Francois Lyotard in an essay about the exhibition *Les Immatériaux* at the Pompidou centre in 1985. The essay and the exhibition it referred to, explored precisely the destabilization of the construct of Modern by the new technological conditions. Lyotard's (1984) definition of interaction in relation to the exhibition is useful here to characterize this shift. He explained:

> When I say interaction, what I am thinking of is rather a sort of ontology of the endless transmission of messages which are translated by each other, for better or worse, as much as possible, and where man himself is not the origin of messages, but sometimes the receiver, sometimes the referent, sometimes a code, sometimes a support for the message; and where sometimes he himself is the message. (…) We can no longer say that in the structure of communication [today] man is, for example, in the role of the sender any more than of the receiver. With the advance of scientific research – but also literary, philosophical, and artistic research – it seems that he may occupy many places in this structure; so that is what I mean by "interaction". (p. 37)

In this conception of communicative interactions afforded by the then emerging electronic and computational media presented and explored in *Les Immatériaux* (Centre Georges-Pompidou, Paris, 1985), artists took on the role of cultural mediators, intervening at many different levels within the social grid, as opposed to the external genius looking upon it. This is a fundamental distinction between the role of intermediary, and that of visionary, although I found the two roles more often than not juxtaposed and expressed as complementary rather than differentiated.

Beyond communication, the digitization of media, data, tools and processes throughout the 90s and onwards, combined previously segregated disciplines into a common space where actors and specialists of different fields make use of the same platform to share their work and the advancements in their field. The knowledge and practice of fields of study that were for a long time isolated in their discipline of origin became easily accessible and advancements began to cross-fertilize areas of inquiry. According to Sonvilla-Weiss (2007) this dissolved the boundaries between scientific, technical and cultural knowledge. Rappaport and Burns (2011) explain that for artists this has resulted in a range of new metaphors, strategies and structures from which to develop new work. The advent of new media art emerged with, and for a long time it remained centred on, the intertwinement of art and the new computational networked technologies. The most often expressed role of the artists is that of moderating techno-scientific progress through her aesthetic devices and critical discourses, without ever settling into the assumptions and methods of the disciplines she dwells on for her practice. This is reflected in the ideas of several authors who, like Ascott (2001), maintain that artists should work at the intersection of different fields, while remaining detached from all categorizations of disciplines and media. He stated:

> Many artists escape the constraints of artistic identity by staying freely in the speculative zones of science and technology, mysticism and philosophy. Breaking free of categories, intellectually and emotionally and constructing new realities, new languages, and new practices, is what I term visionary pragmatism. (p. 10)

It was Sonvilla-Weiss (2007) who qualified the new media artist with the adjective ‘intermediary’ that I have adopted. For him, it expresses the role of the artist as “a catalyst between diverse fields of knowledge, ways of thinking, social models and solution strategies” (p. 3). He attributed the expansion of territories for the arts to software artists, media and knowledge designers, and hackers for their commitment to open avenues of exploration “in

which their role and their scope of action have not yet been fully explored" (p. 4). Such avenues of exploration can be socio-political visions, or inquiry in disciplines as (traditionally) dissociated from the arts as biotechnology and genetic engineering. The broadening scope for artists' intervention is thus expressed by Wilson (2008), when he writes:

> Those who believe that the arts are now up to date because they pay attention to digital technology have misunderstood the course of history because the research goes on – investigating many other fields in which the artists should be proactive pioneers, rather than merely consumers of the results (…) Every area of scientific and technological research is a potential focus for the arts (pp. 30–31).

Extending from these ideas, Burnett (2008) speaks of the growing recognition of the role of artists in bringing the creative arts closer to the social and natural sciences. Like Ascott (2001), he expresses that the role of the artist as an intermediary is closely related to the role of the artist as visionary. Burnett contends that by collaborating with other disciplines, by engaging with their knowledge or by mastery of their tools, techniques, and languages, artists expand their scope of action and allow themselves to "choose and locate vantage points and, thus, provide different ways of seeing not only works of art, but the world that surrounds and enframes them" (p. 119).

The discourses of new media art education emerging in the past 10 years, which I introduce and examine in the two final chapter of this dissertation, demonstrate that the construct of new media art, the roles of new media artists and their space of action are, at least discursively and ideologically, relentlessly expanding into new configurations of disciplinary alliances. In chapter 7, I contemplate that these new avenues opening to the new media artist also include forms of creativity and exploration geared towards economic profitability. Although the discourses of the roles of new media artists predominantly emphasize its non-economic values and for the most part, the roles of the artists are expressed as in clear opposition to the goals of capital accumulation and profitability of techno-scientific innovation, I suggest that the construct of the protagonists of expansions of territories proposed by Sonvilla-Weiss (2007) should be analyzed alongside neoliberal constructs such as "cultural entrepreneurs" and "workers of the contemporary knowledge-economy".

5.6 Conflicting discourses in the roles of new media artists

The predominant discourses about the roles of artists and the purpose of their creative pursuits define these as being primarily social, highlighting their contribution by creating cultural products that reflect critically the ethical ramification of technology. My analysis demonstrates that it is not the properties of the object or form resulting from the creative processes that are forwarded in the roles of the artists, but the transformational possibilities and the potential of art to effect cultural and social change. The new media artist is construed as an individual who, in addition to being tech-savvy, is either gifted or trained in sound habits of mind, or better moral values based on which she will moderate techno-scientific and social progress. The predominant discourses of the new media artist as visionary and intermediary imply higher critical-morality and ethical understanding of the effects of media on the world. It is often suggested that artists who explore new technologies will offer a counterweight to the pervasive corporate techno-scientific interests, their discourses and effects, by merely being in existence, and that the engagement the works of art require from the viewers/users will open to different ways of perceiving the world. Thus, through creative and applied use of the technologies, media artists offer critical commentary but also generate possibilities for new discourses. Budge (2012) sums up these social affordances when she states: "[art] can offer a way of making sense of difficult times in the world, a way of creating a voice, a space to react, to reorder, to reshape, to inspire, transform and connect" (p. 12).

Budge's (2012) statement, as many others I have included in the previous sections addressing similar issues, implies the ability of artists to promote better worldviews. Therefore, I argue – and I will continue to stress this point in the next chapters – that the rhetoric about the dangers of the power of technologies juxtaposed to the roles of the artist as visionary and intermediary presumably carries the assumption that artistic or aesthetically oriented work through and with the new media, will necessarily be for better ends. Relatedly, this discourse omits the possibility that artists using advanced or any other technologies, even if detached from commercial interests, may also contribute to negative ends. This discourse precludes the possibility that art may harm, which leads me to suggest, in accordance with Scharrer's (2007) stance regarding media education, that the idea of new media art and of new media art education as a preventive and interventionist measure is idealistic, and sometimes paternalist.

The rhetoric that places the artist on higher moral and ethical grounds comes hand in hand with the discourse of resistance to corporate capitalist power, which I introduced in the

analysis of discourses of the new. More specifically, this resistance is to the industries of techno-scientific research and development, distribution and consumption. It is important to point out, however, that this discourse is not exclusive to media art or new media art education. According to Potts (2011), “cultural studies, along with much of arts, humanities and political economy broadly proceed from an analytical foundation [of capitalism] derived from or significantly influenced by a view of capitalism as rapacious, unforgiving and anti-humanistic” (p. 128). He outlines several points of critique that are usually advanced in opposition to capitalist interests, to which technological innovation is systematically associated. Several of these points resonate with statements brought forward in the unit of analysis: the critique assumes that for-profit technological innovation draws upon greed and self-interest, that it is driven by a calculating mentality that is ethically and culturally corrupted. It’s motives are, he says, “non-inclusive, produce and accentuate inequalities” (p. 130). Hence the production of marketable goods has been discursively framed as ruthless and amoral in opposition to production and consumption of art and culture, which are implicitly for the good, and hold values that not marketable and therefore superior.

Before moving on to analyze the discourses that frame the pedagogical approaches to train new media artists at the university in ways that meet the constructs and roles of the new media artist as presented in this chapter, it is important to introduce other salient discursive formations that disturb the above propositions of the highly praised roles of the new media artist. The next section demonstrates that to speak of the dichotomy between the roles of artists and the negative effects of new technologies when aligned with the interests of market, mass production, profitability, and triviality, is not to say that new media art education is invariably and by definition dissociated of, or in opposition to, profitable industries and the commercial arts. Perhaps outside the institutional context of the university, in independent artistic communities, the discourses of the roles of the new media artists would remain solidly grounded in this opposition. However, there is evidence that new media art education at the university is not so firmly tied to the leftist, social end of the social-moral to economic-profit spectrum of values, as the above propositions alone may suggest. This comes through, for instance, in the quantity of texts that address new media art and design education as one and the same, and in the reconceptualization of the term *creativity* throughout the decades of discourses analyzed.

5.6.1 New media artist / designer / commercial artist

Schnapp and Shanks (2009) analyze the longstanding breach between art practices that are oriented towards the production of artifacts for art markets (from craft markets to the high-end markets of contemporary art), and practices that are socially based, interventionist in nature, and for the most part conceptual or process oriented. The latter are celebrated in the discourses of new media art education precisely for their potential to defy market logics. This dichotomy has been prevalent in the historical western way of thinking about art but in the present times a continuum can be established from one end of the spectrum to the other, with many artists working at both ends. Schnapp & Shanks (2009) attribute this change to “new and far more fluid relationships” (p. 147) that are drawn today across formerly separate disciplines and practices. The advent of new media and technologies affected the evolution of not only artistic genres but also of entire fields of study and practice, which became “less singularly focused, increasingly generic or interdisciplinary” (Buss, 2002, p.176). Artists are becoming less devoted to a single discipline and practice, taking in different approaches and trades as they navigate increasingly complex knowledge systems. The boundaries between artists, designers, animators, innovators, inventors, and engineers established in the industrial age eroded as they are no longer defined by separate materials and work environments. They all produce work and use processes that can fall within a broad heading of ‘Art’.

Sixteen articles in the unit of analysis addressed in tandem new media art and design education. In analyzing the discourse about their roles, I noted that both artists and designers, in work processes that range from artistic (non-utilitarian or commercial) to industrial production, are expected to push the languages of new media forward. They are expected to adapt developing technologies in ways never intended by their producers, to create new standards and conventions that do not strictly adhere and conform to utilitarian and commercial hardware and software as offered to them (Sweeny, 2008). It is, of course, always suggested that their intentions and adaptations are for the ‘better’. According to Buss (2002) common characteristics shared by art and design disciplines include “the conception, production, promotion and dissemination of the material outcomes that constitute our visual culture and encompasses artefacts intended for intellectual and aesthetic contemplation to functional products, systems and services" (p. 176).

In addition to the tools, the media, and work environments, new media artists and designers have come to share key-concepts and discourses to describe their roles and practices. Creativity – the faculty of pursuing experimental and inventive endeavours – has long

been associated with artists, and was naturally carried onto the discourses of media art. In the recent decades I noticed the term is sometimes used interchangeably with 'innovation' and 'problem-solving' with which mostly designers are associated. These terms are today heavily used in market-driven discourses, and by the modern university to describe its missions and the qualifications of its graduates across fields of study.

5.6.2 Creativity

Creativity has historically been associated with intuition, and used in common discourse to refer to modes of knowledge and practices that were in opposition with the rational and analytic ways of knowing (Leão, 2008). When the term *creativity* is used as a synonym for intuition and for individual expression, which are appraised faculties of the artist, it is too often omitted that the processes of producing and acquiring knowledge from creative, intuitive, and expressive endeavors are ill-defined, which makes such processes difficult to translate into pedagogical approaches. In this sense, Hudson (1987) argued, the emphasis on creativity "has done significant damage to the status of art education" (p. 279). I elaborate extensively on this perceived damage in the next chapter. For now, I wish to point out that if indeed, as stated by Hudson (1987) and reiterated by Wilson (2001), the understanding (or lack thereof) of the processes of creativity has undermined the status of art education within the modern university, it is worth paying closer attention to the shifting meanings of this concept. In analyzing the discourses of creativity in the last two decades, I noted that the statements that frame the concept progressively distance it from ideas of intuition and expressiveness or any other *modus operandi* that may be unique to artists. From the late 90s, the idea of creativity becomes closely associated with that of innovation and it gains a new social, political, and economic significance. This shift has greatly framed the status of new media art as a discipline of study at the university in the modern western institutions (Blythe, 2001).

Creativity and innovation are used interchangeably by many authors, as intrinsic to the role of the artist as visionary (Hagebolling, 1990; Murray, 1999; Wilson, 2008; Schnapp & Shanks, 2009), but some authors draw clear distinctions between them. Gigliotti (2008) points out that "whereas creativity is concerned with uncovering underlying natural orders of the universe, innovation emerges as practical applications of these discoveries" (p. 67). She contends that although innovation is increasingly found in school program curricula, it originates

in the discourses of product- and profit-oriented corporations therefore innovation (but not creativity) can be based on misplaced and destructive values. Problems arise, she concludes, “when innovation becomes the driving force of the creative impulse, rather than the reverse” (p. 67). In yet another argument that echoes the discourses of the negative effect of new technologies, Gigliotti (2008) warns that if artists and student-artists are committed to chasing the newer technology and media that are constantly being updated and re-negotiated, rather than invested in their social, political, ethical, and ecological implications, then new media artist, designers, and educators “may actually contribute to the destruction of [their] own creativity” (p. 71). This is yet another demonstration of the rhetoric of the pervasive powers of the capitalist interests of corporate industries. In the view of authors like Gigliotti (2008), who insist in this dichotomy, industry innovation priorities are economic, whereas creative artistic work should remain detached from such interests.

The analysis of content and discourse revealed a shift in the statements that frame the concept of creativity from the late 90s. Parting from the earlier dichotomy that distinguished *creativity* from *innovation* and *economic interests*, the shift that sees these three terms converge is associated to the emergence of the concept of “the creative industries”. Although originally British, this designation has been adopted by other countries in their national policies to refer to an aggregate of sectors and disciplines that have traditionally been associated with aesthetic modes of knowing and doing. Although there has been many debates on the taxonomy of the creative industries, in the recent years, and as more nations adopted the designation and policies that unified the sector, progress has been made towards a common framework (Flew & Cunningham, 2010). The creative industries cover a wide range of different, sometimes overlapping practices including broadcasting, design, fashion, advertising, games, visual, performing and interactive arts, as well as the roles of museums and galleries. Note that the rise of creative industries coincided with the dotcom hype, and with – as exposed by Rossiter (2006) – the rise of information society, and related discourses of a “new economy” combined with the convergence of technology that displaced the monopoly of creative production and broadcasting from state or institution regulated systems to distributed, individual means. Information becoming the main commodity, and with individuals the points of its production, distribution, and reception, economic value in the creative industries became derived not only in the creative goods produced, but in the exchange value of intellectual property. In fact, the common thread across the sectors aggregated within this designation is not the trade of products, which pertains only to some, but rather that they all “consist of the generation and exploitation of intellectual property” (Rossiter, 2006, p. 24). For the products of the creative industries, as well

as the contribution of the creative class to the growth of various other industries, these sectors have come to be considered a vital part of the modern economies.

For those who continue to associate creativity with intuition, ill-defined processes, and tacit knowledge the term ‘creative industries’ may sound like an oxymoron, because industry implies standardization of production mechanisms and structured distribution strategies (Blythe, 2001). This is likely the case for a majority of art educators who discursively construct the artist and their roles as predominantly social, driven by higher moral values, and perceive the changes the artist can effect in their creative use of new media as being for better social outcomes than those afforded by mainstream uses of technological media. However, my analysis of the discourses demonstrates that the roles of new media artists are being simultaneously extended to (or engulfed by) the socio-economic nexus of the creative industries. The works, ideas, and styles of new media artists are assimilated along with other ‘products’ as part of a larger sector that does not distinguish between commercial and non-commercial production, and is overall praised for its contribution to economic growth, rather than its social and aesthetic agency. In the creative industries, *better* is synonym of more, of efficiency, performance, and profit. The concept of creativity has thus morphed to become inextricably linked with economic performance and success. This is illustrated in a 2014 ad that appeared in a UK newspaper simply stating: “Creativity pays” [Figure 1] (www.thecreativeindustries.co.uk).

The arrival of the concept of the creative industries into the discourses of new media art education is significant as it offers evidence of the convergence of the discourses of media art in the university with economic forces, which in most statements in the unit of analysis, are expressed as conflicting discourses. The convergence of these discourses occurs predominantly in Level 3 of analysis: that is in relation to the systemic, institutional conditions for new media art pedagogies, which I analyze in detail in chapter 7. I will then review the systemic conditions under which the use of the key-concept of creativity in different discursive streams affected the status of new media art education in the modern university. To briefly introduce that argument, I will explain that fine arts in general, and new media art as a case in point, are ideologically and rhetorically placed as protagonists in the discourses of creativity that universities have so loudly branded ever since creativity has become a synonym for innovation and economic prosperity. Both creativity and innovation are used as rhetorical flourishes in policy documents, program descriptions and university mission statements (Budge, 2012). McWilliam and Haukka (2008) claim that there is more pressure on universities now than ever to be creative, to teach creativity, and to produce graduates who are creative. This extends beyond art disciplines, which have traditionally been the guardians of creativity. Even if the conditions in which creativity flourishes, and the resources needed to foster it, are yet to be understood and demonstrated by contemporary higher-education institutions (McWilliam et al., 2008; Budge, 2012). Propelled by the systemic discourses, non-artistic disciplines are recognizing that fostering creativity through experiential and practice-based learning can also be beneficial to the skills of their graduates. Instead of lamenting the loss of higher moral grounds in favour of values of economic profitability, I will argue that this shift in the concept of creativity contributes to elevate the perceived status of media artists and, relatedly, the value of media art as a discipline in the structural hierarchy of the neoliberal higher education institution, which then becomes more open to support the development of new media art education programs.

After having exposed in this chapter the most predominantly expressed roles of media artists, I proceed to examine how the approaches for teaching and learning new media art are described and articulated in contemporary higher education institutions. What (if any) new pedagogies are invoked to train visionaries and intermediaries through the constant emergence of newer media? What skills and competencies will the curriculum address to nurture these roles? At the intersection of these expressed roles that carry historical ideologies with the newly found place of the creative arts at the university, how is the curriculum of new media art defined

to attract prospective students? What disciplinary context, technical basis and career outcomes are put forward? These questions are addressed in the two following chapters.

CHAPTER 6: Pedagogies of New Media Art Education

Curricula and teaching-learning approaches are aligned with desired learning outcomes: knowledge, skills, and competencies (Spelt, Biemans, Tobi, Luning & Mulder, 2009). Hence, after the analysis of discourses of the new and the roles of new media artists, it can be expected that premises from those discourses are carried onto how artist-educators conceive the pedagogies for new media art education. This is what I investigate in this chapter.

In the following pages I present my analysis of the discourses within excerpts coded as Level 1 of analysis: *Curriculum and Teaching-learning approaches*. In the first sections I demonstrate that the discourses of new pedagogies are no different from the overall discourses of new in that they are characterized by calls for change and juxtaposed to descriptions of the 'old' models and assumptions that have governed art education. These are legacies that the new pedagogies both carry and attempt to move from.

I proceed to elaborate on the two most salient expressed orientations for new curricular models and pedagogies for which I provide examples of described best practices: fostering transferable skills and interdisciplinary learning. I will demonstrate that the discourses of new pedagogies qualify them as expansive and that one emphatic aim is to broaden the scope of bodies of knowledge and techniques with which new media art education ought to be concerned. Nevertheless, these pedagogies remain student-centred and sustained by discourses that are focused on the individual transformational and emancipatory ethos of education.

In the last sections, I draw from recent theories of higher education and configurations of interdisciplinarity to present my critical analysis and reflections on the discourses of new pedagogies.

6.1 The trappings of classical art education

I have so far demonstrated that a recurrent strategy in the articulation of ideas of new consists of calling for change in statements of urgency, juxtaposed to rather long descriptions of that which is imperative to move on from. It is no different in the discourses of new pedagogies. The traditional models are often setup in opposition to the new directions, rather than in continuity. In addressing the calls for change proposed for an up-to-date education of new media artists, several artist-educators offer more or less detailed accounts of the assumptions and approaches that traditionally governed art education, in comparison to which they highlight their 'innovative' propositions. In spite of this predominant rhetoric, it comes through the discourses that the 'old' models leave persistent legacies, some of which Ascott (2001) designates as "trappings of classical art education" (p. 10). These traditional principles are expressed in statements and in described teaching-learning approaches up until very recent publications, thus offering evidence that change, especially institutional change, is easier said than done. Hence, I begin this chapter with the analysis of the discourses of continuity with traditional models of art education based on that which artist-educator-authors have expressed, complemented with my review of related theory.

Art education has been divided into the different media, and great focus has been placed on the mastery of specific crafts in which students are thoroughly invested. As previously stated, artists develop identities attached to the communities of practice and cultures that form around artistic genres (Eber, 2007). However, when it comes to the education of artists, Loveless (1990) and Danvers (2003) maintain that the received tradition searches for general long-lasting rules and the best universal way of training all artists across genres; in this sense it has been homogenistic and monolithic. The pillars of the foundational model for learning art on which the curricula of many art programs are based are production, criticism, and art history. Traditionally, students trained in the production and learned the foundational theoretical subjects in a shared discursive and physical environment: the studio.

The modernist fine-art tradition, explains Schreiber (1998) cemented the idea that the students' talent would reveal itself, if any was there, by placing her in the studio and introducing her to the tools of making art, while the educator offered direction and critique. Both educators and students continue to conceive the process of forging one's artist-identity as a solitary quest consisting of individual experiences (the studio practice, the critique, the thesis show/exhibition). The process of learning art, like the processes of making art, is largely conceived as individual,

experiential and emotionally laden. It is not uncommon that the student-instructor critiques or that discussions address (sometimes praise) the learners' emotional investment in the learning and art-making processes, which are ignored aspects in the learning and practice of most other disciplines (Shreeve & Austerlitz, 2008). The expression of emotions is part of the manifestation of the artists' identity, tied with the romantic idea of the auratic frame of the artist (Schnapp & Shank, 2009), and the related construct of the artist as the sensitive and gifted individual who, through her craft, conveys powerful messages and envisions alternative futures: the artist as visionary. Shreeve and Austerlitz (2008) recount that it was with the rise of early philosophical theories that the logic-rational thought processes came to prominence, and divorced from Romantic notions of emotion and feeling. To summarize, the logic-rational forms of deriving knowledge, of which positivist science is the most radical expression, have greatly shaped today's perceived hierarchy of disciplines and forms of knowledge, how knowledge circulates, what knowledge is questioned and how, if and how disciplines cross-fertilize: in short, the power dynamics of what Foucault calls "*le régime du savoir*" (1982, p. 781). At the top of this *regime* is empirical knowledge, or claims of truth that can be verified by means of the analytic scientific method. According to the modern logic of Whitehead and Russell's (1910) *Principia Mathematica*, the questions humanists and artists asked were incapable of verifiable hypothesis, propositions or provable answers. Emotions and feelings are not observable, and were at the time considered feminine attributes, another reason for having nothing to do with education. Gregory (1980) elaborates on the dissociation that occurred when humanists and philosophers in academia defected to science to develop new interpretative tools to investigate in measurable ways questions about the meaning of existence, about the human psyche, intelligence, reasoning and learning. Other disciplines that could not resort to quantification, like literature and other arts were undermined as forms of knowledge. This paradigm shift at the turn into the 20th century towards the authority of science deprived other disciplines, the humanities and arts of validity and authenticity (Gregory, 1980). It carved a divide that persists in academia and distinguishes the subjects and approaches of formal education.

This paradigm also shaped curriculum and teaching-learning approaches, and can still be detected in discursive practices within and about formal institutions of education at all levels. Academia nurtured teaching and learning as well as research approaches that privileged the scientific disciplines, much to the detriment of the humanities and the arts. This seems to have only grown in the past decades in our capitalist and neoliberal context that frames the modern western university (Reading, 1996; Scott, 2006; Rolfe, 2013). For the Fine Arts, which remained

for a long time separated from academia, finding a place in this hierarchy of disciplines has proven challenging.

6.1.1 Reluctance to adopt and adapt to change

Berrett (2011) highlights a paradox in the expressed roles of the artist and art education: while new media artists may be associated with visionary, forward- and critical thinking, with daring and boundary-pushing, their philosophy of training tends to be steeped in conservatism. Keeping in line with the rhetoric of the new, at the level 1 of analysis concerned with the pedagogies of new media art education, I found once again statements claiming that, compared to other fields, art education is too slow to address change. In the texts I collected and examined, slowness is in regards to implementing pedagogical change that responds to the new technological media, and to the new social and interdisciplinary exchanges the technologies and media bring about. New, rapidly changing media, which drive the practice in the field, are difficult to assimilate into the established institutional ways. The components of this system, which in my analysis refer primarily to the teaching mission of the modern university, are the environment (disciplinary cultures), goals, processes, as well as teacher and learner orientation and engagement (Biggs & Tang, 2011). Texts in the unit of analysis rarely addressed all components, as most authors concentrate only on one or two aspects, yet the body of texts allowed me to investigate each of these components in related statements.

According to Wilson (2008), art education has a long-standing problem accommodating new genres that do not fit with the traditional media and the foundational teaching-learning models. Blair, Cummings, Dunbar, Hayward & Woodman's (2008) review and critique of policy documents and the curricular structures of new media art programs demonstrated that the media specificity of a department continues to be a powerful force in the learning experience of art students. Students are attracted to, and educators are more comfortable in, discipline- and media-specific curriculum that they are familiar with and that they all expect to follow. Spelt et al. (2009) and Rikakis, Tinapple and Olson (2013) further add to this argument by stating that in higher education, students arrive into their programs with relatively uniform prior knowledge and skills, which will also shape the learning environment. According to Amiri (2011), students who enroll in art programs do so with certain views as to what will be expected from them and how the courses match their talents and capabilities. Like Amiri (2011), Dohn and Wagner (1987)

also found that art students predominantly see themselves as visually and creatively minded people rather than “scientifically” minded. Courses are often structured, and instructors will teach to meet students’ expectations.

From the instructors’ perspective, Henderson (1996), Berrett (2011) and Ascott (2008) all state that teaching staff is generally reluctant to let go of traditional methods of making and teaching art. Ritchie (2006) and McGill (2012) further assert that faculty disciplinary backgrounds, credentials, and interests also influence curriculum planning; educators’ background form their expectations, discourses, and teaching approaches. The expertise of the educators, most of whom have been trained in narrow disciplines, is said to be a contributing factor of the delay in developing new media art programs that require adaptability and cross-disciplinary knowledge (Wilson, 2008). Even when new disciplines develop or, as I will elaborate in the next section, new curricular models are introduced, educators teach new genres and assess the work through the lens of their primary discipline. They rely on culturally entrenched teaching methods, and on specific vocabulary, jargon, biases and assumptions. Blair et al. (2008) concluded that although educators acknowledge the need for increasing fluidity of knowledge and for skills that cannot be acquired within the established disciplinary boundaries, “[instructors’] overriding desire is to equip our undergraduate students with unique, advanced and hard-won skills and understandings that are specific to our perception of ‘discipline’” (p. 67).

I found several statements that form a general agreement that learning in the new media art unfolds in the making, as a lived experience through the production of creative projects under the guidance of instructors, in a specific learning environment: the studio. The scope of projects varies from small modular project assignments, to major capstone, sometimes year-long projects, involving research and practice (Rappaport, 2004; Legrady, 2006; Blair et al., 2008; Bielicky, 2008; Amiri, 2011; Rikakis et al., 2013). One-to-one instruction used to be the ubiquitous approach to teaching in the long tradition of the student-artist/mentor relationship (Buss, 2002). Instructors would accompany students individually in their art-making projects. This teaching style has become unrealistic at the university, where student-teacher ratios keep increasing to respond to the university’s efficiency model (Kitson, 1991; Buss, 2002; Burnett, 2008; Budge, 2012; Rikakis et al., 2013). Artist-teachers, who tend to reproduce their own experiences, are therefore more likely to teach the way they learned (Berrett, 2011); hence they long for the loss of the one-on-one model and deem harder not to have individual time with the students in practice-based courses.

The traditional emphasis on creativity, tacit knowledge, and originality in the education of artists along with forging the artists' identity continue to be perceived as fundamental foci of art education, also expressed in the discourses of new media art education. This makes for what Budge (2012) calls "pedagogies of ambiguity" (p. 9) – an expression that refers to the subjective nature of transmission of skills and expertise in art pedagogies. This is related to many times repeated aphorisms such as the idea that "art cannot be taught", analyzed by Elkins (2001) in the book *Why Art cannot be taught*. New media art education acknowledges that the processes to foster and exercise creativity are difficult to deconstruct and translate into pedagogical practices and criteria for assessment (Rikakis et al., 2013). This, of course, has always carried great challenges to develop curriculum in art, and most challenging for new media art at the university (Budge, 2012).

Both curricula developed at the university for programs that did not previously exist, and curricula of programs that adapted to the university when art schools became part of the institution, express evidences of these legacies, and of reluctance and challenges in departing from them. This legacy is tied to disciplinary discourses and practices of the training of artists that are at odds with the predominant models in the institutionary complex. As indicated in chapter 3, art programs had to adapt to the general education requirements and to the institutional framework in order to award university-recognized degrees. Art programs seek to simultaneously take into consideration their distinctive nature as creative practice-based discipline, while abiding by the university's degree structure and qualification standards.

The process of art making, in the "old" modernist view, was seen as relatively private and internal to the practitioner, and hence difficult to deconstruct and assess. Art schools addressed this issue by attaching great value to the acquisition of techniques through workshops and projects, and in shared studios in an attempt to unmask, and evaluate by comparison between students the art-making processes they developed (Burnett, 2008). Assessment in art education has come to place great emphasis in the process and the oral and written discourse surrounding the making as ways to track the learning of the student-artists, yet without ever letting go of the importance of the outcome.

In line with the above-mentioned influence of the logic-rational theories and methods that are privileged in higher education institutions, the standardized measurable assessment of learning is paramount at the university, as it is at most levels of formal education. For benchmarking the curriculum structure, learning outcomes, and assessment, the creative process and the pedagogies of ambiguity must be translated into more concrete terms such as

research, enquiry, information. The process, as the work produced, must take the form of observable outcomes, such as text, images, artefacts, perhaps also performances (Buss, 2002).

As a field of study of academia that has been discursively and systemically associated with the Fine Arts but holds more and more affinities with the Sciences, the disciplinary status of new media art is a rather interesting one, which I elaborate on further in this chapter and the next. The legacies and contemporary orientations of other disciplines within the institution increasingly manifest in its discourses. To argue that the legacy of traditional views of the artist and of art education persists and is manifested in statements in the discourses of new media art education is not to say that the present context remains unchanged. Amid the calls for change for new media art education, some are taking effect in institutions, but I suggest this change has unfolded as a slow evolution rather than the claimed revolution.

6.1.2 Calls for new pedagogies

Based on the critical discourse analysis of the past chapter regarding the roles of the artists, and the analysis of statements on the legacy of the traditional models of art education, I noted two conflicting discursive formations emerge: The first, introduced in the section above, indicated that teaching-learning approaches are entrenched in disciplinary cultures, and confined to systemic structures and bureaucracies, both of which are by nature slow to adopt change; The second claims that new media art pedagogies must keep up with rapid technological and societal change, which I proceed to elaborate. As I pointed out in chapter 4, *Discourses of the New*, although generally enthusiastic and expressed with a sense of urgency, not all texts calling for change for the education of artists provide detail on the attributes of that which is new, or the implications and challenges of putting said changes in place. I found that the rhetoric of new pedagogies that assuredly claims the need for change often falls short of such details. Nevertheless, I was able to discern that change is expressed in the sense that new media art curriculum development needs to broaden its scope, and address the impact of technological-social change.

Sonia Sheridan was one of the first voices to call for this type of change in the pedagogies of artists. Sheridan (1983) reported in her writings that, from very early in her career as an artist and educator, she insisted that technologies should be used fully and critically, in the service of developing new forms of pedagogy and art, and not simply reinforcing the

traditions of the past. In 1990, Sheridan was still claiming: “It is time for new foundations in art education” (1190b, p. 165). In her view, institutions’ chase of the rapidly changing new media and their struggle to incorporate new media to old structures lead curriculum developers and teachers to overlook the fundamental aesthetic and creative potential of the emerging media. She claimed that artist training “is oblivious to the present and emerging mental environments created by the newer media technologies” (1990b, p. 201).

Hudson’s (1987) statements strengthen this same discourse of the urgent call for new pedagogies to adapt to the ‘present context’, although again, this context is no less vaguely described when he states:

> One of the greatest failures of much of art education has been not to engender a sense of participation in the reality of the 20th century ideas (...) It is natural and inevitable that at times we need to refocus the directions of art and design education, not from whim or fancy but out of necessity (p. 274).

Twenty years later, similar statements are voiced in the texts by Blair et al. (2008) and Sweeny (2008) amongst other authors in Alexenberg’s (2008) editorial, this time referring to the principles of the following century. Blair et al. (2008) equally call for “alternative [educational] models to support creative practice, thinking, learning, research and innovation in the 21st century” (p. 73). Upon closer examination of this rhetoric that is predominantly enthusiastic yet also broad, I identified the most predominant proposed pedagogical approaches, some described best practices and curricular structures that authors discussed as the directions to take on for what they perceived as the new pedagogies for the education of new media artists. I identified three discursive strands that are perceived as necessary and as new pedagogical directions: Discourses of de-specialization, of critical student centered pedagogies, and of interdisciplinary learning.

6.2 Discourses of de-specialization and transferable skills

For the purpose of summarizing what has been highlighted so far regarding the nature of new media art and the roles of new media artists, I propose to temporarily settle on a definition of new media art, which will serve to ground the ideas presented in this chapter and in the next. Grau (2016) offers the most recent and concise definition of new media art I have found, which is the following:

> New Media Art is a comprehensive term that encompasses art forms that are either produced, modified, and transmitted by means of new media/digital technologies or, in a broader sense, make use of "new" and emerging technologies that originate from scientific, military or industrial context. Along with its emphasis on the "new", New Media Art signifies an explicit difference – or *différance* – with art practices that make use of traditional, in other words, "old" visual media. Hence, much of new media art indicates a concern with and reflection of new media and its ever-changing, complex modes of expression. (Para. 1, 2016)

I have discussed how digital media have effected changes in the disciplines that incorporated the new tools into their practices, by adopting or adapting these technologies, initially to present, store, and disseminate their work and knowledge, eventually in the very processes of their scholarly and/or creative work. Digitization provoked the convergence of disciplines with formerly separate techniques and media to a common digital and networked technological ground. In art, traditional art genres adapted to the new media, and new media art genres emerged that were native to the electronic and computation technologies such as virtual art, Internet art, telematics art, and games art (although from a media archaeology perspective, the newness of these genres can be questioned in light of the genealogy of the modes of engagement they invoke, which can be traced back to prior their development). The sharing of instruments, platforms and languages resulted in the merging of previously separate artistic genres, which today, as a result, are difficult to distinguish and define.

The computer also allowed one individual to do more things. In the pre-digital era, technical tasks were sharply separated by the tools and skills required, hence different tasks were performed by different experts. Today, the same artist using one machine is able to edit the image, lay the type, edit the video as well as the sound, develop interfaces and program

interactions of the user with the machine. Artist-educators in the 90s argued that suddenly students had to be trained in a broader range of skills. This generated a period of confusion in regards to what should be taught. Some, like Kitson (1991) deplored the loss of technical expertise and pointed out the declining quality of the work produced by 'generalists'; others, like Brown – as reported by Iskin (1994) – celebrated the fact that artists gained control over more aspects, if not the entire process, of production of works of art. The range and combination of skills and knowledge that can be performed by a single artist have further broadened as new artistic genres, native to computational media continue to emerge.

Farbrook (2011), for example, writes about teaching machinima production. Machinima turns video games and virtual 3D environments into a medium for creating animated films. It uses the different points of view allowed by the game engine, including first-person shooter perspectives or the avatars' point of view into the scene, to capture scenes where actor-players are recorded in scripted actions that are part of a narrative. Clips can then be assembled and post-edited in standard video production software, with added voiceovers, sound effects and scene transitions. Farbrook (2011) explains that "many of the techniques learned in Machinima production translate easily into classic video production as well, providing an effective hybrid of teaching and learning tools" (p. 144). Machinima was, circa 2013, a new visual media technology that extended the use of video games or virtual reality platforms beyond the original intent of the makers. It uses multifaceted but inexpensive tools with which a student working individually or collaboratively can develop a project from the conception of the narrative, to exploring different game engines, to storyboarding, capturing scenes, to video and sound editing. Besides the technical aspects of this multifaceted medium, the genealogy of media and aesthetics in machinima productions can be a rich topic of investigation in the classroom. When I taught an applied and theoretical course on new media art to future art educators, to illustrate the amalgamation of art genres, and the multiple skills of new media artists, I referred to examples of work, and to Farbrook's (2011) article (included in the unit of analysis of this study). Informed by Thomas Veigl's (2011) analysis of this medium, the in-class discussions also opened to topics as diverse as critique of game culture, legal issues, appropriation and innovation.

Just as the technical and production skills that the education of the new media artists must broaden, so must the techniques of formerly distinct artistic genres that merged. Disciplines at large have come to share tools, concepts, discourses and methods. Roy Ascott,

who I consider to be one of the most forward thinking art educators of our times, stated, “the most extensive changes of our environment can be attributed to science and technology” (1964/2003, p. 128). Aligned with the type of rhetoric that places the artist in a higher moral plane, he added that “the artist’s moral responsibility demands that he should attempt to understand those changes.” (p. 128). In the present context, as Ascott continues to reiterate in his more recent writings, this requires familiarity with the scientific thought, tools, and languages (Ascott, 2001; Ascott, 2008).

As the intermediaries who develop, make, or – to return to Grau’s (2011) definition – prompt meaning-making interactions and experiences in the new technology-mediated contexts, new media artists of today touch on highly disparate areas of study and practice. Burnett (2008) explains that the role of intermediary also means that the work of art exists in public or other spheres beyond the artistic milieu, and that its effect (in line with the theories of the economy of attention) relies on the strength and quality of the discourse used to reflect upon and articulate the work. The discourses about the work produced become as important, if not more, as the creative or inspirational impulses that went into the conception of the work. The quality of the discourse cannot improve, he says, without a profound understanding of the disciplines, their histories, and contexts involved. This has repercussions in new media art curriculum development. The discourses of new pedagogies included many such statements calling for change in the approaches for the education of artists to better prepare student-artists to work at multiple fronts, including that new media artists are expected to engage with disciplinary knowledge outside of the arts, as well as the materials, methods and techniques of these disciplines.

The shift in the discourses of new media art pedagogies post-2000 is striking, reflecting the discursive shift in the rhetoric of new that becomes concerned with the broad socio-cultural changes in relation with technological innovation. This discursive shift is indebted to the emergence of a plurality of theoretical, critical, and historical perspectives on (new) media, which triggered a continuously unfolding landscape of cultural and intellectual production. At the level 1 of analysis, this is evidenced in increasing statements that put forward the need to train student-artists to supersede the constantly changing technological landscape, and to engage with non-artistic methods and bodies of knowledge. Such is the predominance of this rhetoric of the expanding scope of the roles and practice of new media artists, and consequently of de-specialization that I found it pertinent to further deconstruct this discourse. I compared what is proposed as new pedagogical directions to what I had found expressed regarding the roles of

new media artists in the face of the technological and related social change. For the purpose of illustrating the predominant rhetoric, I have extracted and proceed to elaborate on the most recurrent propositions.

For West (1990) an appropriate foundation curriculum is holistic. In order to be adapted to the reality of art making in the late twentieth century, he claims the curriculum should “shift attention from particular media toward a holistic concern with perception and notation as the thematic foci of fundamental art education” (p. 183). He warns that art educators have been content to teach along media and discipline-specific approaches, and alternatively proposes that a more general educational experience, which would include history, science, and language, would benefit the new media art curriculum by allowing students “the freedom to be curious and therefore to experience the joy of discovery" (p. 184).

For Loveless (1990), the change is from homogenistic to heterogenistic views, which are characterized by diversity of goals, design, and resources. In Danvers’ (2003) proposition, learners are to be encouraged to progressively extend their arena of possibilities and to delve into unfamiliar territory and new ideas, new meanings and interpretations, different ways of thinking and making, meeting unpredictable outcomes, as opposed to seeking enduring solutions or answers.

In describing the curriculum of his Conceptual/Information Arts Program at San Francisco State University, which was instituted in 1987, Wilson (2008) explains that it promoted experimental inquiry and practices “at the fringes of the art world” (p. 35). By this he means that students challenge traditional notions of what constitutes valid art media, contexts, and approaches. Future artists need to understand the pluralism that characterizes contemporary art practices and address developments in contemporary science and technology. This requires becoming “knowledgeable about world views, ideas and tools of these fields and to incorporate them in non-superficial ways into their art making” (p. 35).

These statements resonate with Ascott’s (2008) idea of “syncretism”. Ascott’s “syncretic discourses and practice” (p. 59) are those that move inquiry, learning, and creativity across knowledge fields. He does not hesitate to assert that students should learn to look “everywhere and anywhere, into any discipline, scientific or spiritual, any view of the world – however esoteric or arcane – any culture, immediate or distant in space or time, in order to find ideas or processes which might engender creativity” (p. 53).

In the face of constant renewal of the fluidity of artistic genres and disciplines, this analysis demonstrates that new media art curriculum will not be based on the traditional educational foci that emphasized the acquisition of technical or media-specific expertise. Although several texts addressed new media art from the perspectives of specific genres (virtual reality art, interactive arts, networked arts, game art) a common concept that artist-educators put forward is that of transferable skills as the foundation of the new media art curriculum. The analysis of statements associated with the concept, or synonyms of transferable skills (Wilson (2008) uses the expression "meta skills"(p.37)), allowed identifying to which skills the expression refers. Generally speaking, these are abilities that can be applied to learn and work in more than one discipline, in different settings and contexts, and that will be sustainable through the flux of technological change (Berrett, 2011; Wislon, 2008; Ascott, 2008). Blair et al. (2008) define "transferable skills" as follows:

> It is our view that the primacy of specialist disciplines within our art school structures has, in many ways, confined staff expertise, limited student expectations and restricted fields of creativity to implied and predictable sets of teaching and learning outcomes. We certainly try hard to offset narrowness by providing opportunities for developing transferable skills, encouraging self-directed learning and providing 'real-world' experiences (p. 67)

The skills pointed out by Blair et al. (2008) are: "team working, networking, lateral thinking and the ability to communicate across discipline and cultural boundaries" to be fostered in a student-centered environment based on "motivation, confidence, independence, versatility, entrepreneurialism, self-appraisal and the ability to extend one's own learning within and across disciplines" (p. 75).

The analysis of these concepts throughout the texts of the unit of analysis brought to light that transferable skills are directly aligned with student-centered pedagogies, and with the expressed roles of visionary and intermediary of new media artists. It also demonstrated that transferable skills are often discursively framed as more valuable than technical skills. Finally, my analysis leads me to confidently assert that the most highly praised transferable skills in the training of new media artists are the abilities to think critically, to collaborate and interdisciplinary learning. I found that the ability to collaborate, as expressed in the texts, is closely associated

with interdisciplinary learning, and therefore I elaborate on these two skills in the second next section.

I will point out that what I have called the discourses of de-specialization in new media art education do not preclude that artist will evolve their own individual craft or a media-specific artistic practice. What it means, as stated by Berrett (2011), is that artists are less tied to single disciplines and techniques than they have been in the past, as new, more varied and interrelated forms of expression exist today than when foundation curricula was put in place as, for example, the artist training concentrations that students could pursue at the Bauhaus. The de-specialization in new media art education curriculum means that students will be trained to work across domains of knowledge, while also being encouraged to develop individual practices based on personal interests and sensitivities, choosing and combining from a wider spectrum of approaches. New media art curriculum, say Rappaport and Burns (2011), should allow open and expansive interpretation of the resources and pedagogical structure. In such a framework, it is conceivable and even desirable that all students in the same cohort pursue different combinations of interests relevant to the individual arch of knowledge each is constructing (Rikakis et al., 2013).

6.3 Student-centred, critical pedagogies

Brown (1993) explains that his main goal in introducing the computer into the arts curriculum early in the 90s was to “free [students] of the limitations of being a user and offer them the opportunity of contributing to the definition of their own future” (p. 3). Students must acquire “the ability to make informed decisions about what effect computer technology may have on their professional and recreational lives” (p. 3), to become critical of their uses and of the potentials and limitations of the machine. He also claims new media artists should be at the forefront of the changes that the technology may engender, foresee what will change and how, and be able to shape to the newer generation of computer-based tools for their own ends.

Similarly, for Kirschenmann (2001) fostering the abilities to “handle media aesthetics”, “development of valid criteria” (what criteria are valid is not specified by the author), and to “judge critically” (p. 18) are fundamental to art pedagogy processes. The goals of such processes, he continues, are:

> (…) to consciously encourage production and active reception, and in so doing, oppose a mere passive consumption. In addition, these processes are based on conceptual ideas and are not restricted to questions of material and technique but are expanded and opened to questions of content, interpretation and criticism. (p. 18).

It is important to highlight in the discourse analysis of the above statement, the expression ‘restricted to’ questions of material and technique that, like the expressions ‘narrow’ and ‘mere’, serve to establish a hierarchy in types of knowledge and abilities. Shanken (2008) reinforces these priorities by stating, at the end of his text about reflections on teaching art at the intersection of science and technological media: “If my students learn nothing else, I hope that they learn how to critically think about art and technology and the ideologies and rhetoric that inspires their production and shape their interpretation” (p. 251).

For Sharir (2008) transferable skills include to “become familiar with cultural backgrounds, critical theories and analytical tools. An additional strong component of [the course described] includes discussion and critiques of mature finished works and related writings” (p. 225). Rappaport and Burns (2011) also define the principal skills for new media artists as “awareness of media and critical theories” which they deem valuable to “engage in dialogues of response and responsibility when making works for public consumption” (p. 8).

Again, the authors do not describe which critical theories and analytical tools those are. It is illustrated in these statements that the facilitation of critical thinking and analysis encompasses reflecting on, critiquing and questioning the *status quo*. Critical thinking is concerned less with the technical and material form than with the content, the context of the work, and the text about the work.

Salient in many of the calls for change presented above towards new pedagogies that foster critical thinking is the emancipation and transformation of the individual mind and identity of the student-artist, an idea that can be found up to the most recent publications. Student-centred pedagogical approaches go hand-in-hand with the discursive strand that calls for the importance of critical and analytical skills.

In his call for change, Loveless (1990) highlighted that the main expressed goal of contemporary pedagogical approaches continues to be to "develop qualities of the artistic mind" (p. 203). This is also advanced by Sharir (2008) in an article in which he discusses pedagogical experiences in cyberspace that allow students to investigate, "the artistic, intellectual, visceral, and emotional issues which can be addressed using the opportunities of [the new interactive technologies and virtual environments]" (p. 225). Diamos' (2012) pedagogy for teaching digital media is also centred on fostering students' "growth of a personal visual language" (p. 6) and focused on "the students as the innovator" (p. 10). She further claims: "The student draws from experience to develop concepts that are engaging and self-realized. Student projects are focused more on expression than technology so that meaning is never compromised" (p. 10).

Expected outcomes are aligned with the usual emancipatory discourses surrounding the identity and roles of artists: she who reflects upon the prevailing worldviews, imagines alternative (better) possibilities, and is responsible for countering the (negative) effects and dynamics spurred by the new media technologies introduced in society. Critical thinking is the primary skill towards becoming a visionary. It is seen as necessary to formulate alternatives, to make objects and propose experiences that prompt discussion and raise awareness, and ultimately shift established power relations – in this sense, critical thinking is also a fundamental skill for the artist to become the intermediary.

Pedagogical approaches for engaging new media art students in critical thinking and analysis are more often than not tied with instructional activities based on literary forms of knowledge, which are tied to the theories and history of the field. Critical thinking is expressed in

the discourses students develop to articulate their practice, namely in the textual or oral presentations about the work they produce, as well as others' works of art in relation to their context (Geahigan, 2005; Shanken, 2008). Such discussions or writings refer to material practices, yet few texts are dedicated to examination of how practice-based instructional activities will foster critical thinking. In other words, authors do not explain how critical thinking unfolds in the making, in spite of recurrent calls that the arts should remain true to their distinctive nature of practice-based disciplines. This is not to say that critical thinking does not occur in the very processes of making, through experimentation with media and materials. However, processes of art making, which are often personal, experimental and driven by creativity, are intuitive and non-linear. Therefore it may be difficult to discern, and to translate into oral or textual descriptions, which kinds of thinking come into play, when and why aesthetic, conceptual, and critical choices were made.

6.3.1 Analysis of critical pedagogies

The idea of critical pedagogies stems from the same postructuralist philosophy that frames the methodology of this study; postructuralist theories have the particularity of being attentive to the theoretical commitments and the personal and social implications of discourse systems, and to the examination of power, especially those systems that create and perpetuate imbalances and oppression. These discourse systems are rarely explicit or centralized in a recognizable source, but rather embedded in habits and ideologies that manifest in large part through the discourses of individuals, their terminology and habits of interpretation. For a long time, educational structures were a tool of reinforcement of existing social orders, and did not promote critical analysis and individual emancipation. Critical teaching, or teaching for empowerment, emerged in line with postructuralist theories that are traced back to the early 20th century, in reaction to the predominant logic-rational theories. Dewey is often referenced as the precursor of these educational theories. For Dewey (1916), education is a transformational and emancipatory project, which is effected on the individual but with repercussions in the entirety of social, political and economic systems. The liberation of thought that can occur through learning is not achieved by transmitting information from one individual to another. Rather, it is in teaching-learning exchanges based on sharing of ideas and emotions that the individual is transformed and empowered to further pursue her own growth.

Critical pedagogies returned to prominence with the liberatory movement of the 60s. Brazilian educator Paulo Freire is the most influential figure of critical pedagogy for his work on promoting the oppressed to awareness of the circumstances of their oppression, and of their oppressors. Critical teaching is concerned with the task of uncovering normative structures, imposed interpretations and how these are enacted in the established social orders. Davis (2004) describes this form of teaching as “an attitude that is oriented toward making the familiar strange” (p. 141) (a principle that is also echoed by Bloor and Bloor’s (2007) “act of making strange” which is fundamental in the CDA methodology of this research). The main goal of pedagogical strategies of educators oriented by postructuralist sensibilities is to direct learners to exercise critical examination of the conventions that frame their language, choices and understanding of the world. The discourses of new media art education to promote student-centred approaches such as critical-thinking are directly aligned with critical pedagogies of postructuralist descent. These discourses evoke the role of new media artists as visionary, as a critical agent of the social and aesthetic conventions imposed by the new technological media, and as one who will offer a counterweight to the pervasive and manipulative regimes by producing media work that opens to different ways of interpreting and perceiving the world. It also speaks of the role of the new media artists as intermediary, or catalyst between fields of knowledge and ways of thinking. The ability to intervene, analyze and mediate across disciplines and modes of knowledge requires that one does not settle within the conventions and discourses in place.

The irony of critical education discourses is that they can never, by their postructuralist nature, become dominant discourses in academia because, Davis (2004) explains, their purpose is to interrupt and deconstruct the ruling structures and the *status quo*. The concerns of new media art education to prepare visionaries and intermediaries are plural and moving targets, and pedagogies that are critical must move with them. New media art education must, in this sense, continuously review, question and renew its stance.

To reiterate, the predominant statements that claim the visionary and intermediary virtues of the new media artist imply that new technological media embody the corruption of modern life and announce a future where individuals are disempowered, and that without artists we are at risk of becoming victims of media manipulation. Yet, just as the talent of the student-artists will not reveal itself by presenting her with the tools of art making, critical thinking will also not develop spontaneously by having a student exposed to a work of art. This rhetoric carries the assumption that the new media artist-educator knows what critical stance is best and how to

foster such ability in the student-artists. It also assumes that the ability to think critically that will have been nurtured, and consequently the future artists' critique and intervention will serve a higher moral stance. The texts I analyzed do not outline how teachers go about nurturing these abilities, nor the ethical and moral education implied in these discourses.

Finally, as introduced above, there is an additional point that consistently manifests in statements of the predominant discourses of new media art education described in this chapter that also rests on philosophical theories carried on for decades in the field of education. That is the notion that critical student-centred pedagogies are primarily associated with literary and discursive forms of knowledge and skills, as opposed to practice-based knowledge. At the turn of the century, in the context of the industrial reorganization of western society, Dewey's (1916) calls for change in education were already pointing out that the [educational] revolution was incomplete, and change was needed regarding traditional distinctions between thinking and making. He stated:

> The idea still prevails that a truly cultural or liberal education cannot have anything in common, directly at least, with industrial affairs, and that the education which is fit for the masses must be a useful or practical education in a sense which opposes useful and practical to nurture of appreciation and liberation of thought. (p. 161)

The excerpt above, and the argument that frames it, resonate with the persistent ideology that until today polarizes literary forms of knowing and practice-based learning. These polarized views place the technical, material skills at the level of the vocational (hence, industrial), and invariably subordinate to the acquisition of literary and discursive forms of literacy and mental operations such as critical thinking. The latter are presumed truly liberating and emancipatory, therefore associated with the desired academic transformation and emancipation of the individual. Although the discourses of new media art education assert that making and material practices are at the heart of the discipline, the absence of explanation about how learning unfolds in the making denounces a malaise. This is yet another discursive instance of hedging (Bloor & Bloor, 2007), by avoiding full commitment or precision.

The described learning tasks that engage students in critical thinking, include moments of group critique in which students orally present their research and processes, as well as written dissertations in which they justify the aesthetic choices that resulted in the work

produced, are essential to provide observable and measurable elements (the propositions, the discourse, the vocabulary, the sources) that the instructor can use to assess both process and product, in relation to prespecified goals. Methods and criteria for assessment are summarily addressed in the unit of analysis. When these are discussed, they are presented as imposed by institutional standards and procedures (Danvers, 2003; Rikakis et al., 2013, Ursyn, 2015). According to Pritchard, Heatly and Trigwell (2005), who investigated the importance of the dissertation/written assignment to practice-based disciplines, assessment is one of the reasons why many in the current context of higher education feel discomfort with the idea of dismissing theory and critiques, without which the processes of making and reflections of the learners would be hard to articulate and assess.

The predominance of texts focusing on literary and discursive critical skills, addressing concepts and ideas rather than techniques and media, speaks of the allegiance of new media art education to the tradition of the humanities and liberal arts. This study rests on the analysis of textual discourses about teaching-learning and – to the extent these are present in the texts – description of new media art making in education. Textual reports of the making would require dissecting the ‘mere’ and ‘narrow’ technical processes and the material properties of the media students engage with. It is evident from the characteristic of the texts in this unit of analysis that authors writing about new media art education are not interested in such descriptions, compared to, for example, publications in the fields of engineering or applied sciences. Texts in these fields are largely comprised of thorough descriptions of the techniques and methods used in the making and/or experiment. Not surprisingly, the texts of the unit of analysis that included more technical details were those that proposed models of new media art education and curriculum involving subjects that have traditionally been taught in engineering and the computer sciences, such as programming languages, and forms of interactive digital art (Mateas, 2005; Amiri, 2011).

6.4 Discourses of interdisciplinary education

Several statements cited in the previous sections begin to indicate that new pedagogies for new media art education call for breaking free of disciplinary boundaries. Emphasis on transferable skills such as collaboration, critical thinking, critical analysis, and conducting self-directed inquiry serve the student-artists well for the plurality of approaches, and for the disciplinary boundary-crossing that they are expected to demonstrate. The new pedagogies for new media art aim at introducing students to a wider range of tools, disciplinary languages, methods, and ways of knowing, which are meant to diversify artistic approaches. To return to Wilson (2008), "every area of scientific and technological research is a potential focus for the arts" (p. 31). It is therefore not surprising that I often found the concept of interdisciplinarity weaved through the discursive strands of the artists as intermediary and of new pedagogies.

From my analysis of statements associated with code 1.6 *Interdisciplinary learning*, there are three main goals for developing interdisciplinary curriculum for the education of new media artists. These are: to train student-artists to communicate between areas of expertise and collaborate in diverse teams (Hagebolling, 1990; Mateas, 2005; Legrady, 2006; Rikakis et al., 2013), to expand their horizons and learn about different ways to perceive, define and address problems, which Legrady (2006) calls to "hybridize research" (p. 215), and to incorporate ideas and technologies from other fields into their practice (Pinkel, 1986; Dohn & Wagner, 1987; Shanken, 2008).

Hazelkorn (2005) stated: "Perhaps some of the most exciting boundary crossing initiatives have emerged through links between the arts, science and technology" (p. 149). Art, science, and technology (AST) is indeed the most predominant configuration of interdisciplinarity in the discourses of new media art education I analyzed. For the most part, the expression 'science and technology' refers to art engaging with techno-science. Notions from the social sciences are implicitly referenced as equally relevant to the education of artists, but rarely central to the discourses of interdisciplinarity. In the last decade, the term 'science' slowly begins to also encompass references to the natural sciences (Ascott, 2008).

There are many pedagogical and institutional implications for interdisciplinary teaching and learning at the university. These topics have been extensively theorized, and I will refer to some of the recent theories on knowledge and interdisciplinarity in the last section of this chapter and in the first section of the next, as they informed my critical analysis of these

discourses, and of the systemic implications of these discourses of new pedagogies (Chapter 7). To remain faithful to my analysis of the predominant ideas that characterize these discourses, the following description is based only on the most salient expressions in the data of my study.

Although discussions of interdisciplinarity are not new, nor are they specific to media art education, the urgency and challenges of developing interdisciplinary curriculum consistently emerge as themes in publications throughout the entire timeframe of this study, with evident saturation in publications from the last two decades. Discourses of interdisciplinary teaching and learning also fall within the broader discursive formations of novelty and calls for change. It is expressed that we must move on from the long-established separation, and even opposition of the teaching and learning methods in the arts and in the sciences. Srinivasan, House, Saslow and LaFayette (2007) sum up this opposition on which I will proceed to elaborate, when they simply stated: "It is a commonly held prejudice that artists are math phobic, and computer scientists are visually lame" (p. 2).

In academia, disciplines are distinguished by their epistemologies, discourses, and ways of teaching and researching. Teaching and learning in particular are firmly grounded in canonical approaches, which often rely on the seminal texts and theories of the field. These approaches make for the internal unity of fields of study and practice, and are the basis on which researchers, practitioners and educators identify as a community. Teaching and learning cultures, like research methodologies, are difficult to change and contribute to delimiting disciplinary boundaries. Barry and Born (2013) state that "disciplines exhibit clear inertial tendencies" (p. 7), and even when internal differences or what they call "intellectual divisions" (p. 8) exist within disciplines, these often remain over long periods of time.

The disciplinary cultures manifest, for example, when students and instructors meet in the classroom, the studio or the lab with common expectations of what and how they will learn/teach, which in turn reinforce the established models. Students arrive in higher education after choosing their discipline. Very often this choice is based on the impact of previous years of study and their learning experiences. Dohn and Wagner's (1987) study of a program that introduced art students to topics of the computer sciences revealed that students reported they chose the arts because they had less aptitude and/or interests in science and mathematics. They identified this tendency to reinforce disciplinary ways of learning as "functional fixedness" (p. 234). They concluded:

> During their time in higher education students acquire certain approaches to learning appropriate to the kind of study they pursue (…). This means that problems are likely to arise when students with learning abilities important for coping with art studies are channelled into studies demanding other cognitive learning styles. (p. 235).

Even though calls for interdisciplinary curriculum are consistently found decade after decade, the problem of functional fixedness seems to persist as it continues to be reported by authors in later publications. Legrady (2006) and Emma (2009) noted that students will not spontaneously cross disciplinary boundaries when asked to perform self-directed inquiry towards their practice. This is true even within the artistic genres and styles they cultivate: “If I ask students to do whatever they want to do, they often avoid risk by doing something they already have learned in the past” (p. 17), maintains Emma (2009). In experimental pedagogical projects that brought together engineering, psychology and art students, Legrady (2006) concluded: “students approached the projects' planning and development based on worldviews and problem-solving approaches defined according to training in their individual disciplines” (p. 217). New learning approaches must be taught, especially when other “learning sets” (Dohn & Wagner, 1987, p. 234) have already been inculcated.

It suits here to remind the reader of a point which I have insisted on so far that the discourses of new media art education characterize the field as pluralistic, fluid and expansive; to return to Burnett’s (2008) and Ritchie’s (2006) definition presented in chapter 2, new media art is characterized by the cross-pollination of disciplines as the field uses the jargon, principles and assumptions of many other related fields, and its discourses carry the disciplinary background of all those engaged in producing scholarly and artistic work, as well as in teaching new media art. The field suffers from the instability characteristic of an emerging field of study. When art entered academia it became a discipline among disciplines; it adapted to the institutional structure, teaching-learning and assessment benchmarks, but remained ideologically and physically separated from other fields. Often, to abide by institutional faculties and departmental structures the arts were further divided internally into various media (West, 1990). The pedagogies expressed in the texts I analyzed indicate that new media art programs defy that separation, as the proposed teaching-learning best practices are, for the most part, described as breaking free from the traditional models of art education, which have been largely tied to canonical theories of art.

Students often arrive in (media) art programs with a firm grasp of modern and contemporary art, and some knowledge in art history. However, the history of new media art is not only that of art. Histories of new media art are multithreaded, as I advanced in Chapter 3 supported by theories of media archaeology. The histories of new media art, especially in the last two decades, are the histories of science, technology, but also the new cultural histories: those that revisit and write about events, practices, and constructs from perspectives that have been disregarded in the conventional narratives. In his foreword to Zielinski (2006), Timothy Druckrey reminds us that all these reviewed histories inform new artistic approaches that revisit old media and sometimes dwell on imagined evolutions of media as if they were new. There are many challenges to implementing courses in non-canonical areas such as the history of AST, not the least is finding qualified faculty (Shanken, 2008). This subject is slowly replacing traditional art history foundational courses in media art programs that seek to promote 'true' interdisciplinary thinking. It can be said that disciplinary cultures, functional fixedness in teaching-learning approaches, and rigidity of curricular content are expressed as the greatest hindrances of interdisciplinary media education.

Interdisciplinary new media art education is based on the idea that the knowledge and tools of the sciences are complementary to those of new media art. Hence, the urgent calls embedded in the discourses of new pedagogies are towards developing approaches that will bring new media artists to acquire the necessary skills to engage with the scientific disciplines. Burnett (2008) gives voice to such perspectives:

> The challenges for art education are many, but none is more important than redefining the orientation of disciplines in art and design and to explore new disciplinary boundaries that reference history, but also deal with the future. The challenge is not to dilute some of the core strengths of the discipline, while at the same time recognizing the fluidity and permeability of their boundaries. (p. 116)

My analysis of the statements that frame the idea of interdisciplinarity in new media art education point to two main approaches: the first – model 1, refers to infusing the curriculum with subjects that have traditionally been taught in the sciences. The second – model 2, entails developing pedagogical collaborative projects that bring together students and teachers from

different disciplines. I provide examples of both approaches, and I will proceed to analyze how they resonate with recent theories on interdisciplinarity.

6.4.1 Interdisciplinary pedagogies 1

The data of this study reveal that the most recurrent example amongst described pedagogies that seek to bridge art with the sciences are proposals to introduce computer programming languages in the new media arts curriculum. Such art-science curricula is the object of many pedagogical proposals and debate (Srinivasan et al., 2007; Burg, 2008; Ariga & Mori, 2009; Amiri, 2011; Rappaport & Burns, 2011; Diamos, 2012). Programming languages and developing software are central topics in the disciplines of computer science and computer engineering. The skills required to understand and 'write code' are qualified as forms of computer literacy and procedural literacy. Fishwick (2002) quotes famous computer scientist Alan Kay to define computer literacy as "a contact with the activity of computing deep enough to make the computational equivalent of reading and writing fluent and enjoyable" (p. 289).

For several artist-educators, computer literacy does not always equate with the knowledge of specific or advanced enough skills that new media artists ought to master. Mateas (2005) argues that one can learn how to use the computer at many different levels but generally, users will only grasp its superficial capacities. Although most artists use it, it remains for them a black box. User-friendly software avoids exposing the user to the more complex technical aspects, thereby closing opportunity to engage with the code and with the unique conceptual possibilities of the computational media. Thus, due to the lack of engagement with intrinsic structure and affordances of the medium, general computer literacy deprives the user-artist of "the crucial relationship between authorship, code, and audience reception" (Mateas, 2005, para. 2). Bogost et al. (2011) as well as Mateas (2005) claim that the training of artists must instead foster procedural literacy skills, which entail "the ability to reconfigure basic concepts and rules to understand and solve problems, not just on the computer, but in general" (p. 32). Mateas (2005) completes this definition of procedural literacy as "the ability to read and write processes, to engage procedural representation and aesthetics, to understand the interplay between the culturally embedded practices of human meaning-making and technically mediated processes" (para. 2).

Procedural literacy is a concept that originated in the 1950s within the rationalist "computationalist paradigm" according to which all cognitive phenomena could be translated into logic-like rules (Varela, 1999). With the successes of the first experiments of artificial intelligence (AI) in which computers were programmed to outperform humans in logic tasks, in line with the usual rhetoric of new in the face of technological progress, there was a collective enthusiasm about the potential progress still to come in this area. The dominant belief, explains Davis (2004), was that computers would match and outperform human abilities to reason, speak, make moral and political decisions as soon as they could store enormous databases with matching processing capacities. AI fell spectacularly short of the expectations towards its progress, largely due to the realization that humans do not rely only on vast amounts of information accumulated, stored and processed in linear ways. Constructivist theories came to tame the rationalist perspectives, by proposing that human knowledge is also abstracted from physical and bodily sensations, and from culturally conditioned and socially situated ways of navigating the world (Davis, 2004). As I will argue in the last chapter, complexity theories further deconstruct human cognition as a collective, biological, cultural phenomenon that needs multiple disciplinary approaches in order to be understood.

Procedural literacy hence originally aimed to understand how human cognitive and practical tasks can be translated into, and sometimes transformed or enhanced by algorithms. Hence it supposes that writing code can potentially be explored as an expressive medium, and therefore it is of relevance to the education of new media artists. Interactive arts and video games, for example, require procedural literacy. These are native computational genres; reading and writing game-like artifacts are recurrent projects around which educators organize procedural literacy curriculum (Amiri, 2011).

Courses or programs in interactive art and game development are often offered at media art schools or departments. In regards to the task of introducing artists to computer programming languages necessary for experimenting and creating with code, educators bring up the issues associated with functional fixedness: resistance from students and educators to learning and adopting the medium coupled with institutional barriers in introducing new pedagogies that do not fit the pedagogies usually associated with art education (Mateas, 2005; Amiri, 2011). Additionally, they point out the perceived hierarchy that places critical-literary and discursive skills above the technical skills. Mateas (2005) explains:

> For humanities scholars, artists and designers, computer programming is seen as a narrow technical skill, a mere familiarity with the latest fads and facility with the latest

> jargon of the computer industry. In this view, programming has almost no connection with theoretical and philosophical considerations, with concept and aesthetics, with a design focus on human action and interpretation. (para. 1)

In his extensive literature review of various approaches to teaching programming languages Amiri (2011) concluded that the dominant axiom for developing code is a linear five-step process: “What [one wants to do], How [to do it], Do it, Test, and Use” (p. 204). This methodology corresponds to the prevailing scientific research methodologies which consist of hypothesis formulation, experiment design, experiment, analysis, and report or revise the hypothesis, or the engineering protocol of ‘requirement determination, design, build, certify, and use’. Their study concluded that the prescriptive methods used in the applied sciences have made their way beyond computer science, and are now used in the curriculum of many interactive media courses in art and design. As such, teaching approaches for programming languages introduce students to the abstract features of computation, programming language structure and syntax, train students to be aware of the full cycle of systems production, and pay great attention to details at all times in order to ensure the software will run on the device without glitches. It is a complex process that involves systematic testing at all stages. Such structured learning methodologies that follow a framework of procedures are fundamentally at odds with the intuitive nature of artistic practice and with the critical, student-centered art pedagogies described earlier in this chapter. At first, they also do not appear to meet the goals of new media art education if these are meant to align with the expressed roles of new media artists.

6.4.2 Analysis of interdisciplinary pedagogies 1.

The “prescriptive methods” used for teaching topics of the applied sciences described in interdisciplinary teaching, model 1, are derived from teaching assumptions linked to the philosophical theories of rationalism (exclusive reliance on deductive logic) and empiricism (emphasis on experiment and demonstration, of which positivism is the most radical expression). As introduced at the beginning of this chapter, these theories conditioned a perceived hierarchy of forms of knowledge and of disciplines, and carved the long-standing divide between the analytical sciences and humanities. Their structured methodologies

prevailed for a long time as the primary western models for deriving (scientific, hence perceived as true) knowledge. Consequently, this paradigm has shaped curriculum, teaching-learning approaches, and can still be detected in discursive practices and the predominant structures of formal education. As explained by Davis (2004), rationalism and empiricism promoted conceptions of teaching "concerned with logical, carefully planned movements through topics" (p. 78), reflected in linear lesson plans, and analogies of teaching with the terms instructing, directing, and building, and other connotations that suggest the structuring of the learners' inner knowledge. In such conceptions, teaching begins by determining the specific desired outcomes, then instructing on the foundations of the subject matter, and proceeding through a sequence of incremental steps to attain higher levels of complexity.

Unlike critical, student-centered pedagogies stemming from postructuralist philosophical theories that conceive teaching as means of empowering the individual, for rationalists, teaching is instructing and learning is seen as a strictly mental, brain-based operation that can be conditioned. Methods are systematic and develop around a specific subject, so there is an explicit detachment of teachers from learners. Practice serves the purpose of a demonstration of formal principles and theories. Davis (2004) explains that with this paradigm, mathematics was assigned a privileged status in the curriculum of modern schools. It is a discipline that lends itself to such systematic curricular structure that starts at the elementary competencies and moves through progressively more sophisticated concepts.

Along with the disciplinary divide these pedagogical theories instituted, formal education methods, including those in academia, retain other important aspects of the rationalist paradigm, namely the need to assess learners' understanding in standardized, quantifiable methods, suitable to evaluate students' progress, but rarely used to inform teaching decisions and approaches. Earlier in this chapter I observed that the education of new media artists at the university insists in maintaining in the curriculum instructional activities that can be observed and measured (oral or written descriptions of work processes and thought that attest to a students' understanding of concepts, their critical thinking and informed aesthetic choices), without which the knowledge involved in the creative and experimental processes would be difficult to assess. The accent that institutions of formal education place on assessment is said to be the reason why some art-educators feel discomfort in dismissing theory from practice-based disciplines (Pritchard et al., 2005).

Finally, it is to be expected that the different teaching assumptions and teaching methods that prevail in disciplinary cultures also translate into corresponding learning attitudes, with students expecting teaching approaches for specific curricular content. Although attitudes towards teaching and learning, and the systemic structure of formal institutions of education in many ways continue to reflect the various teaching-learning philosophies, it does not preclude that seemingly parallel philosophies may converge.

In a previous study, I analyzed an introductory course of computer programming in which art students learn how to generate visual and interactive works. I found that students' attitudes towards programming and the issues related to functional fixedness can be overcome, largely due to the disposition the new generations of learners have to learn outside the structures of formal education. The instructor, whom I interviewed, stressed that every year more students were arriving into his course with more knowledge of what a programming language is and does (Freire, 2009). This course introduced students to Processing ®, an open-source, object-oriented programming language developed at the MIT Media Lab in 2001. For students arriving into the course with little or no experience in programming, the learning curve was at the beginning quite steep. However, my research concluded that as they comprehended the basic structure, through self-driven research and sourcing, students were soon able to tackle other concepts to achieve quite complex results. They did this by exploring and adapting code they sourced from the open-source software libraries, developed and shared by the community of developers who share updates, libraries and tutorials in an open-source platform.

A total of 23 articles in the unit of analysis address issues of introducing artists to computer languages. It is beyond the scope of this study to detail all the described best practices to foster procedural literacy, yet several approaches concurred with Mateas' (2005) claims that when introducing new media students to computation, it is important to emphasize that "while programming does have its abstract aspects, it also has the properties of a concrete craft practice" (para. 25). The act of coding expresses social and cultural assumptions. Different tools allow different levels of engagement, open to certain styles and possibilities of interactions, while closing off others (Mateas, 2005). The code carries meanings, biases and the choices of the author(s) that are included or excluded from the possibilities of the interaction with the software, or the case being, the events of the generative system. Mateas (2005) strongly argues that computation for new media students should not be an easier version of the computer science courses. It should remain challenging: the towers of abstract concepts that make

programming languages, such as variables, loops, conditionals, arrays, and functions should be presented tied to the media theory and history of this craft.

Procedural literacy, in the abilities to write code, to understand and develop processes, is often expressed in relation to the role of the artist to supersede the potential of digital technologies as they are offered to us in their mainstream commercial versions. With these skills, the artist is empowered to intervene in the very same media and develop interactive experiences beyond those that are readily available. In describing a newly instituted Digital Media, BFA, program at the University of Wisconsin, Rappaport and Burns (2011) asserted that in addition to introducing students to critical and media theories:

> We believe that students should have experience manipulating code directly because programming teaches students about the underlying structure of data and its metaphors. Later, this knowledge can be used to extend the capabilities of commercial software by developing unique scripts and programs for a variety of contexts including web, interactive environments and stand-alone applications (p. 8).

In the statements above, we see the roles of the artist as visionary and intermediary expressed, and the principles of critical pedagogies weaved through the teaching-learning of a discipline that descend from logic and mathematics, thus has traditionally been framed by a rationalist culture. The model of interdisciplinary pedagogies 2 seeks to propose a more integrative approach for interdisciplinary learning.

6.4.3 Interdisciplinary pedagogies 2

Within the discourses of interdisciplinarity, the second approach I identified is that in which the curriculum is structured in didactic projects that bring together students, teachers, as well as professional experts from different fields of knowledge and practice, sometimes from external organizations or industries. In addition to exposing students and experts to each other's disciplines, these projects are praised in the discourses of new pedagogies for fostering the ability to cooperate and collaborate, which fall within the notion of transferable skills.

Such approaches are described from the earlier texts of my unit of analysis, namely in texts by Sheridan (1983). In her writings about the Generative Systems program she

demonstrates that it frequently brought artists and scientists together in the investigation of the scientific-technological systems of the time. This, Sheridan claimed, was to the great benefit of artists who saw their passive role in shaping the technological landscape turned into an active one. It is also the model presented by Hagebolling (1990) in her introduction of the Academy of Media Arts Cologne, founded in 1990. She stated that “preferences will be given to interdisciplinary development and research projects in which artists, scientists and technicians closely work together” (p. 320). She also emphasized that part of their interdisciplinary approach was to develop projects with close ties to professional experience, and bring together experts in different fields.

The curriculum described by Legrady (2006) in a foundation course at the UCSB Media Arts and Technology program that was common to students pursuing concentrations in art and in engineering required co-teaching between faculty specialized in different areas of expertise. One teacher of engineering signal processing teamed with one of media arts project production, “as a way to foster engineering-level research in conjunction with the experimental approach of the visual arts” (p. 217). The curriculum was designed so that students learn subject matter of each other’s fields, but came together to realize a final project that synthesized the knowledge acquired in each concentration. One of the goals of this endeavour was that students learn to exchange with other fields of knowledge. Legrady’s curriculum is similar to Rikakis et al.’s (2013) art-engineering program of studies in which “students bring the expertise gained through their disciplinary concentration into a network of interdisciplinary courses and projects connected through a common list of competencies” (p. 3).

Like the authors above, several others have expressed the value of collaborative practices involving stakeholders from different areas as a way for students to develop a common vocabulary, to function as reciprocal sources of information, inspiration and support (Scholz, 2005; Blair et al., 2008; Rappaport & Burns, 2011). To return to the aforementioned example of computer programming, Mateas (2005) goes as far as to assert:

> Practitioners who themselves don’t write code will find themselves in interdisciplinary collaborative teams of artists, designers and programmers, doomed to failure because of the inability to communicate across the cultural divide between the artists and programmers. (para. 4)

Given the diverse and changing technological media landscape and the ephemeral relevance of curricular projects focusing on technical skills, as a solution to avoid constantly rewriting curricula, curriculum is structured along projects, driven by issues, problems, and themes as opposed to techniques, media, or discipline-specific constructs. Such models break with the rationalist teaching-learning framework of many scientific disciplines based on pre-established principles and concepts that can be broken down into a series of objectives, sequences of learning, and subject-specific skills students are expected to acquire (Blair et al., 2008; Rikakis et al., 2013).

Developing this type of interdisciplinary project based curriculum requires the collaboration of experts from separate departments to ensure the projects are mutually rewarding and address the learning goals of each discipline involved. Unlike courses that are nested in and restricted to students in specific departments, instructors will meet a cohort of students with diverse backgrounds, who arrive with different prior knowledge and, as discussed in the previous section, different expectations and attitudes towards learning. These are two factors that greatly stress the responsibilities of faculty engaged in this mode of interdisciplinary curricular programs (Rubini & Gleber, 2004).

6.4.4 Reflections on the discourses of interdisciplinary education

My critical analysis of the discourses of interdisciplinary pedagogies in new media art education is much indebted to recent theories on interdisciplinarity, namely to Barry and Born's (2013) proposed framework of modes and logics of interdisciplinarity. The editors introduce the volume *Interdisciplinarity: reconfigurations of the social and natural sciences* (2013) by stating that interdisciplinary research and practices are not new phenomena in academia; what is relatively new is the recent rise to prominence and the pace of dissemination of particular discourses, or "how it has come to be seen as a solution to a series of current problems, in particular the relations between science and society, the calls for accountability, and the need to foster innovation in the knowledge economy" (p. 1). Relatedly, academia has seen an increase of funding for initiatives in research across the natural-social sciences, and the art-science divide (Shanken, 2005; Barry and Born, 2013).

From the perspective of the university's teaching mission, at the 2007 Media Art Histories conference, Sonvilla-Weiss (2006) stated that the renewed interest in interdisciplinarity

as well as in new disciplines altogether, has had little impact on the academic teaching and learning culture. He asked the question that meets my own rationale for this research of "how the increased recognition of interconnections in differing fields of knowledge, systems and ecology of theories is perceived in light of learning tasks" (p. 5). In this section, I follow up on that question, specifically addressing interdisciplinary teaching and learning in the education of new media artists at the university. I identified four critical points in my analysis of the predominant discourses: 1) the first pertains to the uses of the term interdisciplinarity as expressed in the domain of this study; 2 and 3) the second and third issues pertain to the lack of acknowledgment of multiple possible configurations of interdisciplinarity and of the perceived importance of artists' contribution in art-science collaborations; and finally 4) I analyze evidences of the persistent authority of science.

1) *Did you mean multidisciplinarity?*

Barry and Born (2013) write about three broad modes of cross-disciplinary configurations: multidisciplinary, interdisciplinary and transdisciplinary modes. In multidisciplinarity "several disciplines cooperate but continue to work with standard disciplinary framings" (p. 8). This is different from interdisciplinarity, in which the goal is to integrate or synthesize perspectives from different disciplines to address a complex issue and achieve a new result. Interdisciplinarity is sometimes hard to distinguish from the third mode, transdisciplinarity, which bears more radical implications. Transdiciplinarity suggests a post-disciplinary approach, which enables new, unprecedented ontological frameworks from which disciplinary perspectives can be critically analyzed and questioned.

As seen in the previous section, teaching-learning approaches in new media arts education at the university are qualified as interdisciplinary. However I argue that in light of the above definitions, based on the predominant descriptions of interdisciplinary pedagogies, the teaching and learning approaches would be best qualified as multidisciplinary. In the descriptions of the projects in *interdisciplinary pedagogies 2. Collaborative projects*, students and teachers come together to contribute with their disciplinary knowledge to a common pedagogical project. In Legrady's (2006) course, for instance, everybody is doing their disciplinary job, teachers are teaching and students are learning in their respective disciplines as they come together to contribute towards a result that may indeed be qualified as interdisciplinary. The outcome may reflect the negotiation, compromise and the weight of arguments of each discipline, and the different perspectives, techniques, and knowledge may

have been transmitted and acquired by participants from each discipline. Yet, can it be said that it is an integrated form of disciplinary knowledge that is taught and learnt? Will artists and engineers know as much about the process and result in all of its components? Osborne (2013) claims this interdisciplinarity is of “the platonic sort” (p. 92), because it is summative but not integrative, and does not generate a novel kind of integrated knowledge.

In what I found to be closer to an integrative approach, Rikakis et al. (2013) define their art-engineering curriculum as promoting “integrative collaborative learning that inspires innovation, and prepares the type of engineering-art experts and complex problem solver that are currently needed in creative industries” (p. 1). This statement contains many ideas worth analyzing. To start, I would like to single out the concept of “engineering-art experts”, which implies a form of integrated expertise. The program of studies described offers courses from different academic departments spanning from Engineering, Design, Arts, and Social and Cognitive Sciences. Students compose their own path of courses and accumulate individualized sets of competencies. They come together to work collaboratively with other students, who themselves bring a different set of competencies to the exchange. While I believe it to be an efficient model of distributed learning and collaboration, I am critical of the discourses attached to it. Hence, my question remains: will such a model train a hybrid form of experts as well versed in art as in engineering, or will it rather make for unique, (and indeed exciting and complementary), combinations of knowledge? It must be taken into consideration that in the early years students are likely to choose according to prior learning experiences and also likely to choose combinations of courses related to their preferred vocational orientation.

One must also take into account the teaching challenges of putting these pedagogical approaches in place, and potential conditions for enabling the development of interdisciplinary learning. Scholz (2005) and Bogost et al. (2011) allude to the difficulty of finding faculty able to develop and implement interdisciplinary curricula, most of them having specialized in narrow areas of knowledge. For example, when it comes to developing curricula that address procedural literacy skills, as described in sections *Interdisciplinary pedagogies 1*, Scholz (2005) states: “It is difficult to find faculty members who are conceptually discursive and technically advanced, or artists who have in-depth knowledge of both theory and programming” (p. 106). Most teachers have not been trained in interdisciplinary thinking, therefore it is hard to deconstruct this skill into learning strategies. Scholz (2005) and Seaman (2008), like Legrady (2006), propose co-teaching, which I will further argue ahead, is again most likely to generate multidisciplinary teaching-learning experiences and outcomes.

According to Spelt et al. (2009) interdisciplinary thinking is a complex cognitive skill defined as "the capacity to integrate knowledge of two or more disciplines to produce a cognitive advancement in ways that would have been impossible or unlikely through single disciplinary means" (p. 365). In the texts I analyzed, it is generally stated that students acquire vocabulary and techniques of other disciplines in the act of collaboration, thereby sharing knowledge with experts or colleagues from different fields. Yet very few texts addressed assessment of learning outcomes from such pedagogical approaches, to demonstrate that students are indeed thinking with, and applying methods and techniques of the combined approaches, in tandem.

2) Endless possible configurations of interdisciplinarity

In the discourses of interdisciplinarity, disciplinary learning is presented as inherently restrictive, conventional, closed and homogenous, and articulated as that which we must move from in the new interdisciplinary pedagogies of new media art education. The discourse of new pedagogies that calls for interdisciplinary teaching and learning polarizes disciplinary and interdisciplinary knowledge. It ought to be emphasized, in a critique of such discourses, that even within AST clusters that most texts refer to, the assemblage of disciplines can take on multiple configurations. In all the possible associations of disciplines that can go by the designation of interdisciplinary, it is rare that all disciplines involved are equally weighed. Osborne (2013) explains that different disciplines have different ways of knowing and doing things, and have "different kinds of propensity for interaction" (p. 91). He therefore proposes speaking of modalities of porosity and promiscuity of disciplines: some disciplines are more porous than others.

The discourses of interdisciplinary education from the perspective of media arts are heavily focused on the goal of complementary fulfillment of both media-technological and artistic, creative skills. It is suggested that students in science, technology, and engineering and in art will equally benefit from the knowledge acquired from their counterparts when engaged in science-art collaborative projects or curricular modules. Given the goal of my study, the criteria I developed for sampling published texts for the unit of analysis excluded all texts that addressed the training of students in non-media art concentrations in topics and skills attributed to an artistic education. For this reason it is not possible to ascertain, based on the data of this study, whether applied sciences also find benefits from art-science collaborations. However, literature I reviewed on practices and discourses of interdisciplinarity advises caution in stating reciprocal contributions across arts and sciences. A large review of over fifty years of publications was

conducted by the Science, Engineering, Arts, and Design (SEAD) network that included more than forty reports on the collaborative nature of these disciplines (Malina, Strohecker & LaFayette, 2015). This was a concerted consultation of 150 researchers and practitioners of the network on the critical areas of research and practice, their views on the opportunities and barriers in the rise of what they call “an ecology of networked knowledge and innovation” (p. 7). The goal of this endeavour was to first compile a report that assessed, on an international scale, the persistent or new critical issues and opportunities for transdisciplinary networked knowledge, and to then advance white papers and form action clusters derived from the first reflection. The meta-analysis of twenty of the forty white papers proposed concluded that “it has not been demonstrated that the arts can contribute in a systematic manner to basic science” (p. 64). This concurs with Osborne (2013) who claims that art-science collaborations often tend to be about new kinds of art, not about new kinds of science.

This is not to say that the arts do not have or cannot influence scientific thinking, discoveries, and inventions, but it does highlight disciplines will benefit differently from collaborative endeavours. This is a point that I found omitted from the discourses of new media art pedagogies leading to the conviction that in art-science collaborative projects artist students will learn from, and become skilled in the techniques and vocabulary of scientific methods, just as scientists will benefit from the aesthetic and visual concerns they will incorporate in their work processes and outcomes.

3) *How do disciplines assemble?*

If disciplinary assemblages are, more often than not, unbalanced in their reciprocal contributions, what are the most typical assemblages? Barry and Born (2013) propose a framework that helps clarify the typical arrangements in which formerly isolated disciplines come together. These are the subordination mode, the integrative mode, and the agonistic-antagonistic mode. I have changed the order in which Barry and Born present their framework to better suit the models of interdisciplinarity most salient in this study.

The first mode, as the name indicates, puts one discipline to the service of another discipline in more or less explicit hierarchical divisions of roles. The service discipline makes up, or fills in for that lack in the (master) discipline. Evidence of this mode of interdisciplinarity is found in the earlier publications of this study, in which the contribution of art to sciences is to provide the tools to visualize otherwise abstract scientific concepts and phenomena, for the

world to understand complex data, or see that which is not visible to the naked eye. Hudson (1987) stated that artists "are still quite useful at conceptualizing and creating models and equivalents" (p. 271). The knowledge pertains to the sciences, but the artists develop the creative representations that will render complex phenomena and, increasingly, big data accessible to other disciplines or to the lay public, by aestheticizing (and thereby often publicizing) "aspects of scientific materials or imagery that might not otherwise be appreciated or known" (Barry & Born, 2013, p. 11). The branch of information visualization – which is a native form of computational representation – would be a more recent equivalent of Hudson's (1987) "artists' impressions" (p. 271) of scientific concepts. The sometimes-interactive visualizations of scientific data are brought up in several texts as possible an avenue of work, as it requires technical skills and knowledge of software that artists often use for interactive animations and motion graphics. Although this is a rather narrow and instrumentalist conception of the work of the artist that is put to the service of science, this work does require that artists engage with the sciences in order to graphically interpret complex scientific constructs and data (Bielicky, 2008; Rappaport & Burns, 2011). Such work also often encompasses collaborating with other disciplines such as economics, marketing, psychology and business.

The second mode of interdisciplinary arrangement is integrative. Ideally, this mode combines in more symmetrical ways than the precedent mode, the knowledge, ways of thinking and making from two or more established disciplines, to solve problems in ways that would not have been possible through single disciplinary approaches. Although none of the texts I analyzed about discourses of interdisciplinary education explicitly referred to these modes, I deduced that the most prominent models of interdisciplinary education I read about express this type of configuration as their goal but in effect describe pedagogical approaches that do not reach it. I introduced examples of curricula that strive for this configuration in my critique of the uses of the term interdisciplinary versus multidisciplinary. The *Interdisciplinary pedagogies: model 1* presented in the previous section is a good case in point. The integration of computer science and art aims at training well-rounded, procedurally literate new media artists that use programming as a medium for artistic work. They are expected to be fluent in both computer science and artistic ways of thinking and making. Yet, in reality, different possible levels of engagement with the computational medium, and access to open source code mean that artists learn how to program, not in the systematic curricular structure of scientists, but for project-specific needs. In most cases students will acquire an understanding of parts of coding, or of a specific language that will serve the ends of one specific project.

Osborne's (2013) notion of a trespasser comes to mind. The trespasser is one who passes into other domains to bring another perspective, tools, or metaphors into their own. As a result of trespassing, most of what the researcher or practitioner has to say about the discipline she is trespassing onto is partial and/or will seem obvious to those that are disciplined into the trespassed field. This brings us back to the idea that new media art teaching-learning will contribute little to science teaching and learning. Osborne's metaphor leads me to propose that perhaps the most predominantly described new media art education approaches are training trespassers rather than intermediaries. Nevertheless, the act of trespassing does entail acquiring some understanding and dwelling into the other discipline with the benefit of adding an additional dimension to the learner-practitioners' discipline. It can also be useful in the sense that what drives the trespasser to be one may be to criticize the explanations and conceptual or technical limitations in their own disciplines, or alternatively to bring a critical point of view and point out the limits of the disciplines into which they trespassed.

Finally, Barry and Born's (2013) third mode of interdisciplinary engagement is the agonistic-antagonistic mode, which is associated with more radical shifts in knowledge practices. It is also the rarest kind to find in practice. While the two previous modes do not preclude or override disciplinary knowledge, the last one refers to ways of deriving knowledge that attempt to overcome the established epistemological and ontological assumptions historically embedded in the disciplines. They are defined as "agonistic or antagonistic" for they enable contexts for mutual critique of the assumptions of disciplines, and how these disciplines identify as such. I only found evidence of such modes of knowledge as expressed ideological directions for new media art education (Sonvilla-Weiss, 2006; Ascott, 2008), but not as described teaching-learning approaches or reports of experimented best practices.

The above described models of interdisciplinary assemblages, whether the act of rendering knowledge more accessible, or trespassing across disciplines to critically interpret specific constructs and methods of making with the purpose of commenting on other forms of knowledge, are driven by what Barry and Born (2013) call the logic of accountability. This logic manifests, for instance, when the social sciences and art contribute to public understanding of applied or natural science. Institutional support for interactions across the arts and sciences is often based on this logic, as it fosters the idea that the arts will render scientific knowledge more accessible and thereby will generate the interest in science from new non-expert publics. But there are also interdisciplinary configurations guided by the logic of accountability that resist such subordinate approaches for mediation, namely media art practices that instead engage

critically with the politics of the sciences. Art-science assemblages guided by the logic of accountability are aligned with discursive formations that call for new media art and new media art education to critically explore the ethical ramifications of new technologies. The artist-visionary is expected to take on a critical stance in understanding and comment on the practices of other fields, presumably on the misuses of techno-scientific innovation. The intermediary will react, reshape, and propose alternative worldviews using and adapting those very same media for different (better) ends.

If, in addition to the aesthetic and creative skills that define their work, the contributions of artists are attached to their roles of visionary and intermediary to put into practice the logic of accountability that drives AST interdisciplinary arrangements, this leads to the reflection – one to which the scope of this study will not allow offering an answer, but that is further analyzed in the next section and the last chapter – whether reversely, scientists will exercise accountability on the work of artists, namely when artists appropriate and misinterpret scientific concepts and methods.

4) The authority of science

Most claims of interdisciplinary education purported to equally benefit students and educators from art and science disciplines, with several texts claiming such approaches contribute to the end of the two cultures divide. The expression ‘the two cultures” is ubiquitous. It has been assimilated in academic discourses to refer to the two major disciplinary groups: the humanities and the applied sciences. Most scholars may know the origin of this expression, but the expression has become so entrenched in academic jargon as well as in academic life and its institutional structures, that authors will more often than not omit the source.

The idea of the two cultures to refer to two large bodies of knowledge that are difficult to reconcile was introduced by Charles Percy Snow in a famous lecture he delivered in 1959 at Harvard titled *The two cultures and the scientific divide*. His thesis was that “intellectual life of the whole of western society is increasingly being split into two polar groups: the literary intellectuals and the scientists” (p. 4). He went on to outline a number of misunderstandings between the two cultures that in his view made it impossible to find a common ground where the two cultures could meet. Snow (1959) drew a pit between the sciences and the humanities in expressions of “a gulf of mutual incomprehension, hostility and dislike”, of “lack of understanding” (p. 12) and of “different kinds of mental activities” (p. 23), including at the level of

emotion. In my review of Snow's text, in addition to the statements surrounding the expression "the two cultures", which have been largely discussed in this thesis in relation to predominance of other discursive statements that reflect the issue of the disciplinary divide between the sciences and art, I found two other related claims and corresponding arguments which I believe have also been carried onto the contemporary discourses of interdisciplinary education for media arts: the idea that the polarization of cultures represents practical, intellectual and creative loss for society, and second, that the only way to counter the established dichotomy is "by rethinking our education" (p. 19). This dissertation is based on this premise.

C.P. Snow's (1959) lecture is still referenced today by many authors as an anchor point from which they will argue both in agreement and disagreement. It is possible to find arguments that reference Snow to demonstrate the unchanging state of disciplinary divides, as well as arguments demonstrating the long way we have come in bringing together traditionally different ways of knowing. I found *The Two Cultures* (Snow, 1959) referenced in five texts in the unit of analysis (Gregory, 1980; Hudson, 1987; Dohn & Wagner, 1987; Loveless, 1990; Mateas, 2005), all of which contended that the convergence of the two cultures is still a work in progress, but a goal that the pedagogies for the education of media artists should continue to strive for. This idea is found in the first text I analyzed, in the 80s, as well as in texts published in the most recent decades. Gregory (1980) maintained quite eloquently, in his introduction to a program of studies that aimed precisely at the convergence of science and humanities:

> We do not believe that human beings have undergone cognitive speciation or that human brains are capable of deriving epistemologies and value systems that are in any final sense mutually unintelligible. Since Western humanities and modern science stem from a single developing civilization, we can assume that C. P. Snow's "Two Cultures" is no more than a metaphor for dialectal differences within a single tradition of thought. That is not to say that it is not difficult to learn to recombine them. (p. 300)

Mateas (2005) expresses similar views to Gregory (1980) in regards to the slowness of the process of instituting computer and procedural literacy at the university has been since A. J. Perlis advanced the proposition in 1961, that the computer and programming languages should be foundational in university-level education, not only in computer sciences but all concentrations. Interestingly, C.P. Snow attended the lecture in which Perlis presented his views at the MIT. Forty years later, Mateas (2005) maintains:

> Yet the two cultures divide persists, with artists and humanists often believing that programming is a narrow technical specialty removed from culture, and computer scientists and engineers often happy to pursue just such an unexamined and narrow focus. (para. 36)

I also found the expression “the two cultures” repeatedly employed without any reference to Snow, in addition to many other expressions and statements that may or may not derive from it, but certainly reiterate his propositions. For example, Galloway – reported by Iskin (1994) – asserted that what is important in the collaborations between graphic artists and computer scientist “is the creative conversation between intelligences” (p.348); or when McWilliam et al. (2008) write about “epistemic cultures” (p. 249) and “disciplinary cultures” (p. 251), and Rikakis et al. (2013) of “the complex cultural differences between the arts and engineering fields” (p. 1), to provide only a few examples.

In spite of the almost consensual views of authors addressing the theme of interdisciplinary education, and the predominant claims pointing to balanced contributions and equal exchanges of knowledge between the disciplines involved, there remain traces of the hierarchical relations of art and science, mostly of the authority of the scientific method as the dominant way of deriving knowledge (Wennberg, 1996; Legrady, 2006; Rikakis et al., 2013). In such statements, this authority is conferred by the rigorous systematic, scientific methods for teaching, experimenting, and for assessment. Legrady’s (2006) account of co-teaching with a computer-science expert illustrates such discourses:

> In the classroom, I am continuously reminded that my engineering colleague delivers information that is grounded in proven measurable facts, whereas my observations as an artist are at best opinions, formed through experience but without the authority of scientific testing. (p. 218)

Although both Legrady (2006) and Rikakis et al. (2013) attempt to bring the different disciplines together in pedagogical contexts that claim to mimic the real world experiences, they also mention the challenges of reconciling art and engineering learners in art-science collaborative didactic projects, which is symptomatic of the persistent difference between the two disciplinary cultures. Rikakis et al. (2013) assert:

> The fundamental knowledge basis for engineers and artists are fairly distinct as engineering starts from science principles and arts from aesthetic and form construction principles. The trees and branches of knowledge, or tool boxes, of engineering and arts, do not have significant overlap and thus require sequences of learning that are fairly independent (p. 1).

Legrady (2006) explains that engineering and scientific methods dictate that the process will invariably stay firmly focused on its intended goals. Artists, on another hand, stay open to deviate from an initial course of action, if there ever was one, since many artists (perhaps unless for commissioned work) will admit to working in an open-ended way towards an unplanned outcome. She concludes, “the meanings and evaluations of works of art do not generally follow clear and predetermined means of understanding and evaluation. (…) The situation is quite slippery in relation to the quantifiable scientific paradigm” (p. 218).

Curriculum developers in new media art will reach out to scientific fields for techniques, concepts and principles/theories with the intention to integrate the two fields, but reversely, when the sciences call upon the artists, the interdisciplinary mode will often be that of subordination. I have already discussed a recent major study by the SEAD network that found that the arts have not contributed in a systematic manner to the sciences (Malina et al., 2005). Perhaps the most evident symptom of this is that new media artists have stepped into the lab, and are delving into scientific fields of knowledge in all possible configurations, but the reverse is far less common, at least at the level of higher education, where fewer scientists conduct any or part of their work in the art studio.

A quick search of terms in all the coded excerpts demonstrated that many authors place the new media art student in the lab, rather than in the studio (Hagebolling, 1990; Schreiber,1998; Rutenbeck, 2004; Ascott, 2008; Sharir, 2008; Bogost et al., 2011). Schnapp and Shank (2009) define the lab as follows, in an excerpt in which they point out that labs were primarily associated with sciences:

> Both project-based learning and practice as research and craftswork find their place at the laboratory. Labs are places where knowledge and power are conjoined; where learning is not limited to the discourse but instead based on a richer experiential sensorium; where labor is carried out. (p. 157)

When reflecting on the role and place of the artist in the lab it is hard to bypass Bruno Latour's extensive work of writings, lectures, and the exhibitions he curated, namely the large-scale exhibition Laboratorium (Antwerp, 1999). The crux of this exhibition was to conduct an experiment both on science and on contemporary art, to witness in simultaneous subjective and objective views of the world. As part of the programming of this exhibition, Latour delivered one of 15 lectures and demonstrations under the theme *The Theatre of Proof*. In this lecture he discussed and performed about the intellectual and anthropological implications of the *laboratorium* as a workplace where the practice of investigation is enacted. He clearly spoke of the contemporary paradigm that glorifies the scientific experiment as proof of that which is true when he says: "The primary qualities of the world are known by mathematical physics, what remains are the secondary qualities, which are surely of some relevance to the daily world of ordinary people, but which lack one essential character: that of being real." (1999, p. 187). In the face of this paradigm, art practice, perceived as a secondary form of deriving knowledge is constantly comparing, connecting and competing its modus operandi to the scientific one. He further explains this art-science relation:

> The Romantic artist invented in the early days of the industrial revolution, the modern artist invented in the mid nineteenth century; all were defining their skills and vocations against the rising tide of a "scientific worldview". Even in our century, the many movements against representation were obsessed by the idea that science had somehow managed to swallow realism – if not to say reality – in its entirety. The very idea of an avant-garde, autonomous, esoteric artist, free to raise his or her own technical puzzles, unfettered by social demands at the opposition of Philistines – to what extent this ethos depends on the model of the scientist? (…) There isn't a single feature of the arts that is not drawn in contrast to or in imitation of those of science. Change the view of science, and the arts are bound to change as well. (p. 187)

In light of the analysis of critical and interdisciplinary pedagogies for new media art education, I am tempted to conclude that we are assisting the intensification of this tide, in which artists situate their practice in complex relations to those of scientists. Whereas in the past this was done through contrasting practices and discourses, we are now assisting appropriation, imitation, hacking, repurposing of constructs, methods and principles. The final sentence of Latour's quote above "Change the view of science, and the arts are bound to change as well" (p. 187) meets the principle concluded earlier at the description of critical pedagogies, that the

concerns of new media art education are moving targets, around which new media art education continuously reinvents itself.

6.5 Memos on the discourses of new pedagogies

Part of my answer to the question, what is new in new media art education, is already found in this chapter. The discourses of the new are perpetual and cyclic, and as a result, so are the urgent calls for change. There is a sensible tension between, on the one hand, the proclamations of the desirability of the new, and on the other, the legacy of the traditional models, which are heavy with ideologies and practices that continue to prove resistant to fundamental change. The discourses of new media art education certainly adopt the vibrant rhetoric of the discourses of new and calls for change, but as I anticipated before and is further demonstrated in the analysis, in the last three decades the wind of change in higher education has blown more like a breeze; far from any notion of revolution, the pedagogies in place for the education of new media artists change in a slow evolution. As such, the education part is the least new in new media art education. The most salient foci of new pedagogies (critical student-centered pedagogies, de-specialization and interdisciplinary learning) serve a continuously broadening curriculum well that must prepare future new media artists to learn about and through new media creative practices, which are constantly evolving.

It is noticeable that the predominantly described pedagogical orientations are not tied to the distinctiveness of artistic practice-based work, which is why it is worth questioning whether these most salient orientations are unique to the field of new media art education at the university, or whether they would also surface as predominant orientations in the education of other fields. On the notes of my analysis, I entered a memo about how few texts explored as their central focus the unique nature of practice-based creative learning. Most excerpts coded under *New pedagogies* addressed the critical thinking, interpretation and discussion, and the collaboration that revolved around, and inform the making. The work of art is written about as the object of critical processes. The product is seldom written about in the stages of making, in the different forms it takes, and even more rarely in the mistakes that occur or unsuccessful outcomes. Because the individual growth and emancipation of the individual are at the centre of the teaching-learning experience, it is assumed that there can be no negative outcome (learning experience or creative result) to the processes of learning.

For the past 30 years, new media art education has focused on practices based on computation and digital technologies. It can be said that these were the technologies from which new media art was born. It has primarily focused on the mediality and aesthetic of digital audio-visual interactive media. Therefore (perhaps conveniently) new media art educators have

successfully avoided discussion about learning through issues that arise when working with other media that entail mechanical processes of making. Material installations, robotics and performance that explored the new techno-scientific tools came later again into pedagogical practices (Bunt, 2012), new practices of performance art that combine time-based projected media involving the body, and/or the built environment are rarely mentioned. Technical and material questions have been persistently qualified in the discourses of new media art education as narrow and restrictive concerns. These are questions that can sometimes be complex and difficult to articulate, and require the use of jargon that may sound technocratic and therefore not appealing to the established assumptions and discourses of art education.

In the last chapter I posit that disregarding questions of material and technique in the education of new media artists is a shortcoming in the face of the announced broadening scope of the field, and will contribute to limit the role of the artist to that of the trespasser. Media art education will not be new and will only be at a greater loss if it continues to acquiesce to established hierarchies in types of knowledge and ways of learning and knowing. As I will demonstrate, as media art expands to consider new configurations of interdisciplinary practice, artists will dwell on objects of study, experiments and techniques from areas of inquiry where the media and the matter cannot be reduced and instrumentalized the way the digital and the technological have been.

As new media art expands into new configurations of disciplines, whether these be long-lasting or sporadic assemblages, artists will be confronted with terminology, media and processes that are germane to fields of study with which artists have rarely exchanged within the confines of the university. In contemporary contexts, the education of new media artists will be far more complex than the complementary fulfillment of media-technological and artistic skills, mediality and aesthetics (McWilliam et al., 2008). In the last chapter, I analyze the most recently emerging discourses of new media art education, which demonstrate that increasingly, questions of materiality and technique do not equate with a technocratic approach to teaching and learning, and should be examined and discussed in iterative ways with the theoretical, interpretative and critical components of the curriculum. These emerging discourses will bear significant shifts onto the established assumptions of new media art education, and I hope will engender effective change that, in time, will reflect in teaching-learning methods.

CHAPTER 7. The discourses of new pedagogies and the discourses of the university

It would be simplistic to pretend that the training of new media artists is determined only by curricular and pedagogical questions, and that the challenges lie solely in the tensions between new and traditional approaches, and between the teaching of art and of other fields of knowledge that new media art draws on. As if the complexities intrinsic to developing programs in this unsettling field of study and practice were not already overwhelming, as I stated very early in this dissertation, the present direction of higher education is tied to a larger, complex politico-economic context. McGill (2012) reminds us that curriculum planning in higher education is "an ongoing social activity molded by myriad contextual influences" (p. 4). One such influence that is yet to be examined in this dissertation is the institutional context in which the teaching-learning approaches advanced by the discourses of new pedagogies play out.

Such is the weight of the institutional architecture, the policies and ideologies of the modern university in the discourses of new media art education, that I have already woven many such considerations throughout the analysis of the discourses in the previous chapters. As early as in the analysis of the roles of new media artists of chapter 5, but mostly in chapter 6, I noted the emergence of two discursive formations that pull in opposite directions: it is reiterated that new media art artists, as well as the pedagogies to train them, must meet rapid technological and societal change, but are constrained by the established disciplinary cultures, which are by nature slow to adapt to change. This is not without systemic implications since the divides between disciplinary cultures continue to be reflected in the structural organization and bureaucracies of the modern university. The university, like most social institutions, is characterized by inertia and resistance to change that is contrary to its discourses. This resistance is tied to the established architecture and bureaucracies, and enacted by the groups with interests in the powers in place, who may feel threatened by, or uncomfortable with change (Freeman, 1986). It is also Foucault (1982) who stresses that the power that circulates within institutional structures often remains in place because individuals/groups indeed prefer not to call it into question.

In this chapter I further my investigation of these bureaucracies and interests of groups, and analyze the discourses of new pedagogies that new media art educators subscribe to in light of the power of the overarching structure and ideological context of the modern university and its inaptitude to adapt. I determined that the systemic level of analysis (level 2) in fact unfolds into two sub-levels: the first reviews statements that pertain to the bureaucracies and

administrative policies of the institution. The second reviews statements that speak of the ideological orientations and expressed values of its individuals. This chapter comes full circle with the introduction to the domain of the study laid in chapter 2, where I reviewed theories about the neoliberal orientations and the corporatized, market-driven administration of the modern university. I conclude that, even if expressed in a predominant rhetoric of resistance to the disciplinary structure and policies of the modern university, the discourses of new media art pedagogies are also affected by, and ultimately might reinforce the neoliberal discourses of the institution.

7.1 The place of new media art programs in the institutionary complex

The following statement is exemplary of the predominant discourses of new pedagogies for new media art education found throughout the unit of analysis.

> Nowadays there is an increasing fluidity of knowledge and skill that cannot be easily apprehended within our current idea of cognate disciplines. (…) It is time to re-think our old art school allegiances to disciplinary territories, departmental resources and course team loyalties. If the visual arts are to have a stake in the future, then we must extend the teaching of creativity through planned provision that celebrates and nurtures the kinds of innovative connectivity that students are already engaged with outside their academic lives. (Blair et al., 2008, pp. 67–68)

It connects with other similar statements that foreground the concepts of creativity, innovation, and "fluidity of knowledge" (elsewhere expressed in relation to interdisciplinarity). This statement is expressed in the typical rhetoric of new, with a sense of urgency propelled by the imperatives of change to meet the future. I have started the argument that the modern university, organized in an inert structure of established disciplinary cultures, does not readily accommodate interdisciplinary or creative ways of learning, even though it brands these two concepts as core directions of its teaching mission.

In the examination of the discourses of new pedagogies of the previous chapter, I also pointed out that staff and students in new media art programs inherit of the pedagogies and cultures of the disciplines to which they (feel) they belong. The physical and structural place of a department in the organization of the university is the site where a given disciplinary culture is enacted. Therefore, in this chapter I will speak of departments as clusters of related disciplines that share in a common culture. In different institutions, these clusters may be 'schools' or 'faculties', although I will refer to 'departments' as it is the most common designation in the unit of analysis. So, the allegiance of a program to a department impacts who develops the curriculum, how it is implemented, and which and how much resources are available to the program.

Averns' (2004) study revealed that, from 1994 to 2004, growth in new media art and design programs exceeded other art disciplines by more than ten percent, with new facilities being created for those programs. Blair's (2005) survey study (n=35) reported that 40% of new

media and digital media art programs in the USA were listed in Art departments, 20% as separate departments (under many different names), and only 17% involved interdisciplinary configurations. In concurrence with Blair (2005), Rubini and Gleber (2004) explain that “most typically, programs emerge within traditional, well-established allied areas, and grow up using the standards and measures well established in the home base area”(p. 52). Even if the curriculum of new media art programs seeks to expose future artists to a wide variety of fields of knowledge, the discourses of collaboration, of interdisciplinary teaching and learning, and of transferable skills previously discussed largely defy the traditional physical and ideological separation of art from other disciplines in the university’s institutionary complex. Hence, for the vast majority, new media art programs of study continue to find themselves isolated from non-art departments. Ascott (2008) asserts this separation of art from other disciplines in academia. The Fine Arts, he says, are usually housed in “old nineteenth- and twentieth-century buildings designed for other kinds of practice and older sensibilities. They are incorporated in, but rarely tolerated or understood by, the university sector that has absorbed them” (p. 52). Schnapp & Shanks (2009) further illustrate this as it occurs at Stanford University:

> Stanford isn’t atypical of universities of its kind in publicly espousing the arts’ centrality to the life of the mind while promoting a de facto segregation. (…) A small number of interdisciplinary programs provide formal bridges between various disciplinary silos, without, however, compromising or contesting their separation. (p. 143)

When new programs are created, they are very rarely instituted as truly new areas of study and practice, detached from established departmental cultures. Rubini and Gleber (2004) propose a hypothetical yet useful best-case scenario for the institution of new media art programs. In their scenario, new programs would be built on a disciplinary *tabula rasa,* with autonomous control over the selection of staff and administration of resources. Such program would develop new curricula in accordance with the most up-to-date knowledge and skills assembled from the relevant disciplines, concerned with a determined object of study, topic or issue. Based on the goals of the curriculum, the program would determine its own framework of assessment for student learning, and the requirements to award degrees. Their hypothetical best-case scenario of a new media art program echoes Ascott’s (2001) ideas that artists should remain detached from all categorizations of disciplines. The authors propose an opportunistic assemblage of disciplines for timely studies and practices. The previous chapter demonstrated

that such interdisciplinary configurations are difficult to put into practice because of the established epistemologies and pedagogical approaches of the different disciplines involved. I add here that two related challenges are likely to arise when developing such a program. The first pertains to achieving consensus amongst the individuals: faculty, administrators, and to some extent students, who are firmly trussed in their disciplinary cultures. This in turn falls within a larger, overarching issue: the fluid and interdisciplinary nature of the ideal new media art program is hard to reconcile with the institution's segregated departments, which are often in competition with each other. The modern university tends towards establishing uniform standards for training and methods of assessment of individuals and programs across domains of study (Sweeny, 2008) in order to evaluate departments and programs and rank their success (and relevancy). The institution, especially in its teaching mission, is therefore not accommodating to unique, new programs.

Before I go on to elaborate on these issues and proceed to the numerous institutional barriers to new, interdisciplinary pedagogies, and unique programs of study such as the one proposed by Rubini and Gleber (2004), I include here a case in point of how programs that embrace new media and require competencies from different disciplines have in the past entered higher education. This example is drawn from texts published for the most part in the 90s that were concerned with the (then) new digital interactive technologies (Kitson, 1991; Sheridan, 1990; Iskin, 1994; Murray, 1999).

According to Kitson (1991) and Murray (1999), the first experts in interactive media and interface design were trained by the industry in tandem with the development of the digital technologies that in the 90s were affecting significant socio-economic changes. At the time, Halal and Liebowitz (1994) pointed out that as businesses took the lead in applying these technologies, millions of corporate employees were being trained in new networked interactive multimedia systems. Equally, these systems were being introduced in culture and education. When universities recognized the need to train designers and developers, they met the demand late and partially, and couldn't keep up with the upgrades in the field. For years, the gap widened between the innovation brought about by industry pioneers and the curriculum of programs being developed to train experts in these technologies. A major institutional barrier, Murray (1999) recounted, was that interactive design was claimed by many different separate disciplines: computer science, psychology, education, design, and the new digital media and art programs that were also being created throughout those decades. All these disciplines had indeed something to contribute to training skilled professionals in the emerging field, which

required visual and verbal skills, programming and understanding of the architecture of systems for information transmission and of cognitive processes. In her text, Murray (1999) argued that interactive displays as a new medium was its own genre of communication of information, and therefore should be taught in autonomous, new programs. It is important to note that the first mainstream interactive interfaces were visual/screen-based, before they became haptic installations and devices with incorporated sensors and geo-location that delivered rich-sensory experiences responsive to a greater variety of actions.

In the rhetoric that is characteristic of the predominant discourses of the new and of the roles of the artists, Murray (1999), Sheridan (1990) and Iskin (1994) claimed that these emerging media ought to be explored by artists in ways that would further develop the new technologies and would subvert the few prescribed applications developed for mainstream users by corporations that were single-handedly establishing the conventions of the medium. Murray (1999) claimed at the time:

> [Artists should] (…) offer new areas of application that can enhance the expressiveness of the medium, as well as an expanded conceptual repertoire. The healthiest programs will be those that draw equally on the empirical bent of engineers and social sciences and on the cultural knowledge and expressiveness of humanists and artists. (p. 5).

Instead, the first institutional concern was to meet the direct demand of industries by graduating skilled developers, but even that need was met maladaptively. The new interactive technologies were only being absorbed into the old frameworks of teaching, and therefore falling short of their potential creative ends. The old framework referred to the institutional separation of disciplines that developed isolated programs of study about the new interactive media, even though all were concerned with the same object. As I elaborate in the final chapter, the evolution of media does not wait for the institution to organize around its new possibilities. The nature, standards and possibilities of human-machine interactivity, Amiri (2011) explained, never ceased to become more intricate and sophisticated. More than 10 years after Murray (1999), Amiri (2011) surveyed in the UK alone more than 70 undergraduate courses related to interactive media/design based in various schools and departments that rarely come together (computer sciences, schools of media and communication, or schools of art and design). Yet, all these different programs chase rapid technological developments and struggle to offer well-rounded, meaningful training in interactive media. As is the case with the interactive digital technologies, new media continue to be integrated into higher education through different

disciplines, and it can be long before the programs acknowledge they are offering partial and complementary competencies and knowledge.

In the discourses of new pedagogies, new media artists are best trained to become well-rounded in the disciplines that contribute to, and shape the development of their practice, even if there is not one set definition of 'new media artist' that ties it to a specific set of competencies. Nigten (2005) describes the different attitudes new media artists take on towards media, ranging from the visionary who is knowledgeable of new media but has little interest for technical skills (in this case she collaborates with technicians to develop her artistic propositions), to the multitasker who functions at the conception as well as production levels, working "partly as artists in the traditional sense and partly as system designers, engineers, and techno-scientists" (p. 86). Multiple media, genres and approaches are the reasons why new media art is hard to define. It is, however, generally agreed that it is the practice-based exploration of the technical and social affordances of the new technological media and of the not-so-new media in new ways, and that the disciplines that contribute insights into this form of creative making are many. It is also agreed that new media artists have the potential to contribute to those disciplines in ways that are not germane to them. In line with these arguments that I found through the predominant discourses of new pedagogies, Rutenbeck (2006) proposes that disciplines in academia need to "become coupleable to promote both self-observation and cross-disciplinary observation" (p. 28). He adds, however, that even though universities are logical breeding grounds for this coupling of disciplines, and that this idea is increasingly presented as fundamental to their academic mission, it has not yet been fully embraced in the institutions' functioning. Adopting the tone of the prevalent rhetoric of calls for change and of the discourses of new, Rutenbeck (2006) fears that without such changes towards effective modes of coupling disciplines, academia will become "overshadowed, marginalized, and potentially eliminated from contemporary social discourse" (p. 28).

The interdisciplinary and fluid conception of what new media art is, and relatedly of the pedagogies that are advanced for training new media artists, are articulated as a rich space of creative exploration and innovation (Bunt, 2012). However, by promoting individual paths through crossing and coupling multiple forms of knowledge and touching on different disciplines to different degrees, this conception of new media art also entails loss of disciplinary focus, which represents a major challenge in the established order of the academic system. In this sense, the *modus operandi* of the institution, which are slow to implement newness, are at odds with the predominant discourses of new pedagogies for new media art education. This is what is

revealed in the analysis of statements coded within level of analysis 2, related to the systemic structure of the university and the institutional ideologies, which appear prominently throughout the unit of analysis. In the analysis of these statements I extracted the most commonly expressed systemic barriers to the new pedagogies, since the alarming discourse of calls for change is, once again, characterized by an emphasis on that which we must move on from.

7.2 The institutional orthodoxies

It is generally agreed that the traditional model of disciplinary silos in academia inhibits creativity, collaboration, and interdisciplinary learning, which are expressed as central skills to the education of the future new media artist. This is not to say that collaborative arrangements between disciplines or departments do not exist; on the contrary these have become common, encouraged by the enthusiastic institutional rhetoric that brings forward the perceived benefits of contributing to the interdisciplinary university (Hazelkorn, 2005). In most cases, however (in teaching more so than in research), interdisciplinary initiatives will remain singular experiments. Several texts in the unit of analysis are reports of such experiments, complete with an argument as to why such endeavours ought to be optimized and become the norm in the education of new media artists. In spite of the demonstrated potential benefits, these efforts will "rarely culminate in a meaningful restructuring of the university mechanism itself" (Rutenbeck, 2006, p. 28). Interdisciplinary activity will also evolve differently across institutions. Hazelkorn (2005) explains that "while some 'epistemic' cultures will be built out of a gradual process of change, accommodation and resistance, others will appear as opportunistic, even aggressive, in terms of their gestation and their impact on academic orthodoxies" (p. 138). More often than not, the biggest challenge will be the ability and willingness of the academy to change (Ascott, 2008; Meta Bauer, 2012). The academy remains tradition bound and intractable when it comes to making room for new models, even if new models are driven by much needed pedagogical reform.

The predominant institutional structure of the university, explains Kitson (1991), carries the defects of bureaucracies including "slow decision making, rigidity and an emphasis on precedent" (p. 542). This translates into resistance to change, inertia in leadership and complex political and administrative processes, namely in the allocation of resources. Eber (2007) stated that "where a discipline sits on the art continuum in the eyes of a given school determines who teaches it, in what way, and with what equipment" (para. 11). Contemporary higher-education institutions are currently confronted with a range of politico-economic conditions that shape the place of disciplines in academia and relatedly, their predisposition to interdisciplinarity. The allocation of resources is increasingly competitive between disciplines and therefore emphasizes disciplinary separation, sometimes even within departments and schools. It is thus not just epistemologically, as argued by C.P. Snow in 1959, but also systemically that disciplines can still be considered enemies.

Institutions organize social relations (Rossiter, 2006). The political and bureaucratic logic of the organization of the modern university into disciplinary clusters (departments) is, therefore, a social structure that organizes its individuals and communities in relations and dynamics. To speak of divided or assembled disciplines in the modern university is to speak of communities of individuals that although sharing in a common sociality, hold different roles and have different knowledge and assumptions. These individuals also hold different interests and positions of power within the institution. Power—again, it is important to remind Foucault's (1980) original French term '*pouvoir*'— is akin to the notion of agency and to one's ability to take action. It is something that circulates within social systems, and functions in the form of a chain amongst individuals. It is the beliefs, the discourses and the roles of individuals that allow or constrain their ability to conceive of, actually develop and implement tactics for institutional change. I continue with this Foucauldian framework to analyze the systemic orientations of the modern university through the discourses and described interests of its communities. Departments are constituted of faculty, administration, and students, whose roles and actions are bounded within a common administrative infrastructure.

7.2.1 Staff (faculty)

I mentioned in the previous chapter that faculty, administrators, and students of departments and schools share strong ideas about who teaches what and how they teach. I will add here, they feel the same about what resources, equipment and space belong to them. Yet, if a new, new media art program is to be developed along the orientation that the predominant discourses of interdisciplinarity for new media art education announce, faculty involved in such programs will be selected for their expertise in a variety of pertinent fields of study. Together they will develop and facilitate a well-rounded interdisciplinary curriculum to address determined subjects and skills. To return once again to Rubini and Gleber's (2004) program, which I am using as the hypothetical best-case scenario, the new program may not be limited to collaboration between faculty in art, computer sciences, and technology (AST is the most commonly discussed configuration of interdiciplinarity in new media art education). Rather, the ideal new program would benefit from exploiting the strengths of as many faculty as possible, whose expertise touches on objects and topics of the proposed curriculum, regardless of their

home-department. This also means that different universities will develop their unique programs to work with the strengths of their faculty. Yet, even in the most common AST collaborations, it continues to be challenging to arrive at a definition of new media art that is agreeable to all those involved, and upon which to develop a multifaceted curriculum that will meet the teaching-learning culture of the disciplines of each individual (pedagogical approaches, objects of study, materials, …). In practice, these cultures are not easy to displace, and there is much more to say about the individual's positions in, and their sense of belonging to them. Rutenbeck (2004), Blair (2005), Eber (2007) and McWilliam et al. (2008) all mention issues of this kind factoring in the overall institutional resistance when it comes to finding staff willing to engage in interdisciplinary programs of study, and sharing between departments.

First, it can be difficult to find new experts and qualified faculty who are knowledgeable of interdisciplinary teaching and interested in art-science collaborations, with most faculty preferring to ally with disciplines that are more closely related to their own. Additionally, when new media are introduced and new artistic genres emerge, there will likely be a period with a lack of experts and practitioners already in or entering professoriate in higher education institutions who have been trained and are fluent in the languages of that which is new. This was illustrated in the case of the introduction of new interactive technologies in the 90s.

Although interdisciplinary teaching and learning has been held up as an important avenue for new media art education at the university, instructors are rarely hired based on their hybrid disciplinary research and practice. Rutenbeck (2004) explained that the established standards to appraise scholarly achievement for promotion and tenure in academia continue to be very much based on disciplinary expertise, mostly relying on publications, presentations, or product development and patenting, as measures of individual merit and of one's contribution to advance knowledge in specific fields. He adds that these standards particularly discourage art-science collaborations. This adds to Schnapp and Shanks (2009) and Ascott's (2008) claims on the isolation of art, which is evident not only in the physical space but also in the knowledge production and dissemination systems of academia.

Secondly, engaging faculty who already hold tenure in specific departments in interdisciplinary initiatives presents challenges of its own. New ways of working are often met with resistance by the very actors who are already in place to undertake the necessary changes. McWilliam et al. (2008) speak of the skepticism that faculty sometimes demonstrate, especially those who have been valued for their contributions to a specific terrain. This is exacerbated by a widespread perception that interdisciplinary work implies 'washing out' the

disciplines, and that such work “demands more epistemological and cultural agility than does a disciplinary field” (p. 251). Interdisciplinary initiatives at the training level are perceived as experimental and temporary and most likely to require increased bureaucratic demands, in addition to - in line with the first point, not contributing to recognized achievements within their field. One participant in Blair’s (2005) study is cited as stating, “Half a position is no position at all. When the budget gets tight, interdisciplinary programs are the first to go” (p. 63). Such resistance represents a major upset from the point of view of Schnapp and Shanks (2009) who claim that the engagement of experts in interdisciplinary endeavours is crucial:

> Deep interdisciplinarity begins where and when one summons high-level expert practitioners to alter their disciplinary practices: to adopt new media and modes of communication to speak new hybrid language of expertise, to do otherwise (p. 151).

7.2.2 Administration

There are even more pragmatic questions attached to the institution of new interdisciplinary pedagogies, which pertain to the academic hierarchy of disciplines and administration of funds and resources. Departments, which correspond to disciplinary agglomerates, are not only separated by the clusters formed by their staff, they are also separated in the institution by different financial arrangements, space, and resource allocations. In accordance with several authors that expose the effects of the neoliberal ideologies in the university’s governance (Shear & Zontine, 2015; Clarke, 2015; Collini, 2012; Mirowski, 2011), Hazelkorn (2005) and Brown et al. (2008) remind us that institutional funds and resources are becoming increasingly tied to measurable, quantifiable outcomes and performance indicators, characteristics of the audit-focused environment of the modern university.

A plethora of quantitative measures are commonly used to assess students’ learning, instructors’ teaching, and program success across the university, to then determine and compare best practices, evaluate general performance, and the overall profitability of the program. Even the student experiences in each course and in the program factor in that assessment. Central to those experiences is access to equipment and resources during and outside classes, and perceived quality of teaching and relevance of the curriculum (Bichard, 2008). The implementation of these measures drives the different bodies of the institution towards uniformity and standardization, which at the training level, translates into homogenous

teaching, learning and assessment methods. This necessarily nurtures an environment in which diversity, difference, and experimentation are suspect (Danvers, 2003), much to the detriment of proposals like Rubini and Gleber's (2004) best-case scenario for a new media art program, as well as for many innovative new media art teaching and learning approaches I found described throughout the unit of analysis.

As per the logic of competition, Hazelkorn (2005) explains, in order to climb the hierarchy of disciplines that compete for resources and funds inside and outside the institution, departments must demonstrate value in terms of research output, develop third-stream funding sources (meaning revenues from profit-oriented activities), enroll a minimum number of students every year and graduate just as many. These numbers, as well as the number of employed alumni are important indicators of a program's success and relevancy that will impact how many instructors, equipment, and space are available to the program. When considering again Rubini and Gleber's (2004) proposal of an integrative interdisciplinary, practice-based art program, several issues come to mind, as who will count the students as enrolled in their program, whose facilities will be used, in addition to the teaching-learning methods to be employed. The institutional pressure to admit more students is at odds with instructors' favoured art pedagogies; I return to an idea already introduced in the previous chapter in regards to instructors' reluctance to change their disciplinary teaching methods. That analysis demonstrated that new media art instructors long for the loss of a traditional art teaching style that is rather costly in terms of space and instructor per student. This traditional art education model consisted of a relatively small group of students working in a large studio, where the instructor works closely with each student in the development of his or her individual practice (Buss, 2002; Burnett, 2008; Budge, 2012; Rikakis et al., 2013). This model does not fit the universities' "pedagogies of efficiency" (Budge, 2012, p. 9) such as the popular lecture/tutorial based on theory and text that culminates in (at best) a series of exams (but most often only one), which allows a high, hence efficient and economical teacher to student ratio. Compared to this model (also seen in the previous chapter) practice-based art programs are not as structured in their teaching-learning and assessment methods, which is one of the reasons Budge (2012) in turn calls these "the pedagogies of ambiguity" (p. 9). Art pedagogies, with their traditional emphasis on creativity, tacit knowledge, and originality are difficult to translate into measurable competencies, systematic pedagogical goals and approaches (Shear & Zontine, 2015).

Nevertheless, note that compared to traditional art programs, new media art programs have successfully increased course enrolment with new media art genres that are computer-

based, which require less space, resources and facilities than traditional media. These programs have become even more economical as universities began passing on the cost of hardware and software to students. As Averns (2004) explains: "the mandatory purchase of computer hardware and software is commonplace in many non-publicly funded institutions". (p. 43). His study of Canadian institutions demonstrated that in 2004/2005, the art schools with the highest growth in new media art and design courses offered the least studio provision.

7.2.3 Students

Most statements I analyzed about the academic orthodoxies that are resistant to new pedagogical models pertain to the previous two points: 1) the professoriate, namely the instructors' disciplinary allegiance to the culture of their disciplines and the departments where they teach; 2) the bureaucratic administration of the institution, more specifically the competitive hierarchical system to determine the success of programs and departmental access to resources; In third place were statements expressing that the new media art pedagogies that rest on interdisciplinary teaching and learning, collaboration and critical thinking and making must also be embraced and sought after by students. I found that whereas the interest of students and the impact of their previous education, goals, and expectations are discussed at the level of analysis of the new pedagogies, it is understated in the systemic level as a factor affecting enrolment, and therefore related to the value of new media art programs from an institutional perspective. In accordance with Lyon-Callo (2015), I posit that future students' interest in pursuing and completing a new media art program of studies in higher education depends on their familiarity with its discourses, on whether they have or not throughout their k-12 education engaged with ideas and approaches of teaching and learning offered in these programs, and whether they perceive these as integral to the artistic and professional goals they seek. For prospective students (and their parents) wondering where to apply, a new agglomerate of disciplines presented as an autonomous field may appear as an opaque area, with no clear social and economic context, technical basis, or career outcomes.

I have not found studies on whether students considering a university education in new media art have met the discourse of the benefits of an interdisciplinary education and of empowerment through critical thinking and making that are prevalent themes in the discourses of new media art education at the university. Therefore I cannot assert whether these resonate

with the goals of the future student. However, Scholz (2005) argues that while faculty members (also the authors of the texts I analyzed) may express a desire to educate students by offering a stage for critical thinking and providing enduring intellectual skills, instead of the just-in-time technical knowledge of the most common software applications, students see little relevance in exercising critical analysis and dwelling on the canons of theory and history. In their view, these are relegated to an accessory role, perhaps with the exception of domains involving issues of cognition and perception, which are directly tied with practical applications of media (Schnapp & Shanks, 2009). They are more likely to aspire to acquire vocational skills that will open doors in the cultural and creative industries (Amiri, 2011; Meta Bauer, 2012), even if in fact, Blythe (2001) and Scholz (2005) argue, the sector is chaotic and constantly changing and there is no stable media industry, or one defined skill set to succeed in the employment market.

To attract incoming students, retain them in the program and lead them to graduation, new media art programs of study must offer perceived future employment opportunities by demonstrating what skills students will have acquired upon completion of their studies, how these skills align with industry needs, and by stating the programs' ability to keep up with changing technologies. In the unit of analysis, I found that the concerns with keeping up with employability trends saturate in statements from the 90s and early 2000s, the period that corresponds to the dotcom hype, when the developments in mainstream new digital information and communication technologies accelerated along with the widespread idea that more changes lay ahead, with lots of speculation about the newer technologies expected. The new availability of user-friendly technologies of the 90s were indeed creating new industries and revolutionizing most sectors. So at this time of high interest for the technological changes, I found statements that urgently called for programs of study to keep up with, or even anticipate the future technologies. Kitson (1991) went as far as to propose that universities employ Delphic methods for "objective assessment of trends" (p. 546), conduct marketing studies, and maintain close liaison with the new technological industries, with international advisors appointed to course-steering committees to determine the new technologies and the new skills/specializations needed. The description of programs introducing studies and training in the new interactive technologies I presented earlier in this chapter provides insight into how universities addressed these developments. In more recent publications, programs under the broad designation of new media art vary in their vocational orientations, but across the unit of analysis, far more weight is given to marketable skills developments and employment outcomes in the systemic discourses (i.e. policy texts and reports) than in the discourses of new pedagogies.

With the commercial aspect of new media art becoming more significant, concentrations in specific genres like animation, film or games are more concerned with training skilled creators to be product driven to feed these industries, than with taking risks and proposing groundbreaking approaches to exploring the medium (Bumgarner Gee, 2001; Evans, 2005). These are also the concentrations of study that see opportunities to establish partnerships with the private sector. In these programs of study is very common to include in the curriculum "unpaid or low paid labour undertaken under the guise of opportunities to gain experiences that might put [students] at a competitive advantage for prospective future employment" (Lyon-Callo, 2015, p. 84). While some authors like Averns (2004) praise these developments of specialized vocational training opportunities as directions that "raise the profile of [Canadian] creative intent, enhance choices beyond traditional fine art and craft staples, and are necessary for keeping pace with progress and change (p. 43), others like Blair (2008) warn that under the pressure to meet high enrolment and graduation numbers, to demonstrate students are satisfied with the training they received and employable in the said creative industries, departments are tempted to introduce more and more courses designed to meet "ever more specialist niche markets" (p. 67). These programs are more likely to be interested in STEM disciplines and applied skills, given the general prioritization of science and technology in policy and funding (McWilliam et al., 2008). This is also at odds with the predominant discourses of de-specialization, and the discourses of new pedagogies that consider questions of technique and material of lesser value.

Finally, the work market in the creative industries, like the practice of new media artists in general, is not bound to national standards and recognition of accreditations. This is well framed by Clarke (2015), in reference to the UK training in the creative industries, when he explains that although the university is framed by national (UK) government policies and funding, it is in many ways an international system that competes to collaborate internationally for funding opportunities, and to attract students and "other valuable resources" (p. 134). As I elaborate ahead, the creative industries, which have assimilated commercial as well as non-commercial new media art practices, are vast and global industries. This changes the expectation of graduates and the context in and for which they learn and work. Ashton (2010) explains that the focus of preparing students for the global world of work is a well-documented objective at the institutional and governmental level that "manifests in various initiatives and policy reports, runs through activities and strategies of higher education" (p. 42). Brown et al. (2008) add that "we are challenged to prepare graduates for work in a global economy and to inflect this into an internationalized curriculum" (p. 7). The institutional orientation is towards concerted university-industry goals, offering comparable approaches for similar ends across

institutions and nations, and training practitioners in accordance with the optimal employability outcomes.

7.3 The discourses of the neoliberal institution

I determined two distinct levels of analysis within the systemic level. On the one hand, statements that pertain to the bureaucracies and to the market-oriented administration of the institution (analyzed above), and on the other, statements that speak of the values expressed in the institutional discourses, which I now proceed to analyze. In the process of the content and discourse analysis, my notes highlighted that the discourses of new media art pedagogies were more often than not expressed as being at odds with the above-mentioned bureaucracies and the capitalist values of the neoliberal institution. My first analysis accepted – as expressed by several authors, that the new media art pedagogies go against the tide of the power of the institutionary complex in what is valued as content, methods, and goals of teaching and learning. To summarize my findings that illustrate this opposition, new media art programs lack the disciplinary focus that is characteristic of most programs of study and thus risk being perceived as leading to uncertain job outcomes. The institution values an environment in which the 'world of work' is emphasized, even if it has been notoriously inept at catering to the new, and at anticipating the future employment trends. Interdisciplinary learning has become part of the institutional rhetoric but in practice it is highly challenging to counter the established system and the culture of competition between departments attached to it, and effectively implement interdisciplinary curriculum.

New media art program descriptions that can be found in the institutions' websites will sometimes weave the two seemingly opposed streams of discourses in the same rhetoric: these descriptions will highlight the personal, experiential, and experimental studio-based learning that stresses the importance to foster an artist-training environment based on interdisciplinary, critical and creative thinking – in the rhetoric that is characteristic of the discourses of new pedagogies. These descriptions will also speak of the expectations of the creative industries in which students will be employed once they graduate (Averns, 2004). Program descriptions will thus juxtapose statements about the emancipatory power of new media art with statements that enhance the practicality of higher education and the employment opportunities it will lead to. At the intersection of these two discursive streams are the key-concepts of new, innovation, creativity and interdisciplinarity. The analysis I elaborate in the final sections suggests that although the pedagogies of new media art education frame these concepts in humanist values of individual and social emancipation, in the systemic context new media art programs capitalize

on these same concepts, however, framed in ways that are strategic to afford the field a higher place in the institutional hierarchy of disciplines.

7.3.1 The place of new media art in the knowledge economy

Budge (2012) asserts that the discourses of the pedagogies of the creative disciplines must also be understood within the framework of values of higher education put forward by the institutions. She first asks what is currently valued in learning and teaching in higher education and then analyses how this impacts art disciplines. “To articulate and show evidence of value is everything in an environment of intense competition and quality auditing, both core characteristics of the economic rationalism of the contemporary western universities” (p. 6), she says. Her perspective brings to light how the discourses of interdisciplinarity and of creativity may be reflecting and reinforcing the neoliberal agenda of the university and of society at large, and how such discourses simultaneously contribute to position new media art higher in the academic hierarchy of disciplines.

The roles of visionary and intermediary of the new media artist are in line with the rhetoric of resistance to corporate power that is neither new nor exclusive to new media art education. These roles predominantly construct the artist as the “catalysts between diverse fields of knowledge” (p. 3), in opposition to the capitalist interests of technological innovation. Through her critical making with the new technologies, the new media artist proposes alternative (morally better) machines, systems, and experiences that offer a counterweight to the pervasive corporate powers. However, in the systemic discourses, these roles are framed differently. The institutional rhetoric about new media art education is aligned with the language that has been used to support STEM education – disciplines that new media art education indeed converges towards. This language typically frames these disciplines as a means for universities and nations to remain internationally competitive (Barrett et al., 2015). In the systemic discourses, the roles of intermediary and visionary of new media artists are not replaced, but rather reframed in a discourse that emphasizes their potential contributions to economic evolution (Potts, 2011), to industries where new media art graduates will find professional opportunities. This change of focus was first evidenced in the unit of analysis by the discursive shift in the statements associated to the concept of creativity, and the emergence of references to the creative industries.

Although statements about the creative industries in the unit of analysis saturate only in the late 1990s and post-2000, much earlier publications made a direct link between the increase threat of unemployment for university graduates in art and the rise of initiatives that involve interdisciplinary combinations of art, science, and technology, driven by the potential of the association of art with other techno-scientific disciplines to improve career prospects for art students (Dohn & Wagner, 1987; Hudson, 1987). As I moved on to the analysis of the systemic factors and how these influence the new pedagogies, it became clear that the post-2000 discursive shift denounces the influence of a broader, institutional ideology. Beyond the pedagogies, these are values that also frame the field and the roles of new media artists.

These discourses equally place creativity, innovation, and interdisciplinarity as central values, however, framed as essential to the skills of the work force and to economic growth. Potts' (2011) theory of evolutionary economics was central to my understanding. His theory connects the creative industries to organizations, social networks and institutions in the different phases of the trajectory of innovation. Science and technology research and develop the new material forms in line with economic opportunities, thus they operate on the supply side of the production. Yet, it is not sufficient to produce goods; demand and constant renewal of demand is a crucial part of economic evolution. There must be a (perceived) need for the new, and constant (re)development of markets that will assimilate it. The creative class, as defined by Florida (2012/2002) encompasses not only artists of all genres, designers, musicians, but also engineers, scientists, and knowledge-based professionals, who shape the way societies think, share information, live and consume. The creative sectors are important at several stages of the innovation process. They intervene in the development of the technological devices (new generations of products, shapes, functionalities, and software), in the social/human component (new services, engagement strategies, institutional and business models, organization strategies, branding), and content (new aesthetics, genres, new narratives) (McWilliam et al., 2008). New media artists, as part of the creative class, are considered cultural intermediaries. They are developers of innovation and tastemakers who shape the material and cultural environment of the masses who have increasing purchasing power and leisure time. Without a doubt this class is geared more towards consumption than art and contemplation, signaling a trade-off to the values attached to creativity. Blythe (2001) explains that although the concept of the creative industries originated within arguments of economic justification for the support and development of the aggregate of arts, crafts and design, it assimilated both commercial arts and creative practices with social and artistic goals. She explains: "In the commercial arts the priorities are economic, in noneconomic work, artistic or social. The new aggregate makes no

distinction between the two activities and celebrates the resulting sector for its economic achievement" (p. 148).

Flew and Cunningham (2010) observed as well that 10 years after the introduction of this concept, several nations from Britain across Europe, to American, Australia, Singapore, South Africa and China were associating creativity with generation of economic wealth as opposed to "simply claimants on public revenues on the basis of nonmarket or intrinsic values" (p. 1). Nevertheless the creative industries effectively agglomerate the cultural and economic sectors, with some critics claiming that in fact it subordinates the former to the latter.

This means that the assimilation of new media art in the creative industries does not invalidate the roles of the new media artists expressed in the predominant discourses of new media artist-instructors and education theoreticians, which continue to be predominantly centred on social and cultural values. New media artists participate in the contemporary processes of "creation, placement and circulation of cultural works, in both public and private areas" (Schnapp & Shanks, 2009, p.149). They contribute with critical creative interventions; several new technological art genres have been introduced in the contemporary art milieus with new media works now circulating in the art market and cultural institutions. The creative industries encompass a wide range of non-utilitarian practices that effectively bring together creativity with the STEM disciplines and art (the STEAM disciplines), but the audiences for such artistic productions are small compared to the consumers of creative lifestyles and creative products. There is manifestly less interest in art and contemplation than in research and development, and innovation that may be economically profitable (Averns, 2004). Hence the growth of new media art in the institution is rather justified by the recognition that, as a discipline of the creative industries invested in the new and future technologies, it can potentially contribute directly to technological innovation and scientific progress. It is therefore a promising avenue, worthy of financial support.

It is worth adding that the university's pressure to align curriculum and program development with economic values is likely to have the effect pointed out by Mirowski (2011) in his criticism of the logic of the neoliberal mechanisms in knowledge production at the university; this logic implies that knowledge and skills that are not easily commodifiable are likely to be devalorized, and the university is likely to encourage knowledge that is considered of value to the above-mentioned markets. This is certainly related to the fact that the predominant interdisciplinary configurations are across art, science and technology (AST), since innovation at the intersection of these disciplines is perceived as most likely to contribute to profitable

industries. As a result, other forms of interdisciplinary learning are less written about in the unit of analysis, namely interdisciplinary curriculum that associates art with the natural sciences, an emerging configuration of interdisciplinarity I explore in the final chapter.

This discourse seems to announce a significant turn for authors who deplored the long-standing isolation of art in academia, and claimed that art has had to constantly re-assert its value and place in higher education institutions. With entire nations associating "creativity" with economic wealth (Flew & Cunningham, 2010) and universities acknowledging their desire for creative graduates, not solely but largely for their potential to contribute to the economy, new media artists can opportunistically leave their "typical placement in an academic ghetto" (Grau, 2011, p. 349). For the first time, explains Danvers (2003) the issues and skills identified as being central to the pedagogies of art become relevant to, and praised by the wider academic community and by policy makers. The value of interdisciplinary art-science collaborations that new media art pedagogies advance as their primary locus is ideologically supported by the institution as a necessary approach to produce creative graduates. Nurturing creativity, traditionally the *raison d'être* of the training of artists, has become central to the discourses of the university, even if in terms of pedagogical strategies, little is yet known as to how one fosters an environment conducive to creativity. The idea of nurturing creative professionals stands as a premise rather than a strategy. It becomes apparent that the discourses of creativity, innovation and interdisciplinarity have effected significant changes to the seemingly perpetual conflict between market economies and art and culture, and stimulated new dynamics in how they interact with each other.

7.3.2 The new media artist and the graduate entrepreneur

My analysis of the intersection of the institutional discourses with the discourses of new pedagogies goes one step further to argue that the roles and skills associated with new media artists in the discourses of new pedagogies, although predominantly expressed in opposition to the neoliberal values of the modern university, overlap with the idea of the entrepreneur. I return to the review of literature about the domain of the study (Chapter 2) – the modern university that embraces the neoliberal ideologies and corporate-like administration, to remind the reader that the new liberal ideal is, at its roots, spelled out in humanist statements. The calls to educate

individuals to engage, to learn, and make the best use of available resources, are presented as avenues to empower every individual to access information and knowledge that will allow them to become as creative and enterprising as possible. Such statements remind the ideologies of critical and liberatory pedagogies: educated and empowered, individuals will then construct innovative means-end systems.

In *The Constitution of Liberty* (1959), Hayek stated in relation to access and utilization, of resources that, as happen with prices in the free market, competition is the ideal organizational system. Allowing all possible systems to be tried in the real world will (naturally) determine the most powerful instruments for the dissemination of knowledge, and hence which knowledge acquires more value. In economic terms, the motive for the entrepreneur to develop innovative means-end systems is presumed to be to find the most successful way to profit. As the neoliberal ideologies extrapolate the economic sphere to the global socio-politics and culture, and become pervasive through all social phenomena, entrepreneurs will be developing means-end systems to compete and advance their individual place in all spheres of society. In addition to acquiring financial capital, it matters to grow political and cultural capital. Lyon-Callo (2015) points out that, at the university, students "have embraced the message that they will be competing individually in the jobs marketplace, and that to be competitive they need to offer a unique set of skills that will be attractive to employers" (p. 94). The language and habits of thought that foster this competition have become pervasive and are enacted daily in our modern "institutions of personal freedom" (Potts, 2011, p. 129), which include the university. They are seldom critically commented on as acquired or inculcated schools of thought.

The discourses of new pedagogies I analyzed in chapter 6 concluded that a distinguishing characteristic of learning in the new media art lab as opposed to learning in the scientific lab is that the student remains, as per the traditional model of art education, at the center. The process is towards forging the artist-identity, towards her transformation and emancipation and to harness her own individual path of skills, media, and interests. The pedagogies described in that chapter demonstrate that students are trained to navigate different fields of study, they are encouraged to acquire knowledge and ways of making that traditionally pertained to distinct disciplinary cultures, and assemble them in innovative, unique approaches. In addition to building their personal set of cross-disciplinary skills, students are encouraged to formulate their artists' statements, and disseminate it online along with their work and achievements. The personal website is the equivalent to the artists' portfolios, highly valued for a long time in the traditional models of art education.

When I juxtaposed the construct of the new media artist as described in the predominant discourses of new media art education (chapter 6) to the neoliberal construct of the creative entrepreneur (Shreeve, 2007) in the discourses of the systemic ideologies, I concluded that they meet in the ideas that new media artists are trained at the university to contemplate all forms of disciplinary assemblages, to engage in interdisciplinary learning and make the best use of the techniques, intellectual tools and resources from a variety of fields of study. They are constantly encouraged to revise the acquired knowledge to develop their individualized interdisciplinary practice that will distinguish them and their proposed innovative artistic work.

The focus on the values of "creativity" and uniqueness articulated in the humanist legacy derided from ideas of individualism and a romanticisation of the artist, hinders the institutional interests and policies in place for creativity in the new media arts, which rest on more technocratic and economic discourses about the cultural-economy and the dominance of ICT (Flew & Cunningham, 2010). Art educators rarely discuss the realities of the creative industries' workforce – the so-called "portfolio careers" as are those of independent media artists, which often mean taking on multiple (at times simultaneous) jobs and roles across the industries, and constantly proving comparative advantage in new systems and sources of competition with peers. The job of individual artists or small-scale agencies can be rather unstable and precarious as Flew and Cunningham (2010) explain, "they lack the political power and lobbying clout of big corporations, established trade unions, and traditional arts organizations" (p.8)

At the outcome of this analysis, I conclude that both the pedagogical and systemic discourses are aligned with the principles of accumulating capital associated to the individual and her practice, in a competitive system that values creativity, innovation and interdisciplinary knowledge. It was also Potts (2011) who asserted that "entrepreneurs create for the same reason artists do, namely because they see opportunities to create value in the world (or whatever form) and seek to realize this" (p. 129). In line with this idea, the analysis also reveals that the same key-concepts and the same constructs of the new media artists can be framed within very distinct values. One the one hand, the hand of the roles of the artist and the new pedagogies frames the construct of new media artists in a persistent rhetoric of resistance to the neoliberal logic of the "university of excellence" (Readings, 1996) that refuses to accept that what counts in higher-education is entwined with goals of economic success and productivity. On the other hand, that of the systemic discourses praises the contributions of new media

artists along these very same concepts to fuel the success of creative industries, contribute to innovation and thus to economic growth.

CHAPTER 8: Emerging discourses

"Archaeology is always, implicit or explicitly, about the present" (Parikka, 2012, p. 10).

Having examined the most predominant discourses of new media art education of the last 30 years, the goal of this final chapter is to arrive at the present discourses. The analysis that follows is not based on the most predominant discursive formations, but on emerging ones. This chapter is, in a sense, a prelude to the current and future directions of new media art education. In its musical definition, a prelude is a form of warm-up in the tones of the piece to be played that allows the musicians to fine-tune their instruments and their ear to what is about to be played. It is a useful analogy as this chapter is meant to announce the emerging discourses, while I continue to demonstrate how the ideologies and educational practices exposed in the previous chapters contribute to defining the teaching of new media artists at the university today. I identified the most salient emerging discourses based on statements of continuity, but also on statements that indicate a discursive shift, tied to the concept of complexity.

The diversification of media art practices is catching up with the pace of techno-scientific innovation. New media artists, vested in the exploration of developments in various fields of knowledge, are also increasingly engaging with ideas, tools, and techniques that, although new to art, have been used for a long time by practitioners of other disciplines. The discourses of new media art education reflect the broadening scope of practices that are emerging at the intersection of the most surprising assemblages of disciplines and forms of knowledge. The discourses that indicate this growing breadth of the field into interrelated systems of knowledge are the discourses of complexity. Such discourses compel a revision of new media art education, not only in terms of what ought to be taught (content) but also in how teaching might occur (method). This orientation is for now ideological, and is rarely found described in concrete pedagogical and curricular models. I analyze some of the implications of the emerging discourses, and the pedagogical challenges that will likely arise as new media art expands into, and intersects with an increasing range of disciplines. Given the lack of established art education models reflecting the new discursive orientations, my analysis is based on my own experience in one such interdisciplinary configuration. I analyzed the pedagogical implications of bio-art at SymbioticA, where I introduced myself as an art learner to approaches to research, critique, and engage with the life sciences.

At the end of this chapter I reflect on the potential of the discourses of complexity to shift, or at least affect, the current predominant pedagogical assumptions and practices in new media art education. I propose that approaches and methods of complexity science have the potential to steer the education of media artists away from the traditional art education constructs of individual authorship, singularity of skills and of the neoliberal entrepreneurial artist-persona that the institution promotes. The influence of complexity theories can stimulate collaborative authorship, complementarity of skills, and a general conception of media art (and consequently of media artist training) as a method of contributing with thinking and practice to the investigation of contemporary complex issues.

8.1 The different temporalities of techno-scientific change

In embracing the rhetoric of enthusiasm and urgency, both characteristic of the discourses of the new, several authors maintain that techno-scientific change is rapid, unpredictable and inevitable (Loveless, 1990; Wilson, 2001; Burnett, 2008; Collini, 2012). However, many times throughout this study I demonstrated that there are predictable aspects to the socio-economic processes by which certain techno-scientific innovations rise to become mainstream and dominant cultural forms of engagement. It is equally predictable to know how institutions like the university, entangled as they are in these processes, adapt to such change.

I return to Huhtamo's (2011) idea of *topoi* to refer to the recurrent discourses and images through which the new media are disseminated and received that shape the development and culture of subsequent new media. *Topoi* manifest in the main discursive formations of new media art education at the university. The cyclic rhetoric is propelled by enthusiasm and speculation about unprecedented technical possibilities, and a sense of urgency to embrace, appropriate, and investigate the social and aesthetic changes that the new media may generate. Media artists are constructed as those who can critically examine and interrupt the cyclic discourses. In new media art education, the predominant rhetoric will be accompanied by accusations at the inert institutional structures, their cultures and bureaucracies, and of reluctance to embrace and adapt to the new. In the previous chapters, I uncovered the genealogies of discursive streams and the myths that frame the conceptions of "newness", how these affect the perceived roles of new media artists, and the pedagogical approaches most commonly used or proposed for their training at the university. By pointing out the recurrence of statements, discursive attitudes, and persistent assumptions, I demonstrated how the powerful cyclic discourses undermine the very notion of new altogether.

When media are added to a culture, different sectors of the same social ecology exhibit different temporal rhythms in assimilating change, with government and bureaucratic institutions characterized by longer waves and less dramatic changes in their structure and methods of operation. While institutional adaptation is slow, it is not long after the introduction of a new medium that new "socialities" arise (Rossiter, 2006). Some communities are quick to adapt to the new tools or applications made available. From very early in this process of assimilation, the new media reconfigure the perception, modes of engagement, and expectations of individuals

and groups. This is what Kittler (1990) called the processes of habituation to media by which humans internalize the rules and become receptive to new forms of messages transmitted in new technological regimes. The new loses its aura and becomes part of boring everyday life, even before we have grasped the extent of its socio-cultural and economic implications. It is at later stages that users and consumers begin to critically discuss on an informed and differentiated level, the legal, ethical, and aesthetic implications of the media that have become mainstream. Experimental forms and alternative uses of the new technologies begin to surface, and technological forms emerge that were ignored, or never contemplated by corporate producers. For example, in the rise of networked digital media, public knowledge and awareness of issues such as copyright of digital media, built-in surveillance systems, data collection, and algorithmic selection of information arose at later stages. As the technologies became accessible and the public became more educated about them, they were able to grasp and manipulate the technical infrastructure of computational media, leading to the emergence of freeware, open-source software, and DIY practices.

This process of habituation to media, appropriation and experimentation is not orchestrated, but rather a spontaneous social process by which individuals exchange, groups influence each other and work together. As a result of easier access to knowledge and resources, and of increased efforts to improve public understanding of scientific innovation (sometimes by putting the arts at the service of scientific knowledge dissemination by generating visualizations of phenomena and techniques), the time lapse from technological innovation, distribution, and assimilation, to public awareness and appropriation is narrowing. It is not only digital technology and hardware that are more quickly becoming available to the grand-public. Other technologies and techniques that were once confined to the scientific lab are increasingly explored outside of the expert communities, such as biotechnologies and the techniques of the life sciences. The implications and ramifications of using the tools and techniques of the life sciences for art greatly differ from those of AST, and are worth analyzing. Further ahead in this chapter, I investigate some of these implications.

Even though universities are enmeshed in techno-scientific progress and the power of market economies, Rossiter (2006) explains, they move slower than industry and other social spheres. At the university, the theories and material practices with/about new media are usually first advanced at the level of research. These are not integrated into teaching before they have stabilized into accepted modes of knowledge and practices, validated as necessary to the skills of learners through slow institutional processes of curriculum development and accreditation.

Within the decades of this research study (from the 80s until today), I analyzed mostly cycles of emergence and assimilation of digital media. The most predominant statements in the 90s pertain to computational media. From the late 90s, we begin to read about interactivity and hypermedia, and then about virtual reality, games, haptic interfaces, and finally in the last decade, about material based installations, robotic art and performance. So in the past 30 years, new media art education has largely centred on theories and practices at the intersection of art, computer science and engineering—also the most profitable area of research and development for the creative industries. Although curriculum and pedagogical approaches described in the vast majority of texts I analyzed revolve around AST, the discourse analysis of recent statements demonstrates that new media art is expanding its concerns beyond the cycles of innovation and changes of electronic and digital media. The scope of techniques, media, materials, forms of innovation and of art are broadening, and so is their impact across disciplines and forms of knowledge.

8.2 Discourses of complexity in new media art education

In the last decade, several authors stated that artists should look into all possible areas of inquiry for ideas and processes (Danvers, 2003; Wilson, 2008; Ascott, 2008; Berrett, 2011). Wilson (2008) contends: “in our kind of culture every area of scientific and technological research is a potential focus for the arts” (p. 44). He therefore urges artists “to question paradigmatic boundaries handed down from science disciplines and marketplace definitions of importance” (p. 44). Moriyama (2006) also called for this expansion of the field into new arenas of investigation and art making:

> New artists are making their own fields where they can give birth to the new expressions, by interconnecting digital domain to the domains once considered to be irrelevant (literature, medical science, and body reconstruction). To support the digital/media art education we must not limit its area by preconceived ideas. (p. 3)

In line with this agenda of expansion that contends that many other forms of knowledge are of concern to new media artists, educators favour pedagogies of de-specialization centered on nurturing transferable skills of critical analysis and interdisciplinary learning. Through these skills, it is believed that the future artists will be better prepared to engage with, interpret and question knowledge and practices in many different areas of inquiry (Ascott, 2008).

Discourses in the most recent texts point to the ideological directions of this expansion, and introduce some of its pedagogical implications. The analysis that follows is not based on the most predominant discursive formations, but rather on what I consider to be the most significant emerging ones. I determined the significance of these discourses, first, because they stem from ideas and key-concepts introduced by influential voices in the field. In chapter 2 I discussed the influence of reputed authors and publishers, whose ideas are most likely to drive the predominant rhetoric. Critical discourse analysis has such influence into consideration. Second, I determined the relevance of emerging key-concepts and statements based on their continuity with previous discourses and their progressive saturation. ‘Complexity’ is the predominant key-concept under examination. Although it appears in the data as a new concept in recent publications, it is framed by ideas already analyzed in chapters 6 and 7 about developing increasingly broad, interdisciplinary pedagogies in which learners dwell iteratively across disciplines and forms of knowledge, to address complex contemporary topics.

In order to further understand complexity as it pertains to knowledge contexts, I present the two discursive threads within which this key-concept is articulated. The first one revolves around networked structures and the potentialities of web 2.0 technologies to construct, share, and create new knowledge. As is the case of the major discursive formations I analyzed in this dissertation, a discursive shift occurred in statements about complexity that detached its understanding from the technical affordances of networked technologies, to refer to the broader phenomena, organizational structures and dynamics. This corresponds to the second discursive stream about complexity, which in my perspective holds heavier significance for new media art education today and in the future.

8.2.1 *Complexity* of networked systems of communication and information

The World Wide Web is the most recurrent example mentioned in the unit of analysis, and probably the most 'visible' model of complexity, which I found associated to the ideas of connectivity, and of the rhizome-like structure of remotely connected individuals that has come to define our culture. The internet unified visual, literary, and oral knowledge into one channel that digitally processes, (re)presents, and disseminates media. Much beyond the access to digitally hyper-mediated information, the web 2.0 revolutionized strategies of communication, generated new forms of human interaction and expression, distributed creativity, and collective intelligence (Pierre-Lévy, 1997). These important technological changes brought into mainstream in the 90s explain the concentration of texts concerned with it in the unit of analysis in that decade and the following. The processes of the Internet allowed for new socio-digital dynamics, with direct implications for change in teaching-learning interactions. When different systems of knowledge (formal and informal) met in the digital world, it became possible to interconnect them in unprecedented ways. In communicative actions individuals found, associated, and freely produced ideas across these systems. Networking sites like wikis and blogs and other web 2.0 platforms multiplied the number of personalized vantage points and dynamic interactive communities that access, share and forward words, images, and sound instantly. The user-learner can now opportunistically and temporarily connect information and knowledge across virtually any discipline and knowledge contexts, many of which had been kept outside the boundaries of the university. Hence the Internet became a platform for polycentric, complex systems of knowledge. It is polycentric because it encompasses many different centres

of knowledge production that entail different positions of observations (epistemologies) and apply different codes for self- and outer-observation (ontologies).

It would be beyond the scope of this study to resume the implications and potentials for new teaching-learning dynamics that the web 2.0 technologies incurred. I found expressed in statements by several authors that academia is still adapting to these new dynamics that greatly differ from the traditional ones (Rutenbeck, 2006; Blair et al., 2008). The ways that information exchanges occur in the World Wide Web are the most evident demonstration of the convergence and overlapping of forms of knowledge, and serve the argument for the need to provide analogous learning experiences in formal contexts of education. Several authors argue that learning must mimic the rhyzomic, networked, associative processes of online navigation. Consequently, teaching must open to pedagogical strategies that accommodate the new processes of learning. Sonvilla-Weiss (2007) spoke of "heterogeneous, rhizome-like structures and networks of remotely connected individuals as ideas" (p. 6) and "emerging models of cooperation, communication and interaction by accumulating various ideas, talents and capabilities" (p. 6). Schnapp & Shanks (2009) proposed that new media art education ought to shift the focus "from 'pure' creation toward the management of networks, links, flows, translations, and mediations—in short, rethinking creation in terms of arteries and nodes" (p. 143). Such claims, Wilson (2008) points out, pose major challenges for education at large and for new media art education specifically, namely for deciding which new knowledge systems are worth investigating, and what curricular structure best accommodates these changes.

Thus, in the first discursive stream, digital networks are presented as the origin or at least the sites for new teaching-learning challenges. In this discursive stream, complexity is focused on the broad accessibility to media, information, forms of knowledge and tools that students access independently. The pedagogies of de-specialization and transferable skills in new media art education address these challenges, as it is believed they will allow students to work across domains of knowledge, by choosing and combining from a wide spectrum of interests and approaches to develop their individual practices. Several descriptions of interdisciplinary programs and models of study are a response to such teaching-learning challenges within the university. The most detailed curricular structure described in the unit of analysis is the Digital Media, BFA program described by Rappaport & Burns (2011). This program is based on an "open and expansive interpretation of digital media" (p. 9), which

requires students to constantly cultivate topics in other fields. Although emphasis is placed on students learning computer programming (as the main topic of “other fields”), according to the authors, the structure of the curriculum is conceived so that students choose and assemble their own self-directed curricular path from a variety of possible combinations of studio and academic courses, where they developed both applied and conceptual skills. Nevertheless the learning options available to students in this program, as in all the units of analysis that refer to specific programs, remain bound to the notions of the course and the discipline.

8.2.2 Complexity of phenomena and organizational structures

Related to this stream, other texts in the unit of analysis refer to a broader notion of complexity, beyond that which takes place in cybernetic space. One that goes beyond the dynamics of networked systems of information and calls for unlikely assemblages of disciplines to investigate complex objects and phenomena, the study of which raises new questions that defy disciplinary divides.

The second stream of discourses of complexity is influenced by approaches to research known as complexity sciences, which came to prominence in the 80s (thus preceding the Internet 2.0), and emerged from the realization that some phenomena do not lend themselves to permanent observation, or to quantifiable, statistical analysis. Instead, they must be understood as systems that require interconnectedness of several disciplinary approaches and methods to be investigated. These theories were developed primarily in the fields of mathematics, physics, computer science and biology. The common attributes of complex systems are that they are self-organizing and adaptive, and respond in novel ways to dynamic circumstances (Davis, 2004). These characteristics of complex systems were also observed in the social sciences and economics. Hayek (1959) is often credited as being an early theoretician of the complexity of socio-economic systems, namely with his theory of self-organization of individuals and mutual adjustments of their entrepreneurial endeavours that reflected in prices in the free, competitive market economies. Complexity studies are dedicated to investigation of such systems that are able to adapt to input or changing environments. The adaptive nature of such systems cannot be attributed to one specific property of the system (a law by which change is regulated) or to one single component or agent of the system (e.g. a leader that orchestrates the changes amongst the parts). The components of the system self-organize in ways that are only possible through that collective’s dynamic in a specific context, and do not necessarily depend on the

properties of its individual parts. The social, biological, physical laws, or even the media, that are at work within the individual parts or agents of the system cannot single-handedly explain the transformation. The capacity to change in response to internal or external forces is akin to an evolutionary process. Hence, these systems don't lend themselves to being investigated solely by using methods of analytical science, which are oriented by the quest for fundamental components and explanations of causality. Different forms of understanding are required to make sense of ever-shifting, complex phenomena.

Cognition is an example of a complex phenomenon that cannot be pinned as the subject of a single discipline. Developments in neuroscience and in biotechnologies borrow approaches from linguistics, psychology, and anthropology. These are combined with philosophical theories that are explicit in their acknowledgment of the collective, cultural influences in the processes of knowing, as well as the biological roots, including the overall place of humanity in the ecosystem of species. All are entangled in what constitutes our current understanding of the processes of the mind, which in turn contribute to investigation and advancements of many other fields, namely artificial intelligence and machine learning. Francisco Varela's (1999) notion of "enactivism" derives from these complex theories that understand cognition as sequences of adaptive activities. Cognition is subject to predispositions and contingencies that are biological, social, cultural and physiological, some of which are internal and other external (the environment) to the cognitive agent. Individuals enact their experience of the phenomenal world and make meaning based on their own re-organization of the new with the old experiences. Enactivism conceives of social interactions (such as teaching-learning) as constant, mutual co-adaptation of agents who coordinate their actions in relation to each other.

Ascott (2008) announced such complementarity of forms of knowledge with the terms "syncretism" and "connectivity" that bring about new universes of discourse, new languages, metaphors and methodologies necessary to reconcile worldviews that separately cannot address many phenomena, including complex social realities we are facing. Syncretic thinking, he explained, is also associative and non-linear:

> In contemporary society, syncretism may involve a parallel process of gathering together disparate technologies (interactive and digital, reactive and mechanical, psychoactive and chemical), and new rituals of communication (mobile, online), and emergent communities (the Net), and should probably be aware of aspects of the holistic practices of older cultures, embracing across a wide spectrum of cultural knowledge (p. 49).

This and other calls for interconnected disciplinary knowledge (Sonvilla-Weiss, 2007; Sweeny, 2008; Wilson, 2008; McWilliam et al., 2008) are related to approaches proposed for interdisciplinary pedagogies at the university, namely the ones detailed in interdisciplinary pedagogies model 2 (Chapter 6), in which students of art and engineering concentrations come together to learn around theme-based projects. Although in theory the argument for this approach is strong, the analysis of discourses of interdisciplinarity in chapter 6 revealed several issues in how interdisciplinarity is conceived and performed in new media art education. Nevertheless the urgency to further expand the scope of interdisciplinary curriculum continues to be expressed, and in fact broadens and intensifies in the emerging discourses of complexity. Complexity studies are issue- or object-based, before they are disciplinary. Discourses of complexity are thus concerned with the entanglement of ideas, forms of knowledge and methods combined in unprecedented assemblages for deriving a new, hopefully better, understanding of the world. Complexity studies offer the closest operational models of integrative assemblages of disciplines, since they require more symmetrical configurations and contributions between disciplines.

8.3 Analysis of the discourses of complexity in new media art education

I wish to elaborate on three issues in regards to the emerging discourses of complexity, according to which the scope of practice of media artists will expand beyond AST, into other (possibly any) assemblages of disciplines in order to contribute to the investigation and interpretation of contemporary complex phenomena requiring integrated interdisciplinary approaches of inquiry. The first issue is that, as new configurations of disciplinary knowledge are contemplated, there are many media that will be new to media artists, but not new to the disciplines the artists delve in. This also introduces artists to new terminology, methods, and techniques that have so far been foreign to media art practice and hence, to art education. Secondly, related to the first, is the issue of materiality. I posit that new disciplinary associations, namely of art with disciplines that are also material- or matter-based such as machine engineering (robotics), bio-engineering, and the life sciences, will require extensive revisions of the discourses of new media art education that have accepted a hierarchy of forms of knowledge that place technical know-how below theoretical and discursive forms of knowledge. Finally, there is the issue of what happens in a learning experience that involves further integrating subjective and objective forms of knowledge, and the need to reconcile century-old assertions turned assumptions that, in the university context, have persistently placed the prescriptive, measurable methods above the non-objective for deriving as well as transmitting knowledge.

I ground my analysis of the emerging discourses of expansion and complexity on a specific kind of interdisciplinary art practices, which have also emerged rather recently, with a growing community of active practitioners who have been raising timely and compelling critical arguments through their work. In expressing the expansive and fluid nature of new media art and the need for curricular structures that allow and encourage learners to dwell on objects, themes and techniques across disciplinary fields, several authors point to the life sciences as an important area of investigation for new media artists. In the unit of analysis, the moist-media of molecules and matter is several times announced as the new artistic media. It was Ascott (2001) who first stated that “at the leading edge of artistic inquiry, our interest is moving from pixels to particles” (p. 9). The moist domain – expression he used to designate the wet world of biology, molecules and live matter, is a new space of investigation for artists, and, I argue, one that will require revisiting the pedagogies and art education practices in place. The twentieth

century, Ascott (2001) further contends, will see the re-materialization of culture in practices that combine “computational exactitude, biological fluidity, and technoetic complexity” (p. 9).

If bio-art or hybrid bio-mechanical-digital art are indeed strong avenues of investigation and art practices that will enter curricula for the education of artists, the introduction of artists to the life sciences and to practices that involve handling live matter and organisms in artistic gestures opens questions that have not been typically of concern to artists, and much less to art education: it opens investigation onto the complex biological, social, cultural, and perhaps spiritual phenomenon that is life. For this reason, bio art is a good example to critically analyze the enthusiastic discourses of complexity and the calls for expansion towards more forms of knowledge that new media art education is urgently announcing.

I did not find texts describing concrete pedagogical practices already in place, nor proposed pedagogical approaches for interdisciplinary configurations that include art and the life sciences. Therefore the critical analysis of these discourses is based on my personal experience in introducing myself, as a learner, to an environment dedicated to learning and creating at the intersection of art and life-sciences.

8.3.1 The case of bio-art: SymbioticA

In tandem with this research, through my other research activities at the university, namely as a research assistant at Hexagram-Concordia, I became interested in art practices that use the tools and processes of biotechnologies. I was exposed to examples of such research-creation, and given my central focus in art education I was intrigued by the lack of curricular content that addresses art practices that intersect with the life sciences, and the question of how to bring these into pedagogical practice for the training of artists. I do not believe that this interest of mine, and the fact that it emerged as a discursive strand in literature of the field is simple happenstance. Rather, it is to be expected that, as an individual who is partaking in the discourses of the academic community concerned with new media art teaching and research, I have been exposed to this topic that is rather recent in the field. As all discourses of the new, the rhetoric surrounding creative practices that explore the natural sciences is greatly enthusiastic, but it will take time for its theories and practices to be integrated into pedagogical practice. Nevertheless, it sparked my interest in regards to its future implications for new media art education.

Driven by this interest, and for its relevance to my current and future research, I successfully applied for a research fellowship at the artistic laboratory dedicated to the research, learning, critique and hands-on engagement with the life sciences - SymbioticA, at the University of Western Australia (http://www.symbiotica.uwa.edu.au). The goal of my residency was to experience and analyze my own introduction to bio-art, and to reflect on it from the perspectives of the new media artist student who engages for the first time with these practices, and of the educator developing curriculum in this field. As someone who has constantly been immersed in art and new technologies, and is familiar with creative practices in AST, I wondered what it would be like to be introduced to such new configurations of interdisciplinarity. What are the implications of pursuing critical and creative practices with and about what several authors claim to be new media for art?

My 5-month residency at SymbioticA resulted in many more questions and insights than are pertinent to present in this section. The following points are based on notes from my experience that contributed to my analysis of claims that new media artists ought to deal with all forms of disciplinary knowledge. The issues I point out only begin to reveal the challenges that are likely to arise in pedagogical approaches that will dwell on this specific configuration of interdisciplinarity for the training of artists. These challenges pertain to discourse and terminology, technique and materiality, and to the ethics of handling live organisms.

SymbioticA is the first established bio art research laboratory dedicated to artistic investigation of the life sciences and biomedical technologies. The physical space it occupies at the University of Western Australia is very much to the image of the reflective, critical and creative activities it houses. The heart of Symbiotica is a studio-office-lab space purposely built for the center. Between the desks there are all types of scientific paraphernalia, with prototypes of previous projects and actual works, vitrines with petri dishes, sculptures, documentation, … The space is grafted onto the building of the School of Anatomy, Physiology and Human Biology, and fully integrated in this school in terms of resources: labs, technologies, technicians, and administrative services. At the time of my residency, there were two laboratories in the building allocated to SymbioticA.

SymbioticA welcomes artists, scholars and graduate students from various disciplines to its residency program (http://www.symbiotica.uwa.edu.au). In addition to public outreach activities at the local, national, and international level, it also has an academic component: the Master of Biological Arts. In this unique MBA, students with background in art, science and the

humanities engage in creative bioresearch projects (with dissertation) and investigate ethical and cultural issues in cross-disciplinary experimentation in art and science. Masters' students undertake both arts and science units as part of the curriculum. Elective courses are also offered at the undergraduate level on the topics of Aesthetic Crossover of Art and Science, and Art and Life Manipulation, in which students engage in lab practices and techniques in the context of contemporary art practices.

Oron Catts (director of SymbioticA) and Ionat Zurr (artist-researcher, academic coordinator at SymbioticA and my residency advisor) are prolific artists who, amongst other projects have explored the use of tissue engineering technologies for artistic expression. Biotechnologies make it possible to grow and culture living tissue outside of the body. Tissue can be grown in shapes using structural polymers, and certain cells can be stimulated to react to input (e.g. *in vitro* grown muscle cells can be electrically stimulated to 'twitch', or neurons can be stimulated to communicate with other cells/neurons). *In vitro*, life is made possible by means of the technological apparatus – a bioreactor – that creates the temperature and moisture levels of the body. When exposed to unsterile, unstable conditions, and with no nutrient supply the cells die. Through their work, Catts and Zurr materially and conceptually advanced "a unique class of object/being" (2002, p. 369): the 'semi-living', in the form of living tissue-engineered sculptures. The first semi-living worry dolls were grown and shown by Catts and Zurr at *Ars Electronica* 2000, and subsequently re-grown and re-exhibited several times through to 2012 (Catts & Zurr, 2002). The sculptures were inspired by the traditional Guatemalan worry dolls given to children to share their worries at bedtime. Viewers were invited to share their worries with the dolls. This was done in writing on a computer in the first versions of the work, and in the most recent versions by whispering the worries into a microphone. The worries were played onto the bioreactor (the artificial womb) where the dolls were kept in the necessary conditions for their life and growth. The artificially grown and shaped living tissue, part of a body yet living outside of it with no consciousness, challenges long-held perceptions of life with ethical, material, and safety implications that are unlike other artistic material-based work.

8.3.1.1 Issues of terminology

In this brief introduction to SymbioticA and to a work by Catts and Zurr, I have already used several terms that greatly differ from the terminology used throughout this dissertation,

where I mostly refer to digital media, which are most predominant in the 30 years of data that this study examines. This sudden change in terminology is something I experienced on arrival at SymbioticA. I was estranged by the parlance and I felt an outsider in their community, whose objects of study, techniques and terminology differs from that which I use in my professional practice. My first weeks required revisiting long forgotten terms, which I hadn't employed since high school biology, in addition to learning a whole plethora of concepts and expressions. In practices that arise at the intersection of disciplines, Myers (2012) explains, language is a particularly problematic issue, "largely because each discipline develops nuanced meaning behind many words that can seem impenetrable even to well-intended collaborators" (p. 246).

I found the basic terminology easy to acquire, and for the most part not that different from other new terminology one is introduced to when using the tools and materials of a new craft for the first time. Fellow researchers and other residents at SymbioticA work in very distinct projects with specific organisms, and employ different techniques. Colleagues were always open to explain their practice, and to demonstrate the techniques they use or have used in the past. What took longer time to grasp in the parlance of bio art were important nuances of the discourse. For example, there are biological and philosophical differences between 'life' and 'semi-living', and between the 'animal' and the 'non-human', between 'killing', 'humanely killing', 'sacrificing' or 'suspending life', or as I would come to learn, the differences (or lack thereof) between 'risk' and 'perceived risk'. The 'medium', in the tissue-engineering lab, refers to the nutrient solution of fetal calf serum used to feed the cells. The term bio-art itself is contested, but I use it here to refer to art that uses the materials of life as the art object on display and biotechnologies as a medium. In this definition, bio-art implies working with life as both subject (posing questions of social, ethical or technological order), and object/matter/media (Zurr, 2008).

Just as the rise of new media art in the 90s began with the assimilation of new digital technologies into art practice, with techniques and terminology that were germane to the disciplines within which these technologies developed (computer science, computer engineering, cybernetics...), as the tools, techniques and modes of engagement of the new media entered mainstream, formerly considered 'expert' terminology came to be used by non-expert communities. I have provided examples of several concepts and expressions that are now common in non-expert discourses, having lost their origin. Following the cyclic nature of the assimilation of new media, it is plausible that biotechnologies and terminology of the life sciences, which artists are now appropriating, will gradually become accessible to the non-

expert publics. Some argue it is already the case. In an interview published in 2012, Catts explains that in the last decades areas of applied research, such as molecular biology, and regenerative medicine, synthetic biology and neuroscience are becoming “more engineering than science” (Myers, 2012, p. 271) and that the tools and techniques used are increasingly standardized and accessible to non-biologists. These tools and techniques are becoming palettes for artists to work and engage with.

8.3.1.2 Technique, safety and mat(t)erial

The second issue comprises technique, safety and materiality/matter. Upon arriving at SymbioticA, I completed the mandatory UWA Health and Safety online induction, and as soon as I was accredited I stepped into the ‘lab’, only to find myself, as in regards to terminology, again unversed with most tools on the bench. Although new media art has adopted the word lab in its vocabulary, it remains that for many new media artists working in academic institutions, stepping into the wet lab would represent a radical change of environment. A salient aspect I wish to reflect on is the distinctive performance and embodied experience that is to work in the wet lab with living organisms.

In the labs at SymbioticA I experimented with some basic techniques, observed some slightly more intricate techniques, and read about and discussed more complex ones. My introduction to the wet lab was with assisting Professor Zurr in basic procedures for tissue culture, on one occasion with a fellow researcher who was culturing *Candida Albicans* (a type of fungus) and on another occasion with an artists whose work involved growing a small neural network in vitro, which ‘synapses’ were stimulated and recorded by a system of electrodes which in turn controlled analogue synthesizers. The work titled “CellF” has since been presented as a performance in several venues worldwide (Ben-Ary, 2015). With Professor Zurr, I learnt about cell lines and their physiological properties, the techniques to thaw cells, how to feed the cells, *passaging* the cells from one dish into more dishes as they divide (grow) and become too confluent to continue growing, and when necessary, how to freeze them.

Learning the routine work at the lab bench and in the sterile hood to grow living cells *in vitro* is in many ways similar to learning other techniques using tools and media one has never experimented with before. Some instruments and techniques require finer dexterity than others, with some media being more robust while other are fragile and sensible. From my first

procedures in the sterile hood, hands in bright blue gloves handling petri dishes and flasks with cells, sucking and pouring solutions from pipettes, raised a certain mindfulness of the hand gestures being performed. At that moment, I could relate with my students of the previous fall, when I introduced some of them for the first time to photography film development and photo printing in the darkroom. In the sterile hood, as in the darkroom, the result of the work is not immediately perceptible –the film because it is, at first, sealed in the tub, the cells because they are not visible to the naked eye. The first time one engages in such procedures, there is great awareness of the gestures, the precision in the measurements and techniques for pouring the solutions. One feels pressure to respect timing, an overall clumsiness and insecurity of having missed a step in the protocol. In the darkroom and in the wet lab, one also learns from experience (including error and failure) how forgiving the media is in each step of the process.

To continue, there is another dimension to working in the wet lab that cannot be overseen, which is from my perspective a distinctive aspect of the experience of handling live matter. The awareness of one's performance and gestures in the lab is heightened when working in a sterile manner, or when one must attend to specific 'needs' of the form of life being manipulated. In the case of cell cultures in the sterile hood, precautions must be taken not to contaminate the cells, which outside of the body are not protected by the immune system. I, or a non-sterilized pipette, could potentially contaminate and kill the cells. Worse, if working not with cells but with a human pathogenic organism, contamination could be mutual.

With practice, these gestures will gradually become more assertive and eventually automatic procedures of everyday routine in the lab, turning into what Latour and Woolgar define in *Laboratory Life* as the "*invisible skills* that underpin the material inscription" (1986, p.245). When one enters the environment without these competencies, in addition to interrupting the efficiency of the work environment, it highlights the minutiae of the experts in performing the techniques and actions. Chris Salter (2015) offers a much richer and detailed description of the artist entering the world of bio-art, based on his ethnographic observation of making and creating in the tissue-engineering lab at Symbiotica.

Unlike inanimate digital technologies, the practice-material aspects and techniques of bio-art cannot be dismissed as 'mere' or 'narrow' considerations. They require knowledge of the physiological properties and needs of the form of life being handled. The hands-on work implies caring and careful monitoring what and how the organism is doing what it does, because biological processes are non-reversible and a specific stage in its development or adaptation can be easily missed. In this type of work, the idea of the 'artist as creator' must be questioned

because the progress of the work is not only contingent on her creativity, her technical competencies or her will. *In vitro* or *in vivo*, with different degrees of intervention from the researcher, biology will still do what it does in the time it needs to do it, providing the conditions are ensured for this to occur. These considerations are part of what distinguishes action from agency, and fundamental differences when working with non-living and living systems (Salter, 2015).

8.3.1.3 Ethics

In addition to familiarizing myself with the tools, the technical know-how, and to learning about cells and organisms, and the protocols to handle them, through discussions with peers I was led to reflect on the ethical complexities of bio-art: the individual, political and social questions that will arise from claiming living entities as art media. The final issue I wish to consider, which does not bear comparable implications when working with digital technologies, pertains to ethical considerations such as the importance of caring for the creatures during the project and determining their fate at the end of the work. Contrary to digital work, which has an on/off switch and can be archived or put away in a box, living art cannot be switched off and placed in storage. The creature can outlive the creative process and the exhibition. It can also die before or during critical moments of the life of the work of art.

Brandon Ballengée is an artist and scientist who manipulated, not semi-living, but living creatures and faced these questions in his work. The work he conducted between 1998 and 2006 was titled: *Species Reclamation via Non-Linear Genetic Timeline: An Attempted Hymenochirus curtipes Model Induced by Controlled Breeding*. In other, more accessible terms, this project attempted to reclaim[6] a species of frog that is presumed extinct[7] using controlled breeding[8] (Weintraub, 2012). Although he used scientific tools, protocols, and the experimental method to prove the hypothesis that this species can be reclaimed, he conveyed the results and presented the process of his research in artistic ways. Starting from a descendant of the 'lost' species, the reverse-genetic manipulation process involved six generations of frogs, before 'arriving at' the intended species. For Ballengée, "each generation of living forms is stylistically different just as each individual animal is unique and should be viewed simultaneously as a living creature and a work of art" (Weintraub, 2012, p. 126). He therefore documented with

[6] designation for strategies that attempt to re-create an endangered species and reintrodce it to its habitat.
[7] it cannot be stated extinct because the native habitat of the species, Congo, is a rich biodiverse region, yet one of the least researched
[8] selecting mating partners in order to cultivate a particular genetic of phenotype trait

images the gradual differentiation between each generation. He also displayed each generation of frogs in aquariums in a museum, during which time he had to arrange for the frogs to be cared for (fed, water changed, and temperatures monitored). At the end of the exhibition, he returned the frogs to his studio where he cared for them until the natural death of the last one, in 2009. It was unsafe to release the lab re-created species of frogs into their natural environment given that it was unknown whether this species could now survive in the wild, or if it carried pathogens that would endanger other species (risk of xenosis). The nature of this work does not lend itself to recurrent exhibitions. Once the hypothesis was scientifically demonstrated and validated, an ethical review of this project (in its scientific purpose) would not justify handling additional animals to demonstrate a second time that which had already been proven, thereby ruling out a repetition of the artistic manifestation.

Inspired by my readings on the work of Ballengé and others, and to further my understanding of ethical treatment of non-human animals while at SymbioticA, I took a one-day program on animal welfare and ethical treatment of animals. The first part of the program was directed at ensuring that researchers and teachers handling animals for scientific purposes are aware of their responsibilities. The program did not contemplate artistic purposes and all attendees were biologists. The workshops taught us how to manage 'the impost on the animal' during the time of the research process. This, I learnt, means ensuring the welfare and well-being of animals, being able to recognize pain and distress in physiological and behavioural signs, and to take measures to alleviate pain and stress of animals during the 'necessary' procedures for the work. A university ethics committee is in place to ensure that every life is cared for, to monitor the living conditions and to ensure that the use of animals is always justified and cannot be replaced by other methods. They stress the importance of minimizing the suffering of animals and especially, that 'death as an end point' is avoided unless justified and essential for the aim(s) of the project.

It will not come as news that scientific research, through such controlled, peer-reviewed best-practices and methods justify physically handling and at times sacrificing non-human animals for the human pursuit of knowledge. As all other participants were biologists, I did not dare open pandora's box, so I left the workshop with my own question unanswered: How can subjective forms of knowledge that do not involve peer-reviewed protocols and standard operating procedures, like artistic knowledge, justify handling non-human life forms in the current framework for ethical research and teaching? Within the 2013 Australian code for the

care and use of animals for scientific purposes of 2013[9], other life forms that are not designated 'animals', which are non-human vertebrate and cephalopods (p.3), are subjected to less strict ethical standards. Artistic work and research in the confines of the university is therefore limited to working with non-animal species and microorganisms, unless piggybacking on scientific research questions, like Ballengé did.

8.3.2 Implications to the emerging discourses of complexity of new media art education based on bio-art

This summary of my experiences of learning about and through practices at the intersection of art and the life sciences begins to touch on some of the technical, theoretical, and philosophical issues that will arise in practice, if new media art curriculum incorporates objects of study, concepts, and techniques of the life sciences. It equally introduces issues that artists may encounter when contributing to the investigation of complex biological phenomena. In inquiry at the intersection of art and biology, the future artist will be confronted with considerations that greatly differ from those that arise in the predominant AST forms of interdisciplinarity.

When entering art-biology collaborations or individual projects, one needs to be ready to be confronted with discourses and values that might pull in different directions. Artists cannot instrumentalize live matter the way they have digital and electronic media. Life is adaptable, and malleable. Organic systems mutate, machines don't. Life is complex, hence understanding it, or even only parts of it, is not reducible to one disciplinary stance. Even hands-on training, which is a crucial part of the academic path of both artists and scientists entails positioning oneself in relation to other forms of life. Caring and respect come into play when manipulating the environment and behaviour of other living creatures. One does not engage with hands-on biology work without some preliminary introductions or without having critically reflected on some of the issues above. The media artist engaging in such practices is likely to partake in the creation of hybrid mechanical-biological systems where machine and organism, technical and organic processes are interrelated in ways that will further complexify the creative process. It is in this sense that I understand Ascott's (2001) revived importance of the materiality in the new art.

[9] https://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/ea28_code_care_use_animals_131209.pdf

There can be serious consequences to trespassing into the life sciences with habits of working in non-linear, intuitive experimental ways, and to handling live matter and biotechnologies with superficial knowledge of biology work. This begs the reflection on the implications of trespassing across such disciplinary boundaries. The trespasser, to return to Osborne's construct, is she who "passes into other domains to develop his or her own perspective" (2013, p. 88), often with the goal of bringing back innovative approaches to her original domain, rather than to contribute to the domain into which she is trespassing or to contribute to further the understanding about a given phenomenon. When done mindfully, such approaches may result in cross-disciplinary fertilization of ideas and techniques, and therefore occasion benefits to both parts, but when done naïvely, the contributions will be, at best, superficial.

In the case of bio art, as was exemplified by Ballengé's project, the environmental impact of the threat of microbial infection or contamination is real. Genetic engineering techniques similar to those employed by Ballengé are widespread in many industries and are becoming increasingly accessible outside of the scientific lab. Through these techniques, genes are added to, or deleted from an organism in order to isolate, remove, or enhance desired traits that will change its genotype or phenotype. Organisms manipulated in this way are called transgenic or genetically modified organisms (GMO). The most common genetic engineering is done on plants to improve agriculture for herbicide and pesticide resistance, or improved nutritional qualities or longer shelf life of produce. One of the first famous examples of an art-science work using these technologies generated Alba, the albino bunny that glowed in the dark, by Eduardo Kac in 2000. A Green Fluorescent Protein expressed by a gene found in the jellyfish *Aequorea Victoria,* which causes the jellyfish to glow in the dark (bioluminescence) was inserted in the genetic code of the rabbit. The ethical quandaries around this specific case have been debated in many media platforms, well after Alba's controversial death in 2002 (Philipkoski, 2002). The availability of genetic engineering technologies, even simple DIY DNA-extracting techniques using salt, soap and ethanol, demand education about the ethical and environmental ramifications of such practices.

On another hand, the act of trespassing from one disciplinary expertise to delve into the knowledge and tools of other disciplines can be driven by the logic of accountability (Barry & Born, 2013), to "be critical and counter-intuitive in relation to existing explanations" (Osborne, 2013, p. 89). Contemporary bio-art practices can be driven by this logic. As was explained to me by Catts, bio-artists use the tools of the life sciences, but do not abide by its methods for the

validity of their symbolic and artistic endeavours. In their practice, some artists take a critical stance in relation to the conduct and impact of scientific research, and thus question the authority of science. The status of the experimental method as the primary approach for deriving and demonstrating irrefutable findings has granted the analytic disciplines a superior status in what is considered 'true' and valid forms of knowledge. For this reason, it is granted to manipulate non-human animals to derive new knowledge. Also for this reason, the ethical implications of scientific experiments, the social and environmental impact, and the discourses through which findings are sometimes disseminated remained for a long time insufficiently critically examined. The field of science and technology studies (STS), which only consolidated in research universities as a field of study in the later half of the twentieth century, is dedicated to social studies of how scientific discovery and its technological applications relate to social developments in law, politics, public policy, ethics, and culture. One stream of STS takes particular focus on the impact and risk that science and technology may pose to peace, security, environment, and human values. In STS, science and technology is the object of study while the social sciences and humanities are the sources of the main methods and intellectual tools of the field. The emergence of STS as a field of study reflects the belief that no single disciplinary stance and specialization is adequate to reflect on, and respond to the complexities of contemporary world challenges (Jasanoff, 2013). The discourses of new media art education, particularly post-2000, were certainly influenced by such cross-disciplinary research that formally investigated the politics, economics, and cultural impact of techno-scientific advancements, and informed the critical discourses of the new that accompany these advancements, which I have analyzed early in this dissertation.

The natural sciences partake in the rhetoric of the new in the same ways that technological advancements do. Scientific discoveries are celebrated in a rhetoric that propels the public into hypothetical, utopian futures for which many, if not most procedures are yet to be mastered. Visual arts are sometimes utilized to aestheticize information and "render scientific discovery exciting or more palatable by expressive means" (Barry & Born, 2013, p. 17) thus fuelling the calls for the public to buy into the speculation and imagined futures. Critical intervention ought to disrupt such narratives. In line with her roles of visionary and intermediary, the bio-artist may take a critical stance in relation to the discourses of the new in the natural sciences. The work of Ballengé speaks of such scientific myths; in his case the popularized idea that science will be able to bring lost species back to life. This is the case of the popular belief that extinct species may be resurrected from frozen DNA. This is also the premise of San Diego's *Frozen Zoo*, seconded by *The Frozen Ark* project in the UK http://www.frozenark.org,

and of both movies *Jurassic Park* (Spielberg, 1997) and *Jurassic World* (Trevorrow, 2015). The remarkable experiment Ballengé conducted comments on the malleability of life, but the artistic ways in which he disseminated his process and findings outside the traditional scientific community opens avenues for art to exercise external accountability over discourses that promote unrealistic expectations and the scientific hypes surrounding the performance of biotechnologies as they are presented to the public.

8.4 The unlikeliness of new media art education

My experience at SymbioticA demonstrates some of the entanglements that are likely to arise when introducing future artists to one specific interdisciplinary configuration. It led me to conclude that the teaching-learning strategies are not yet in place to prepare students for the ambitious roles that some educators envision, namely that of the intermediary in specific assemblages of forms of knowledge. The emerging discourses of complexity are again resting on a simplistic understanding of the idea of interdisciplinarity, and on an idealistic conjuncture that the university is not ready to accommodate. They assume a homogenous, integrative, and balanced configuration of disciplines, coming together in a loosely defined area of inquiry and practice. Driven by notions of accelerating techno-scientific innovation, and of the convergence of forms of knowledge and methods of inquiry on which artists can dwell, educators aspire to prepare students for even broader interdisciplinary learning. I argue that if interdisciplinary learning is difficult—as was discussed in the analysis of discourses of interdisciplinarity, and in the systemic implications of chapter 7— then learning in even more radical disciplinary assemblages is yet at its preliminary stages in the present university context. The discourses of complexity point towards exciting new directions of interconnected and complementary models of inquiry, but it is radical to assume that art education will be able to implement curricula and nurture competencies that will prepare well-rounded individuals able to navigate the issues that arise at the intersections of any interdisciplinary configurations. There seems to be a persistent and escalating overenthusiastic agenda that oversees disciplinary divergences that are far from being resolved, and disciplinary specialization that is needed to arrive at a thorough understanding of certain subject matter.

The predominant viewpoints expressed by new media art educators call for adaptive, flexible and transgressive pedagogies that will foster in students the abilities to integrate knowledge and skills from various disciplines, and that will allow them to develop their own, unique and, most importantly, new art. How does one educate media competency that fulfills the demands of such variety and precision? How does one think critically and communicate across fields, and develops hybrid forms of theory and practice in the present higher education structure? I have sufficiently stressed the problems of conciliating disparate beliefs, sensibilities, and expectations of instructors and learners that guide their teaching and learning attitudes. These issues of “functional fixedness” are represented in their discourses, their habits and

methods of interpretation, which are acquired as part of their disciplinary cultures. This is explained by Davis (2004):

> Intersubjectivists discourses, which are of the realm of social and cultural activity, focused on the human, language and other subjective systems, on personal identity, concerned with the social construction of knowledge, are most represented amongst the arts and humanities, whereas interobjectivist discourses are more commonly represented amongst the natural sciences. (…) Assumptions that are cast in subjective and objective forms of knowledge will be hard to displace. (p. 110)

Based on the previous analysis, I believe that new media art education is ideologically aspiring to be an all-encompassing realm that conciliates the two discourses that Davis (2004) speaks of. In practice, however, pedagogies have not evolved to provide such instruction.

In addition to the questions advanced so far in this chapter, which pertain to issues of curricular content and approaches that will arise with the ambitious emerging discourses, there are also issues of institutional order to be considered. The institution's capacities for reorganization, with its social architecture and norms, are still lagging behind for effective ways to implement such pedagogies. In this respect, the university is neither structurally nor ideological ready to accommodate to the discourses emerging in new media art education.

In the modern university, renouncing to be situated in one of Davis (2004) forms of knowledge entails the risk of perceived loss of focus as a field. As was pointed out in the previous chapter, the does not work to the advantage of new media art programs in the established order and dynamics of the institution. Perceived loss of focus engenders loss of power to reclaim the value of the skills and knowledge it offers to enrolled and future students, and the contributions of its scholars to the ecosystem of expertise that is the university. I therefore add the following considerations, which are likely to arise in the systemic discourses: How will new media art pedagogies of interdisciplinarity and complexity reflect in processes of accreditation, course validation, and program development? What socio-economic justifications are there to produce graduates that thrive in complex thinking and knowledge sharing context?

It can be said that the newness in new media art education is discursive, well before it is applied. The rhetoric of the new precedes the ability of the institution and its players to adapt and organize in effective and concerted action according to their views. The university is itself a

complex social system that embodies its history in its structure. It is subjected to both internal dynamics of power, as well as external influences that steer its operations into specific directions. The university both engenders and responds to spurs of techno-scientific and social innovation and it is affected by related socio-economic imperatives (i.e. it takes on research orientations that are more likely to attract funding from external sources). The university's ecosystem of disciplines, structured in departments and administration, and clusters of specialized individuals that form them, does not radically reorganize. The adaptation is more often than not slow—as has been emphasized in regards to the discourses of new pedagogies. The university has barely begun to cope with the idea of interdisciplinary pedagogies, and already educators are calling for more complex integration of disciplines and forms of knowledge, which are easier said than done. There are exceptions, but the analysis of discourse throughout this dissertation leads me to assert that the systemic and pedagogical disciplinary divisions are still very much in place in the contemporary university, contrary to what the emerging discourses in new media art education pretend. Although there are many examples of highly successful interdisciplinary efforts, the discourses of new interdisciplinary pedagogies calling for radical changes have had minor impacts on teaching and learning cultures (Sonvilla-Weiss, 2006) and rarely provoke long-lasting changes in the university's social mechanisms and infrastructure by which its different parts relate to each other (Rutenbeck, 2006).

8.5 A final call for change

In spite of the slow wave of institutional change, as a discipline, media art is in a privileged place to continue to propose and provoke newness and change within the university, with two of its characteristics being its non-conformity to the established orders, and propensity to associate with other disciplines. Osborne (2013) explains that some disciplines better lend themselves to interdisciplinarity than others: “the mobility of some disciplines across other disciplines is more or less normal to their very sense of disciplinarity” (p. 86). New media art is such a discipline, defined by its extreme propensity to cross-fertilize with many other areas of inquiry and practice. Yet, in the expansion of the field, some interdisciplinary practices gain popularity with communities of practitioners gathering around common media and issues. A community will then share in the tools, techniques, approaches and the discourses, and specific new media art genres or clusters of practice rise to prominence. In some cases, practices at the intersection of art and specific disciplines, like bio-art, consolidate and almost begin to act as ‘interdisciplines’ themselves. Other clusters of practice are short-lived; they may bring together ephemeral groups of curious minds to explore a specific object or a timely issue, but eventually dissipate. ‘New media art’ is a comprehensive term used to designate all these practices, both established and occasional, that explore ‘new’ approaches with ‘new’ media.

I argue that other specificities of new media art education should also be advanced in its discourses, namely those pertaining to the methods, media and teaching-learning approaches that the field privileges. I detect that in the enthusiasm and urgency to expand into every possible direction, in its multiplicity and fluidity of clusters of practice, the discourses of new media art education have been losing sight of core strengths of the field, which must be brought forward since I found them to be less discussed in the unit of analysis. The predominant discourses of new media art education focus on the challenges of developing curricular content, and bringing together constructs and knowledge of different disciplines, different epistemological traditions. I posit that the advancement of new media art as a discipline of the modern university, and as an area of inquiry and practice even beyond the walls of the university should be tied to its own specificities, which lie, not only in *what* ought to be taught, but *how* it ought to be taught. This, I proceed to argue, can also be inspired by models of complex organizational structures.

8.5.1 Complex organizational models and new media art education

What has so far distinguished learning in the new media art lab from learning in the scientific lab are the assumptions underlying the activity. The traditional pedagogies are aligned with postructuralist sensibilities that, as presented in the previous chapters, direct the learner to develop a very personal critical examination of the world. This is achieved by promoting critical thinking and agency for intervention and mediation, however, mostly through approaches that continue to place literary forms of knowledge above material-based and technical know-how. It is paradoxical that in art practices defined, as the name indicates, by the exploration of the affordances and potentialities of new media, or of old media that are newly adopted for artistic endeavors, the predominant discourses for the training of artists consider the processes for acquiring material and technical knowledge less worthy of discussion and analysis. To continue to perform new media art education within the uncritical assumed paradigms is an effective method of resisting change (Brown, 2008).

Teaching-learning approaches in art are aligned with the interpretivist discourses and participatory epistemologies, which reify the belief that the teaching-learning experience is not limited to a predetermined roadmap of study with standardized curriculum, but rather as a pedagogical approach through which students are taught the means of self-expression, intellectual engagement, and the powers of reason. In the lab, art students are encouraged to experiment, and the hands-on work remains part intuition and uncertainty. In learning about and through new media art, interrogation and revision of one's knowledge and work is endlessly cyclic, always seen as positive and productive (Ascott, 2008; Danvers, 2003). Several authors have defined these processes as based on tacit ways of knowing and theorized how to address such forms of knowledge in education (Polanyi, 1967; Atkinson & Claxton, 2000; Gascoigne and Thornton, 2013). The media art student remains, in the traditional model of art education, the recipient, or the locus where the transformation (learning) occurs. Learning is towards forging her artist-identity to harness her own individual path of skills, media, and interests. These pedagogies are defined in contrast with teaching and learning in the analytical sciences, where the object of study is fixed, modes of learning and methods of working are prescribed, and specific concepts, theorems, and techniques are at the center of the curriculum.

Additionally, the predominant assumption in education has been and remains based on the anthropocentric view according to which learning is a (human) social activity that occurs primarily at the level of intellectual cognition. The primary goals of learning are to affect individual as well as collective intellectual and behavioural change. Complexity theories about cognition, which I have introduced above, disrupt this anthropocentric view, and displace the centrality of the subject to put her in a system of complex contingencies that come into play in shaping the cognizant mind. My proposed model based on how the dynamics of complexity can relate to the training of new media artists is aligned with three main principles of complex systems: decentralization, context, and adaptation.

What complexity theories introduce to the understanding of teaching-learning dynamics, explains Davis (2004), is a response to the modern neglect for context. Complexivists acknowledge the interaction of the many agents of a system, including environment, the cultural, social, but also biological conditions that come into play in the processes of learning. “Complexivists maintain that our knowledge systems are rooted in our physical forms engaged in cyclings of matter with all other living forms” (p. 156). If learning is seen as an adaptive individual and collective process, and the learner as part of a complex play of agents, we must question the long-established notion of the centrality of the learner in the teaching-learning process. This implies that the learner is not the only locus of learning, but is rather in interconnection with a range of nested bodies organized in a changing system. In formal systems of education, such as the modern university, this encompasses the classroom collective, the disciplinary community with its history, culture(s) and orientations/goals, and the institutional community: the department. Davis (2004) continues: “Pragmatically, this sort of thinking compels reconsiderations of many of the structures and artifacts that have been prominent in discussions of teaching.” (p. 181). Learning objectives, classroom activities and the status of the teacher/instructor will have to be reframed to address the collective learner (Castro, 2015) as a self-organizing, coherent, and evolving unity, as opposed to an assumed collection of isolated independent learners, and of individual artists. Such a view will question, not only the notion of the individual learner, but ultimately also the notion of the graduate artist-entrepreneur that fetches knowledge and skills to forge her unique artist-identity with the goal to compete and advance her individual place in society.

At the center of the model I propose is the idea of the collective and of decentralization of power (agency) as it occurs in systems composed of polycentric nodes with complementary

sets of knowledge and roles within a given system. These systems offer optimal organizational structures to gather intelligence, and to propose solutions or better understanding of complex phenomena. This is the principle of *The Wisdom of Crowds* advanced by Surowiecki (2004), as he explains:

> If you set a crowd of self-interested, independent people to work in a decentralized way in a common problem, instead of trying to direct their efforts from the top down, their collective solution is likely to be better than any other solution you could come up with (p. 87).

Decentralization does not completely exclude the predominance of influences and structures that are at work and are hard to displace: institutional rules, norms, discourses and history shape how agents interact and information circulates. This is particularly true of higher education contexts, which are heavily regulated systems of power relations, where nevertheless individuals grow, specialize and are self-driven in their pursuit of personal and group goals. As Foucault (1982) pointed out specifically about teaching-learning, higher education manifests some of these institutional traits:

> Take, for example, an educational institution: the disposal of its space, the meticulous regulations which govern its internal life, the different activities which are organized there, the diverse persons who live there or meet one another, each with his own function, his well-defined character—all these things constitute a block of capacity communication-power. The activity which ensures apprenticeship and the acquisition of aptitudes or types of behaviour is developed there by means of a whole ensemble of regulated communications (lessons, questions and answers, orders, exhortations, coded signs of obedience, differentiation marks of the “value” of each person and of the levels of knowledge) and by the means of a whole series of power processes (enclosure, surveillance, reward and punishment, the pyramidal hierarchy). (p. 787)

Throughout this dissertation, I have several times emphasized, supported by Foucaldian theories, that in social systems, communities, and collectives, there is hardly ever an equilibrium in the agency (power) of the parts of the social system. Moreover, in social systems (as a trait that is a fundamental difference with biological systems) there is often also lack of concerted relations between individuals, towards common ends. Rather, there are rules that will structure

the interactions between individuals, amongst which there are often preferential nodes (individuals or groups) and mechanisms (social or material) whose influence will predominate. Additionally, the influence of preferential nodes tends to grow. In this study, this predominance is evidenced, first, in the critical discourse analysis methodology I employed which takes into account the influence of certain theoreticians over others: some texts are more influent and cited than others which is an effective way of spreading specific schools of thought. It is also evident in my analysis of the internal hierarchical relations between communities within the university according to the disciplines they are affiliated with (what Foucault calls “les regimes du savoir”). Finally, I also demonstrate that this principle manifests in the external dynamics of the university and contemporary knowledge economy (the predominance and reinforcement of capitalist, neoliberal ideologies).

The example of free-market economies as decentralized, complex social systems that affect the environment in which subjects develop and therefore affect their behaviour is a recurrent example of complexity model and theories. I addressed it at the very start of this dissertation, supported by Mirowski’s (2011) analysis of the influence of such dynamics in the contemporary knowledge economy. What Mirowski (2011) exposes are coercive dynamics of power: he argues that the mechanisms that determine the competitive advantages of knowledge, and which knowledge is advanced, are often dictated by forces external to the field and context that produced that knowledge. When external interests act upon what knowledge is pursued there is a possibility and likelihood of misinformation. Mirowski (2011) names instances in which inquiry that is pursued and knowledge that is advanced becomes corrupted by having a price attached to it, and by being ruled by the principles of competition and profitability. Although he praises the potential and efficiency of decentralized structures, Surowiecki (2004) also recognizes the possibility of coercion or other forms of dysfunction in the dynamics of complex social structures:

> Decentralization’s great weakness is that there is no guarantee that valuable information that is uncovered in one part of the system will find its way through the rest of the system. Sometimes valuable information never gets disseminated, making it less useful than it otherwise would be” (p. 89).

However, Surowiecki (2004), in accordance with Foucault (1982), contends that influential forces and norms are not all inherently constricting and coercive. They may also be productive and are indeed necessary for complex social system to meet the conditions to

efficiently advance the most pertinent ideas and produce robust solutions towards specific ends. What is needed is specialization with balanced distribution of knowledge. According to Surowiecki (2004) specialization of the parts of the system guarantees a necessary scope of diversity of viewpoints and complementary functions within the system, which in turn encourages interdependence of individuals. Then, what is required is 1) coordination between the parts, 2) aggregation of knowledge, and 3) redistribution of knowledge. Coordination is not to be confused with top-down authority. To coordinate—understood as the power (agency) to link and put in a meaningful or productive order the parts of a system—ought not to be done in a top-down, authoritative or coercive manner. This is equally supported by Foucault (1982):

> The relationship proper to power would not, therefore, be sought on the side of violence or of struggle, nor on that of voluntary linking (all of which can, at best, only be the instruments of power), but rather in the area of the singular mode of action, neither warlike nor juridical, which is government." (p. 790)

Again, here it bears to keep it mind, important nuances that may not come through from the original French into the English translation of Foucault's speech, and possibly distort understanding of his premises. Government, from the French noun *gouvernement* (also used in nautical lexicon to designate *gouvernail*—the rudder), and the verb *gouverner* means to structure the fields of action of others, to orient individual and group behaviour. The word government in English carries connotations that are too quickly associated with political and authoritative powers, but the French significations are broader.

8.5.2 Complexity pedagogies—proposed guidelines

Introducing these sensibilities into teaching-learning interactions will imply changes of the basic vocabulary and discourses from the pedagogical (Chapter 6) to the systemic (Chapter 7), mostly changes in the discourses that construct the individual artist. Whether it is from the perspective of the discourses of new pedagogies that frame the new media art student as the individual empowered to intervene with critical artistic practice and meaningful commentary, and create engaging aesthetic experiences by repurposing or contributing to contemporary techno-scientific advancements; or whether the individual is presented, as in the systemic discourses, as the entrepreneur trained in her unique set of interdisciplinary and

creative skills that will be most valuable to the competitive work market in the creative industries; the locus is always, across discourses of new media art education the artist-author-producer. The discourses of complexity may announce a shift in the discourses and practices of new media art education, moving from the centrality of the individual artist-learner to the agency of future new media artists as part of systems of knowledge production and sharing. This system acknowledges the influence and role of the instructor as the coordinator of its parts and distributor of the knowledge created within the group, as well as any predominant influence from specific individuals or groups. In short, I hope the discourses and approaches carried from the dynamics of complex structures will promote ideals of collaborative authorship, complementarity of skills, adaptation to change, and a general conception of new media art as a method to contribute with practice and thinking to the investigation of contemporary complex issues.

Inspired by Kurenniemi's (1982) stages of computerification of art, I imagined a process that draws from his analysis of the technology of his time, and his speculative views of how the computer would change art. It led me to a sequence of steps for a curricular model that will embrace technique and material without dismissing critical thinking. The sequence I propose will take students iteratively from individual specialization to collective learning, adapting to their learning context (the first immediate environment) in the processes of making.

Kurenniemi's (1982) first stage of the computerification of art was the "The Great Transcription" (p. 100) of all media into computer-readable form. He wrote that the computer did not replace "old" media; it reinterpreted and transformed them into a unified medium. The machine itself was developed initially with reference to its previous, non-digital practices, so the first digital art was based on the exploration of the potentialities of the computer. In line with this process, and with the principle of different temporalities of assimilation of new media exposed at the beginning of this chapter, I conceive that the first contact of artist learners with new media be based on the technical and procedural affordances of the technologies, and exploration of its mediality. Due to the delay in new media arriving into pedagogical practice (likely when they are no longer new), the first contact of the learner will be at the level of the tools and materials that already exist, understanding what they do and how they do it, in the form it arrives to them. Learning the medium entails technical as well as critical understanding of the forms of engagement and interactions it allows, as well as the manipulations that are ethically possible or desirable. How it shapes perception, what exchanges it privileges and what faculties are hindered by engaging with it. This first step meets Zielinski's (2006) proposition, according to

which the artist must be cognizant of the established media practices, understand its social and technical conventions before she intervenes.

The second stage, corresponding in Kurenniemi's (1982) theory to the stage where the computer invigorates the art scene by creating new art forms, was marked by artist-computer-audience interactivity. This will correspond to my second learning step, to the learners applied investigation of what else can the medium be used for. In experimentation that will be akin to hacking practices the learners deconstruct and reconstruct existing media. How can it be changed? How can it be hacked beyond what it has been conceived for? And additionally, how can or will these changes engage others? How will it serve to stimulate interaction? What type of interaction, for whom and in what context? At this stage the learner presents, researches, and debates her exploration of the medium with others in her community of learning and beyond. This is the stage of speculation as well as the beginning of the process of specialization. Kurenniemi himself was a speculator, as is noticeable when reading his text "Computer eats art" (1972) from the vantage point of our future times.

As the artist begins to act upon understanding what the predominant uses of the media are and its place in a given context, it might be a productive approach to pursue antagonistic avenues, taking actions that counter the hegemonic powers associated to the medium. Proposing alternatives is a particular stance of being a visionary, influenced once again by Foucauldian theories. In fact, as he explains, taking such stances is a predominant trait of his body of work :

> I would like to suggest another way to go further toward a new economy of power relations (…). It consists of taking the forms of resistance against different forms of power as a starting point. To use another metaphor, it consists of using this resistance as a chemical catalyst so as to bring to light power relations, locate their position, and find out their point of application and the methods used. Rather than analyzing power from the point of view of its internal rationality, it consists of analyzing power relations through the antagonism of strategies.
>
> For example, to find out what our society means by sanity, perhaps we should investigate what is happening in the field of insanity.
>
> And what we mean by legality in the field of illegality. And, in order to understand what power relations are about, perhaps we should investigate the forms of resistance and attempts made to dissociate these relations. (1982, 780)

I suggest that instead of exploring techno-scientific advancement that extend the mainstream uses of technologies, media artists ought to explore antagonistic uses of media technologies, or revisit the paths of development of techno-scientific innovation (in a applied media archaeology fashion), to propose material deviations in the process of development, and reflect on the outcome of alternative media forms. Many contemporary artists already take on this approach and inspire me in the ways they manipulate and repurpose technologies and machinery. Such is the case of works by the collective RobotLab that presented “bios” [bible], the industrial robotic arm that delicately writes down the Bible on a long sheet of paper. This installation was presented at the Montreal International Digital Art Biennale in 2016 [Figure 2]. Similar industrial machines have been explored by the Korean collective *TeamVoid*. Also in 2016, another piece based on a custom designed robotic arm was commissioned by the Guggenheim Museum (New York) to Chinese artists Sun Yuan and Peng Yu, titled *Can’t Help Myself* : a robot that is frenetically obsessed with containing a viscous, blood-reminding liquid that surrounds it (Weng, 2016).

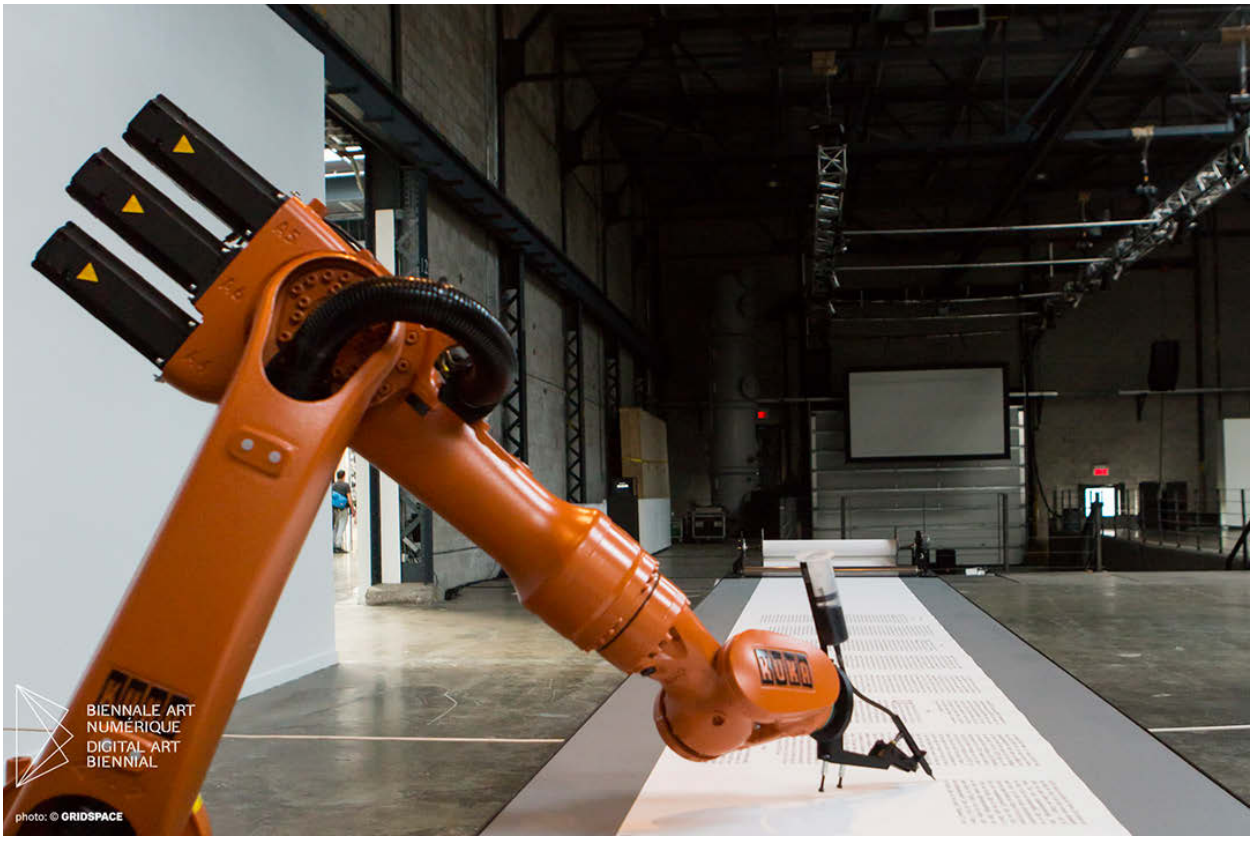

Figure 2.

Beyond Foucault, who focused on the social dynamics of discourse and power, as I have previously argued, my approach is also based on Kittler's fundamental premise that power is socially and materially constructed: "Technologically possible manipulations – he asserts – determine what in fact can become a discourse." (1990, p. 232). I maintain that whereas a great number of disciplines have been dedicated to the study of the social dynamics and influences of media, media arts' contribution stems primarily from the critical applied understanding and exploration of the material conditions that shape social organization and networks, and frame individual and collective agency. As stated earlier in this chapter, the technologies, media, and materials are continuously broadening and interrelated. The cycles of innovation are not about to slow down, and neither are the possible new forms of media art. New media artists' unique contributions lie in their abilities to advance, revisit, or redevelop tools into unique and creative new technologies and new media.

In discourses of 1900's Kittler reminds us of the difference between tools, machines/technologies, and media: the former are procedural, hence perform a process towards a specific production outcome, whereas the latter have, at the onset, "a response programmed in the stimulus" (p. 240). This is how film becomes "distracting", how new imaging technologies have reconfigured human vision and perception to accept, recognize and interpret visuality it does not capture, and how networked digital media facilitate human interactions that wouldn't take place by means of other media. Through their mechanisms of operations, media technologies lead users into taking the part—a process Kittler (1999) calls the disempowerment of humans by media technologies.

> Film established immediate connections between technologies and the body, stimulus and response, which makes imaginary connections unnecessary. Reflexes, as in Pavlov's animals occur with nothing in between: they arc between sensory impulses and motoric reactions. (…) The age of media (not just since Turing's game of imitation) renders indistinguishable what is human and what is machine, who is mad and who is faking it. (p. 146)

New media artists are the intermediaries that interrupt these media-human power relations and propose alternative forms of mediality. If the intervention of the new media artists is specifically dedicated to investigation of the mechanisms of operation (both technical and

social), the contribution of new media art as a field of investigation specializes without necessarily being constrained by taking that stance. It becomes complementary to the disciplines that neglect this dimension, or that explore it to reinforce the hegemonic powers. In this way, in Surowiecki's (2004) principle of complex systems, new media art 'specializes' and forges its place in, and contributions to the university's complex system of knowledge.

Finally, in the last stage that Kurenniemi calls 'consolidation', new computational practices are integrated into old genres as a continuum in the realm of computer art practices. At this stage in learning contexts, the exploration of the processes of the machine, its possibilities, and how it changes art is better grasped and articulated. The cycle of learning with/about any new given medium should end at (and start anew from) understanding of the new proposed affordances of the work produced, what the artist now knows of its creation. Whether it is information that is created, a sensory experience and/or a new machine, it must integrate into and adapt to everything else in the context it was created in and for. This can only be done through consultation and comparison, at all stages, with the findings of peers who have pondered on the same media and issues, taken different directions and found their own solutions, or similar solutions through other paths of inquiry. Learning in this way is iteratively individual and collective: it does not hinder the development of the individual, but it seeks to prevent individualization and the power of the logic of competition that split collective action. The new media art learner places what she knows and makes in a context that is broader than her individual mind and creativity—which is where I feel the present predominant discourses of new media art education are falling short. This can be exercised within the community of learning, in the program and in the university by discussing, proposing, testing and validating experiments with other disciplinary communities. The goal of this model is to train the learner to move iteratively from her own learning and making, to that of others, to see herself as an agent in the most immediate social system. Eventually, the artist is led to reflect on the potential contribution, reception, and impact of her action within the complexity of her surroundings. In some cases these may go beyond the human-social context, as is the case of bio-art practices.

The learning model that I drafted here is one that displaces the artist as the sole creator of her work, and that will displace the learner from the centre to place her in a system in which she must adapt to the changes and orientations of the group as a whole. Creativity and learning are thus propelled by the imperative to adapt and reorganize. For that, I conclude by saying,

new media art education needs to renounce, or at least begin to critically recognize its own acquired and inculcated schools of thought that manifest in its predominant discourses of new and of the individual roles of the artists. It needs to identify the ideological legacies and the institutional discourses underlying its pedagogies, which have been shaping the identity of future new media artists and artist-educators for the first thirty or so years of the field in higher education.

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