PERSPECTIVES ON ART EDUCATION

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Edited by Gerald Bast, *Rector*

CONVERSATIONS ACROSS CULTURES

PERSPECTIVES ON ART EDUCATION

Edited by
Ruth Mateus-Berr
Michaela Götsch

DE GRUYTER

BEST PRACTICE IN EDUCATION

Improving teacher training is an important step towards modernising schooling in Austria. Universities and teacher training colleges will develop curricula in cooperation. Teachers for compulsory and higher schools will work together.

The University of Applied Arts is playing a leading role in reforming arts education. The teachers at this institution emphasize both the artistic and personal development of students. The study Best Spirit: Best Practice exemplifies this approach.

An Austrian Centre for Didactics of the Arts has recently been established, which functions as a platform for institutions at several different educational levels, including elementary and primary education. These efforts show that the University of Applied Arts Vienna is seriously involved in improving teacher training in Austria.

Synergies between schools and school-related fields of practice are being created and promoted. In the last ten years the specialist field of didactics, for example, has been extended in Austria and connected with international discourse.

This International conference Perspectives on Art Education has been organized in collaboration with Teachers College, Columbia University in New York and the International Society for Education through Art is endorsed by INSEA. I am sure this conference will help to make the curricula we are developing and the practical initiatives we are undertaking much more global.

Reinhold Mitterlehner
Austrian Vice-Chancellor and Federal Minister of Science, Research and Economy

TOWARDS ART CENTERED SOCIETIES!

At the beginning of the 21st century, the social and political value system is undergoing a dramatic transformation.

In place of the needs of individuals, seemingly anonymous, abstract and depersonalized 'shareholder' values are at the center of economic and political processes. Educational institutions have been relegated to the role of supplier firms for the economy. Education has been redefined as vocational training, and the curriculum has been reduced to statistically measurable modules, in the service of creating employability rather than visions and ideas. Universities got used – or even are being forced – to focus on evaluation-figures instead of values and content.

What can we do?

The Arts must seek to play a central role in society once – again. Not instead of, but in addition to museums, galleries and opera houses. Not by refraining from artistic autonomy but by reading autonomy in a contemporary context of democratic societies. The key to implementing this lies – as is so often the case – in the education system. Isolated specialist knowledge alone is not a satisfactory basis for innovative strength. Rather we need flexibility, the ability to think and act in interdisciplinary way and in intercultural contexts, bridge different spheres of thinking, cross borders, question existing intellectual as well as behavioral habits, come up with new scenarios and produce amazement with the own work. This is the proper domain of the arts. Therefore interaction between arts, economy and technology systematically should be encouraged at all levels of our education system.

Art cannot change society. But art can change people; and people change societies.

Gerald Bast
President/University of Applied Arts Vienna

PRELIMINARY REMARKS

Research into teaching and learning studio art in higher education is among the core concerns of the program in art and art education at Teachers College, Columbia University. We are excited to collaborate with the University of Applied Arts in this endeavor. The symposium "Perspectives on Art Education" is a sequel to "Remixing Art Education", a symposium that took place in April 2014 in New York. The Viennese symposium continues to focus on the role of art schools, the relationship between studio art teaching and learning, and the implications of research for the dual identity of an artist-educator.

As a graduate program in art and art education we value strategic alliances and international exchanges to optimize resources and to maintain and expand the high quality of education that we strive to pursue. Neither research nor education nor art halts at national borders. This is why we strongly believe in the fundamental necessity for institutions at the intersection of art, education, and research to cooperate on an international level. We have much to learn from each other.

As a graduate school that pioneers innovative ways of teaching and learning art, we see such collaboration as an effective way to improve pedagogy in postsecondary education as well as a way to conduct, expand, and further revise our existing research into artistic development, instructional practices, curriculum design and implementation in visual arts education. Being involved in preparing students for teaching on the college level and concomitant research for many years, we see cultural, technological, and economical shifts reshuffling the learning landscape of art in higher education, which are being addressed in different forms by institutions and art schools worldwide. The Perspectives on Art Education symposium allows us to attend to these changes and challenges as we try to best prepare future students for the widening field of art education.

Teaching and learning – particularly in the arts – is fundamentally grounded in practice, and although purposeful and reflective, can be dynamic and messy. Our decision to make conversation the organizing principle for the symposium is deliberate. We decided that a conversational atmosphere guided by learning-sequences, student-panels, short presentations and concurrent break-out sessions rather than institutional-sounding keynotes would be more inclusive to a practitioner-audience and more likely to create a community of inquiry and curiosity. Feedback from the participants in the past seems to confirm our approach.

Art making, teaching, and learning are highly dynamic, adaptive processes, continually in need to respond to the challenges of the moment. Teaching rarely responds to situations in the same way twice, which is why education, not training, is the best form of preparation. Artists, teachers, and students need to engage in a practice that is reflective, imaginative, draws from a repertoire of knowledge, and can be reassessed each time. As we have learned from Maxine Greene, teaching is a form of becoming, not arriving; you are never there, yet. This is what makes conversation and exchange so crucial.

We are looking forward to another inspiring, successful symposium and accompanying exhibition in Vienna.

Judith M. Burton and Richard Jochum
Teachers College, Columbia University New York

ACT ALWAYS SO AS TO INCREASE THE NUMBER OF CHOICES

(Heinz von Foerster 1993, p. 25–49)

OPENING PERSPECTIVES AND BREAKING WITH THE QUEST FOR CERTAINTY

The Symposium Perspectives on Art Education aims to support and discuss national and international approaches towards education within artistic fields. Artistic languages develop and enable diverse forms of communication.
Austrian institutions with opposing objectives, traditions, habits and research experience are presently engaging with and implementing new curricula at secondary schools.

Ever since the founding of common schools, discussions of curriculum have focused on knowledge (cognitive skills) and the uses of knowledge of "real life". Nowadays skills have to be specified as "competences." A society that is more uncertain of its future than ever before is searching for stability and certainty by setting constraints (John Dewey 1929). But in the words of Maxine Greene (2000), "the ordering of knowledge, beliefs, and values that might be equated with curriculum has to be left open to the unexpected as society becomes increasingly technologized and the economy begins a shifting from the production of goods to the provision of services." Despite this trend curricula are being squeezed narrowed ever more tightly into modules.

The Arts are especially well placed to bring to curriculum inquiry visions of perspectives and untapped possibilities. Art deals with ambiguities, interrelationships and negotiations and facilitates transformations and the unexpected. As it enables us to see anew, an esthetic experience evokes engagement and requires conscious participation.

Art education overlaps with diverse cultural fields, such as history, sociology, philosophy, psychology, mathematics, languages, economy etc. It is believed that lasting change in European curricula for schools and universities can be achieved (and should be our aim). Educational connections, can be effected very easily within the curriculum in art and design. In this way promotion of cultural knowledge, creativity and intercultural understanding through education could be ensured.

Art education enables an interdisciplinary approach, interconnectedness and avoids standardization and "thoughtlessness" (Arendt).

Ruth Mateus-Berr
Chairwoman of the Senate/University of Applied Arts Vienna
Institute of Art Science and Education
Institute of Art & Society

WHAT SHOULD BE DONE

The past fifteen years or so have seen a wide range of points of intersection between art and pedagogy come into being marked by the catchphrase educational turn. On the one hand educational systems in Europe have been undergoing serious modification as a result of processes of regulation and standardization in the course of the Bologna Process. On the other hand, during this same period, education and pedagogical issues have been the subject of intense debate – at documenta 12, for example, situated at the intersection of art and theory, where the question was posed: "What should be done?"

This orientation towards pedagogy has been directly linked to criticism of the economization of education we have clearly been witnessing. A great number of self-organized forums have evolved both outside and inside institutions, that advocate education as a "site of a coming-together of the odd and unexpected" and of "shared curiosities, shared subjectivities, shared sufferings, and shared passions." All of which "congregate around the promise of a subject, an insight, a creative possibility"[1]. Ideally, education creates collectivities, "many fleeting collectivities", as Irit Rogoff puts it in her essay entitled "Turning", first published in 2010. Education, she says, "signals rich possibilities of coming together and participating in an arena not yet signaled"[2] and can thus release energies enabling us to progress "from what can be opposed to what can be imagined"[3].

On the other hand, politically driven developments in the field of institutionalized production of knowledge, especially over the past fifteen years, have taken place under the heavy sway of the dispositif of efficacy. As a result, open spaces that should foster development are being reduced and suppressed – the spaces that, considered holistically, are essential for increasing social awareness of what is and is not important, the urgent issues of today and tomorrow, and for society's very ability to deal with problems. These spaces can open up entirely new perspectives. Under constant pressure to conform, educational institutions such as art schools

wear themselves out struggling to keep on providing open, generous structures, that offer room for thought, for maneuver, action and freedom, and for the potentiality. That is a prerequisite for what Irit Rogoff understands as essential for structuring education for, with and through the Arts.

For Rogoff, potentiality "inhabits the realm of the possible without prescribing it as a plan." She considers one of the most interesting aspects of potentiality to be the fact "that it is as much the potential for not doing as it is for doing"[4]. She urges us to think of this potentiality as "being at the very centre of acts of thinking, making and doing"[5], as being at the heart of the academy, whose particular quality she sees not in the constant demands for substantiation, but rather in moments of speculation, moments in which the eye is open wide, moments of broadening, moments of experimentation, discovery and reflection.

However, quality of academies, of universities that specialize in the Arts, continues to manifest itself in a steadfast determination to provide and safeguard open spaces in which circumstances can be interpreted and learned from in unconventional ways; together with spaces that encourage bold steps and leave room for open-ended processes in which no one is expected to know in advance where thought and practice should go. The goal is to create within the study framework a space for learning and development that stimulates thought processes and work methods which are not automatically adapted to knowledge that has already been transmitted or to established practices without questioning them; and this means opening up spaces for thought and action that welcome difference and disagreement.

Of central importance therefore are not those learning processes that increase knowledge on the basis of set requisites for learning (schemata, frameworks, models), but rather learning processes that transform these basic requisites.

Art schools maintain spaces like art classes for example, that are consciously structured to ensure encounters and debates regularly take place. These are spaces in which individuals draw on personal experience to show and recognize themselves as distinct individuals, and in which meaning and value emerge through mutual exchanges – through the recognition and creation of relationships, interconnections and affinities within groups and networks. In these "provocative communities", experience and knowledge can be understood as forms of social relations[6].

We must do all we can to keep these spaces for learning and personal development, spaces for encounter and action alive and open. It would be worth taking time to discuss how each of us conceives of the notion of "a good way of living" and the vision that motivates each of us, in order to bring these into sharper focus and to give utopia some room.

Barbara Putz-Plecko
Vicepresident/University of Applied Arts Vienna

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2 Ibid.
3 Ibid.
4 Cf. Rogoff, I. "academy as potentiality". http://summit.kein.org/node/191, accessed March 22 2015. SUMMIT – non-aligned Initiatives in education, culture. SUMMIT is organized by Multitude e.V., in collaboration with Goldsmiths College, London University and Witte de With, Rotterdam. SUMMIT is funded by the Culture Foundation Germany.
5 Ibid.
6 Cf. Verwoert, J. 2007. "Frei sind wir schon. Was wir jetzt brauchen ist ein besseres Leben". *kunst lehren teaching art*. Frankfurt/Main, Städelschule.

FOR THE IDEA OF ARTISTIC RESEARCH– DRIVEN EDUCATION

The connection between the classroom and the space of research is a vital one. To nurture this connection it is essential we increase our understanding of how the different threads are intertwined. A classic connection is the one between research and education in the sense of research-driven education. This is an ideal and a sometime reality many people speak about and a few perform. What does it mean within the context of the Arts? Understanding an Art University as a site for both teaching research within the field of the Sciences and the Arts – as it is performed at the Angewandte – this adds an important connection to the field of academia: namely fundamental inquiry and curiosity-driven action in the form of artistic research. Many projects by students and researchers at the university may be understood in this sense.

By taking art as a fundamental approach not just to questioning existence but also to shaping it, this research is beginning earlier than in other institutional settings. If we view didactics within a specific discipline or field as a reflection of the way in which teaching can be adequately understood and developed, D'Art will jointly help to develop these ideas. It will also help us to understand how the field of artistic and scientific practise may develop, from practice to reflection, from reflection to the classroom and so on. The conference will help, research, the arts and society, and that our understanding and awareness of these connections will grow.

Alexander Damianisch
Support Art and Research (Head)
University of Applied Arts Vienna

Perspectives on Art Education
A Look inside

Ruth Mateus-Berr D'Art Project Leader
Michaela Götsch Assistance of D'Art Project Coordination

Teaching and learning art in tertiary education has experienced significant and challenging cultural, technological, societal and economic change. How will art education change in view of the shifting trends in youth culture and expectations in society? How should we educate artists, designers and architects so they can actualize imaginative, socially responsible and respect-guided meaningful art practice? What is the best way to engage in interdisciplinary collaboration and intellectual exchange?

This publication offers a range of perspectives on art education that address these changes. We invited artists, designers, architects, artist-teachers, educators and scientists to submit written papers that will enhance discussion at the symposium Perspectives on Art Education that will take place in Vienna from May 28–30, 2015. This publication contains a collection of the papers the participants proposed.

At the conference, participants will discuss the role of artists in contemporary society, propose new teaching and learning strategies and examine the diversity of art education across cultures and in different kinds of tertiary education institutions. The following guiding questions will function as the starting point for their contributions:

#1 THE ARTIST'S ROLE AS EDUCATOR
What is the role of artists, designers and architects in contemporary society and their extended role as educators?

#2 ARTIST-TEACHER IDENTITIES?
How can the roles and identities of artist, teacher and researcher be combined?

#3 RESEARCHERS OF ART, DESIGN & ARCHITECTURE: THEIR EDUCATIONAL ROLE
What is the role of researchers of art, design and architecture in contemporary society and their extended role as educators?

#4 PERSPECTIVES ON LEARNING ART, DESIGN and ARCHITECTURE
Are teaching and learning strategies in art, design and architecture education transferable to other cultural contexts (social, industrial, museums etc.)? Or vice versa?

#5 ARTIST-TEACHER SKILLS
What skills do art teachers in tertiary education need today?

#6 TRANSFERABLE SKILLS
What can art teachers working in tertiary level institutions learn from instructional strategies in secondary schools?

the role of the arts in the academy as a unique form of knowledge production. Her report of research models and collaborative projects emphasises the stimulating effect they can have on both interdisciplinary and cross-school relationships and collaborations.

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THE TWO CULTURES IN A MULTICULTURAL SOCIETY

Dirk HUYLEBROUCK
KULeuven. Faculty for Architecture

ABSTRACT

In 1959, In his lecture 'The Two Cultures,' C.P. Snow stated that western society is split into two cultures with sciences on one side and humanities on the other. Thus Mathematics, the purest of all sciences, and the Arts, the most liberal of all humanities studies, are at opposite extremes. The technological world today needs both, so how do we teach mathematics to artists? For mathematicians a short 'aha-erlebnis' suffices, but arts students need a more creative approach. Moreover, due to the extensive immigration to Western Europe, 'universal' mathematics often clashes with students' cultural backgrounds. In the US, courses on 'Black Mathematics' have been developed for the African-American community, but this is not the case in Western Europe. The author has written a book about 'multicultural mathematics', and teaches many topics it covers to his architecture students. He also has a theatre presentation called 'Africa + mathematics', that combines music and mathematics. The presentation will include some examples of interdisciplinary collaborations involving mathematics and art and will provide examples from the West and from Africa.

KEYWORDS

Mathematics, Art, Africa, Education.

Art education in a technology based context

In 1959, C. P. Snow presented a lecture called 'The Two Cultures' in which he stated that western society is split into two cultures with the sciences on one side and humanities on the other. Thus Mathematics, the purest of all sciences, and the arts, the most liberal of all the humanities, are at opposite extremes. Yet, a few centuries earlier, during the Renaissance and later, when craft and art were almost synonyms, carpenters assisted mathematicians making extraordinary mathematical models (intarsia, for instance). Moreover, painters were not afraid to get their inspiration from science. Somewhere in the 18th century the fields moved apart. Followers of Rousseau thought mathematical knowledge polluted artists' minds and personalities. Admittedly, many artists still look down on mathematics and the sciences and perhaps this attitude is reciprocated in the way Snow suggests.

However, in the 20th century science, technology and mathematics are increasingly important, and our technological world needs both mathematics and art. Society needs designers interested in developments in science and they play an essential part and we need to get mathematicians doing art and come down from their ivory tower. Mathematics should be taught to artists, like it or not, and art should be taught to scientists (just imagine a successful Science initiative called 'Dance your PhD'), but that is another topic.

Fortunately, the computer has come to the rescue of mathematicians since it enables them to express themselves creatively without the help of intermediary craftsmen or tools. However, mathematicians are not artists and these technological improvements do not guarantee the emergence of mathematical art. 'Artistic mathematicians' often produce nothing more than embellished mathematical results - kitschy attempts at art. On the other hand, computer developments make mathematics more accessible to everyone since formulae and equations are no longer necessary. In the past the development of mathematical art was hindered by a lack of mathematical knowledge, but this is no longer an excuse for avoiding it. Of course, one could ask how many hard formulas do artists need to grasp in order to get fully involved in pure sciences and avoid 'baby math'? As I am not an artist I am not entitled to give examples of kitsch math 'art', but 'Boundaries of infinity' (2012), an artwork erected in the Belgian town of De Panne (Huylebrouck 2014) exemplifies the lack of care some artists take with mathematics. The artist wanted to create a 'tribute' to the Fibonacci series, by adding 1 + 1 = 2, 1 + 2 = 3, 2 + 3 = 5, ..., but when he reached 1597 and 2584, he added them up as 4541, whereas the figure should have been 4181 (see Figure 1).

So, how do we bridge the gap between mathematics and art so that mathematical art become equally well established as biological and kinetic art (Koen Vanmechelen, Wim Delvoye Theo Janssen)? It should be easier to establish since some people consider mathematics the supreme art form because of the freedom it enjoys from material limitations (It is an art form with the 'collateral advantage' of having many real life applications). However, teaching mathematics to artists should differ. For mathematicians a short 'aha-erlebnis' at the end of a course suffices to guarantee student interest, but art students need a more creative approach (Huylebrouck et al. 2012; Szilágyi, 2015).

Figure 1. Fibonacci artwork in De Panne, Belgium
Source: Dirk Huylebrouck

Examples of interdisciplinary math and art

I have been teaching a math-art course for several years at the Faculty for Architecture, KULeuven, in Belgium. The math-art course was independent of the structural and technical math lectures. Students were asked to make an artwork, performance, movie, or whatever came to mind, with the only condition that it needed to have some mathematical inspiration. Thus, for once it was a mathematical finding, not a landscape that inspired artworks, novels, and/or romantic experiences. The students were Internet savvy enough to be able make their own mathematical-art discoveries. Creative people often don't like to follow given examples, they prefer to propose their own ideas and create something freely – very understandably, as they are artists, not technicians nor craftsmen. I taught this kind of art-math design studio jointly with an artist, Wouter Cox, who stressed originality and creativity. On the other hand, as a mathematician I tried to emphasize mathematical correctness and level.

The use of mathematics in art and vice versa undoubtedly involves intellectual exchange, but there are well-trodden paths such as the golden section, Fibonacci series, fractals, chaos, and catastrophe theory. The first is a slippery topic despite what many art books affirm, it is not present in the art of ancient Greece, or

in Da Vinci's paintings, and Le Corbusier wasn't even aware of the (in) famous number at the beginning of his career. There are 'overstatements' and 'extravagant' examples in Mathematical art also. Student Thomas Luyten illustrated this by enhancing an ordinary Flemish villa using the golden number and a spiral. Scientifically the drawing is meaningless, but this fake picture is an understood as a provocative statement in architectural circles (see Figure 2a). Yet, minus the pseudo-scientific mumbo-jumbo, the golden section remains an inspiring mathematical topic. Students Marijn Proot and Pieter Rolies constructed a golden section dodecahedron lamp creating an environment reminiscent of the lamplight in Salvador Dali's 'Last Supper' which is projected onto one wall of the room (see Figure 2b). Jason Slabbynck creatively combined two snub dodecahedron Fuller domes, one rotating inside the other at a very small distance, producing the well-known Moiré effect (see Figure 2c).

Figure 2. A Flemish villa 'enhanced' through an artistic abuse of the golden section; a dodecahedron creating a Salvator Dali Last Supper environment; a Fuller-Moiré light device
Source: Dirk Huylebrouck

In our current technological society artists can create meaningful art practice by adding value to scientific topics, and it is useful to refer to this during their education. Akio Hizume (Japan) made some wonderful polyhedrons using intersecting parallel bars, but did not solve the problem of how to visualize the resulting intersection. Students Ngo Ba Dat and Ruben Rammelaere solved this using glass bars to transport the light from a source at their extremity, so that the intersection became visible in the dark (see Figure 3a). Students Annelore Vercouter and Leila Lavens realized Plato's 'allegory of the cave' using laser light: a laser drawing of a theorem is invisible though the theorem is present, but the mathematical idea only becomes visible through the human intervention of a smoke machine (see Figure 3b). A popular Youtube movie shows the gravity-defying fall of a slinky through a slow motion camera but Shana Chaerel, a student of interior architecture, made the process visible to the naked eye using a glycerin liquid. (see Figure 3c)

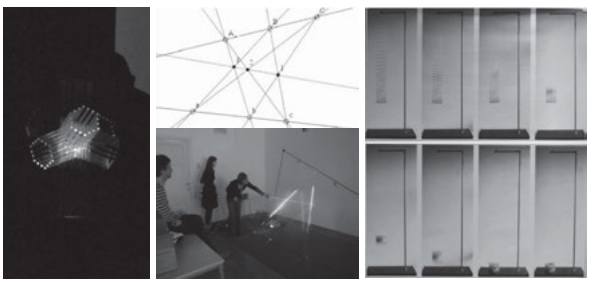

Figure 3. Intersecting glass bars are visible in the dark; Pappus' theorem in laser light; a gravity defying slinky
Source: Dirk Huylebrouck

Socially responsible math and art

Mathematical art can have added social value. In Flemish lace, for instance, patterns are made using fine threads, while in Turkish teahouses geometric tiling decorates the walls. Mathematics unites both these cultures using the same rules for symmetry in pattern, as shown in a work by students Lotte Mattelaer and Sofie Warnants (see Figure 4). Another idea referenced a popular toy constructed from a set of small plastic disks with lateral openings into which other disks can be inserted, perpendicularly. This lead to some ingenious structures that resemble desert roses. Architecture student Yasmine Okutan added an intercultural touch by replacing the circles with polygons and heptagons, which play a special role in Islam (see Figure 5).

Mathematical art is an emerging field in professional art circles. A rare example is 'Vermessen' (2009) by Ruth Mateus-Berr at the University of Applied Arts. She refers to the pseudo-mathematical justification for racism used in social Darwinism by Nazi Germany. One of her works is a photograph showing a human face behind a chart for converting colors to numbers (see Figure 6a). Thus, one can decide on the value to determine if someone is called black or white. Barack Obama, who is 50% black and 50% white, is invariably called the first 'black president', but is he black enough according to Mateus-Berr's scale? Note that Mateus-Berr's statement is certainly not outdated: Nazi type justifications for racism can be found in a book by a certain D. Néroman, re-edited in 1983 (see Figure 6b; Néroman 1983). He asserted that ideal human bodies are subdivided by the navel following the rules of the proportion in the golden section. According to his logic the distance from the navel to the feet of a person who is 1m618 tall is exactly 1m. When this is not the case the person belongs to an 'inferior race' (sic!). And many exhibitions still refer to the alleged aesthetic criterion of the golden proportion, for example at the Vienna Technical Museum (Technisches Museum Wien) or in the Mathematikum in Gießen Germany (see Figure 6c).

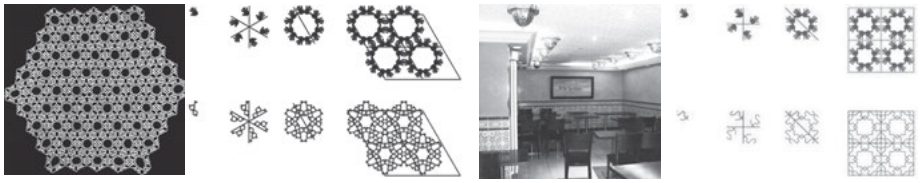

Figure 4. Flemish or Turkish patterns both obey the rules of mathematics
Source: Dirk Huylebrouck

Figure 5. Creative playing with penta-, hexa- and heptagons yields mathematical desert roses
Source: Dirk Huylebrouck

African math art

This brings us to another topic, emigration from Africa to Western Europe. Whenever artists want to address this in a positive way, they invariably use music or the fine arts and never include science or mathematics. Thus, they unintentionally 'comfort' those who pretend that Africans operate at a different intellectual level from the West. There are courses in 'Black Mathematics' in the US. African-American contributions to society are emphasized in every field, including mathematics and African-American artists such as John Sims are not afraid to use it (see Figure 7a). I am surprised that European artists do not assume this social responsibility. Also, math and art with a social impact would surely appeal to youth culture. John Sims does this, for example through using a rap song. The author created a theatre show called 'Africa + mathematics', that combined music and mathematics. The audience enthusiastically clapped the mathematical patterns in sound, perhaps because the musicians, although they are academics, are well known and appear on popular music TV-shows (see Figure 7b).

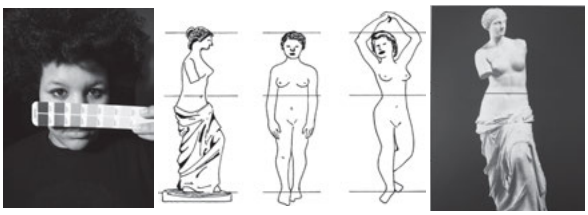

Figure 6. Measuring humans, by artist Ruth Mateus-Berr (2010; source: Ruth Mateus-Berr); Neroman's comparison of a Greek, an African and Jewish woman; an illustration from the Gießen Mathematikum

Let us conclude with one more example, of the so-called 'naïve' painting of Central-Africa (Huylebrouck 2005). It does not follow the usual rules of perspective in that a chair, for example, has only two legs. Yet, the African representation is correct in that it corresponds

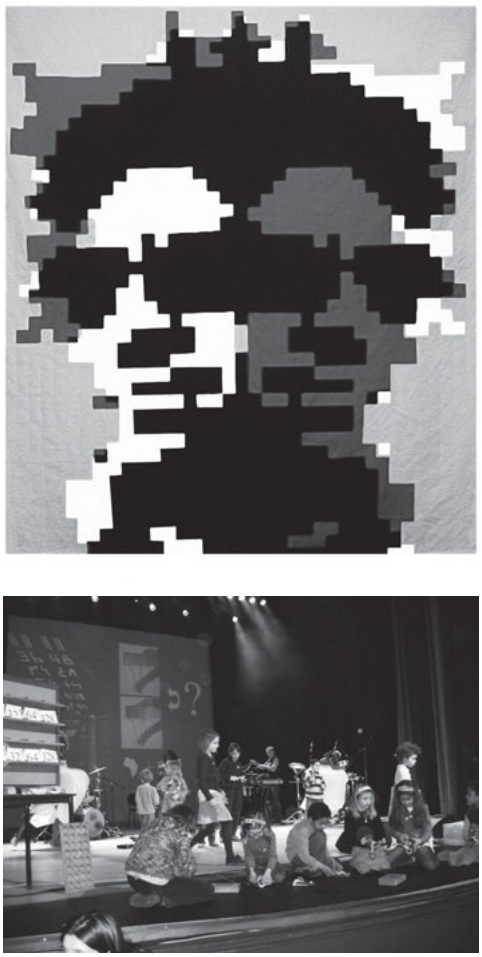

Figure 7. Poster of a John Sims math art exhibition (2015; source: John Sims); a scene from the author's theatre show 'Africa + mathematics'

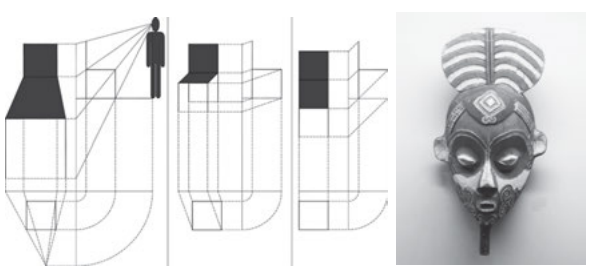

Figure 8. Western perspective, the parallel (cavalier or cabinet) projection and an African representation. The mask has to be observed frontally (source: Africa Museum Tervuren Belgium)

to a parallel projection obtained by looking straight onto an object, under a downward angle of 45° with the horizontal (see Figure 8a). Masks were designed so as be observed frontally, from the same angle also (see Figure 8b). The unconsciously trained Western eye may think the representation is erroneous and ridicule it, but this is yet another prejudice - a mathematical art prejudice.

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OP-TILES AND INTERDISCIPLINARITY

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ABSTRACT

The context for this project, which set out to improve mathematical knowledge through visual arts, was a Viennese secondary school. We used the theme labyrinths, Greek myths and pattern to help students transfer visual knowledge to mathematics. Using reflection and a playful child-centered instructional approach, students studied labyrinth designs on ancient coins exhibited at the palace of Minos, Knossos, and created Op-Art styles and designs. We helped them to connect learning in arts and math and improve their understanding of the role of creative hands-on activity in solving problems in the real world. The key design concepts were 'symbol', 'pattern' and 'symmetry'.
The hypothesis underpinning the experiment was that integrating mathematics into art teaching facilitates mathematical learning, because the arts have the potential to recapture the wonder and curiosity of learning.

KEYWORDS

Art, Math, Education, Labyrinth, Op-Tiles.

Introduction

We want to see the relationship of the academy to secondary schooling develop and grow. Connections between school subjects are not evident to many students and this is one of the main problems with the school curriculum today.

This context for the classroom case study reported in this paper was a collaborative research project funded by the European Council (TEMPUS) that set out to improve mathematics education in secondary schools through visual arts and playful activities (Mateus-Berr et. al 2014 a,b). Professors at the University of Niš and University of Applied Arts in Vienna modified an interdisciplinary course called Pattern and Symmetry to fit secondary school level 4. The case study research, conducted at Bertha von Suttner School in Vienna, enquired into obstacles to integrating disciplines. A math professor introduced twenty-five school children (20 girls and 5 boys) from diverse cultural backgrounds to the theme of pattern in a lecture in English that was simultaneously translated by an art professor and teacher. The topic was labyrinths and methods of constructing them and, in particular, a form of tiling called Op-tiles. (Labyrinth is a common curriculum theme in fourth grade Art in secondary schools in Austria.) The children also learned about the 20th century art style Op-Art.

Following theoretical input on math and cultural history, the students were asked to design labyrinths and Op-tiles. Their solutions were very creative. They produced novel designs and combinations and understood some correlations between math and art.

1. The Power of Learning through Art and Design

Many reformers have advocated using art and design to integrate subjects or disciplines. Using 'Big Ideas' to capture students' interest, together with a holistic approach, is the way artists' develop concepts linked to important human issues that are characterized by complexity, ambiguity, contradiction and multiplicity (Walker 1996, Suraco 2006). Stacey Salazar (2013, p. 66) summarized characteristics of creative thinkers as follows:

> *Teachers and researchers in K-12 art education have articulated the dispositions of creative thinkers: taking risks, being passionate, having self-discipline, being open and flexible, and understanding multiple points of view, the conditions conducive to developing artistic dispositions in learners, such as exploration, play, and dialogue; and, the ways in which engaging students with visual culture and contemporary art may enhance student creativity and cognition.*

Before we talk about art and design as a foundation subject, we will report on our research into curriculum models and interdisciplinarity.

According to Sloan (2006, p. 6) the so-called A+ Schools model in the USA combines "interdisciplinary teaching and daily arts instruction and offers children opportunities to learn in all the ways they are able" (Sloan 2009, p. 1).

We found Suraco's template very useful for distinguishing between different models (2006, p. 6). Most school curricula in the USA are Discipline-Based. In this curriculum model school subjects are taught in separate time blocks throughout the school day and there is no attempt at integration or to explain relationships between them (Suraco 2006, p. 7; Mallery 1999).

Multidisciplinary or Cross-Disciplinary studies combine disciplines. In this case, teachers meet initially to select a theme and modify their lesson content accordingly. Joint planning time is scheduled for curriculum decision-making and outlining lesson content (Suraco 2006, p. 7; Erickson 1998; Jacobs 1989, 2005; NAEA 2005).

Unfortunately, interdisciplinary curricula are rare in schools nowadays. Where they do occur, curriculum units are scheduled accordingly and planned so as to ensure mutual understanding (Mallery 2000; Jacobs 1989, 2005). Interdisciplinary programs may range from a single lesson connecting two or more disciplines, to an interdisciplinary curriculum unit, a school-wide project involving many classes, students and teachers, to an entire curricular framework (NAEA 2002). For the great educational theorist John Dewey (1938, p. 42) aesthetic experience was the basis around which all education should revolve.

Bresler (1997) pointed out that the educational climate in North America used to be embedded in a larger philosophical and political context in the 1990s and this was conducive to interdisciplinary programs. Art and design was viewed as a core subject. Interestingly, these arguments have re-emerged at a time when the arts are seen as endangered. A bulletin entitled "A Vision for Arts Education" (Salo 1993), advocated interdisciplinarity as a way of enhancing meaning in other disciplines. Salo wrote that,

> *The Arts can be taught in an interdisciplinary manner as part of the broader curriculum and can make immense contributions to the teaching of other disciplines. No one can fully understand the Baroque period, for example, without being familiar with the arts [of that period] . . . Similarly, knowledge of the arts is indispensable to understanding the rise of nationalism in Europe in the 19th century or the Harlem renaissance in the 1920s" (Ibid., 1997).*

The Arts in Education (AiE) approach utilizes the arts (and practices and cultural traditions related to the arts) as a medium for teaching general curriculum subjects and as a way to deepen understanding of them (UNESCO 2006, p. 8).

In the Integrated or Infusion Model, two or more teachers create common objectives based around a single theme. According to Suraco (2006, p. 7) this is a hybrid form of integration in which each subject is equal. It requires a great deal of collaboration from teachers.

In the Parallel Disciplines model teachers collaborate and sequence lessons so that topics in two related disciplines are taught within the same time frame. The content is not restructured so it is the student's responsibility to establish relationships and make connections between the disciplines (Erickson 1998, Mallery 2000, Jacobs 1989, 2005, NAEA 2005).

Some people believe interdisciplinary curricula enable students to generate new insights and synthesize relationships among ideas. In the case study we attempted to combine visual art and math classes using Interdisciplinary and Integrated Lessons.

The platonic-conceptions of math understands it as value-free, but according to Brian (1988, p. 209-214) this is a value-laden conception that deflects attention away from the many links between math and society.

Recent studies suggest that interdisciplinary approaches that prioritise Science, Technology, Engineering and Mathematics (STEM) rely on students' own estimations of their competence interrelating these subjects (Jansen et al 2014, p. 43-49). As a formal school subject art and design has empowered education with innovative ideas (see for example outputs from the EU TEMPUS project in math and arts [2014]). At the present time, governments and policymakers in many parts of the world operate a business model of education and prioritise successful outcomes in STEM subjects. According to Boo-Yun (2014) these subjects are overrated. In the USA also, elementary and secondary education has increasingly become homogenized and diminished by a business-style, high-stakes accountability model and, in this scenario, visual art classes are reduced to henchmen (Suraco 2006, p. 9). According to Stokrocki (2005) the Discipline-Based Art Education model in the USA has been superseded.

The focus of the case study reported in this paper was an interdisciplinary arts education course. Art was combined with math and 25 children used sensory hands-on experience (drawing, pattern making and ornamentation) to conceptualize mathematical concepts. They collaborated on designing labyrinths at the start, after which they designed Op-Art posters individually.

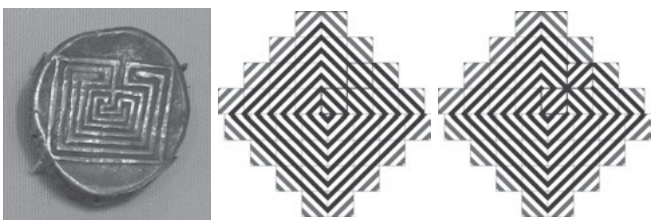


Figure 1, 2 & 3. (left to right)
(1) A silver coin from Knossos, 400 BC
Image Source: „AlMare" Wikipedia Commons
(2) a meander composed from Op-tiles;
Source: Ljiljana Radovic
(3) the meander transformed into a labyrinth.
Source: Ljiljana Radovic

2. Using Op-tiles to design labyrinths and modular patterns

Labyrinth is a good topic for interdisciplinary lessons with multicultural student populations. It is inherently connected to the school subjects of history, math, art, literature, mythology and religion and has historical roots in many cultures.

The word 'labyrinth' comes from the Lydian word 'labrys' (the Latin word 'labris'), meaning a two-sided axe and refers to a motif that appears in ornamentation at the Palace of Minos at Knossos. The famous Greek myth about Theseus, Ariadne and the Minotaur is associated with the labyrinth. Labyrinth motifs are found in many ancient cultures. Visual representations of labyrinths are of interest to mathematicians and art historians.

The Cretan labyrinth in Figure 1 appears on a sil-

ver coin at Knossos. The most elegant way to create the labyrinth shown in Figure 1 is to draw a meander in black (see Figure 2), remove the two marked square tiles, rotate each of them 90 degrees and replace them into the labyrinth pattern (Figure 3). Even very complex mazes can be constructed this way (Jablan 2002, p. 292).

This approach to constructing a labyrinth inspired us to get school children to design posters and T-shirts. According to Jablan & Radovic (2014, p. 16) a pattern is "a discernible regularity in the world or in a man-created design, where the elements of pattern repeat in some predictable manner". Patterns usually originate from symmetry. The periodic repetition of a single element (e.g. a tile) results in an ornament. According to Massarwe et al. (2011) ornaments are culturally valuable geometric patterns composed of basic units repeated in various combinations. Artists and artisans from different cultures and times have used repetition and combinations of motifs to create decorative patterns. Whereas visual symbols and other kinds of visual statement may encode or encapsulate meaning beyond what is obvious to cultural outsiders, people with knowledge of the relevant structures can pick up these cultural messages (Hann 2013, p. 300-301). Curiosity and a desire to understand or decode meanings motivated the schoolchildren in this case study to engage with this topic.

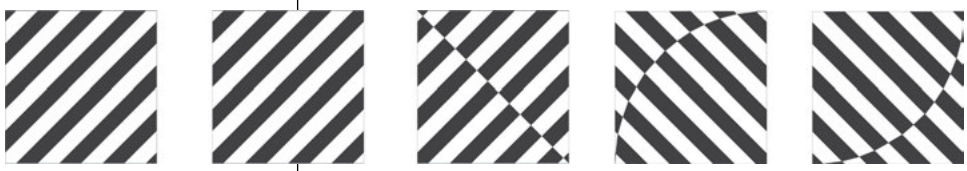
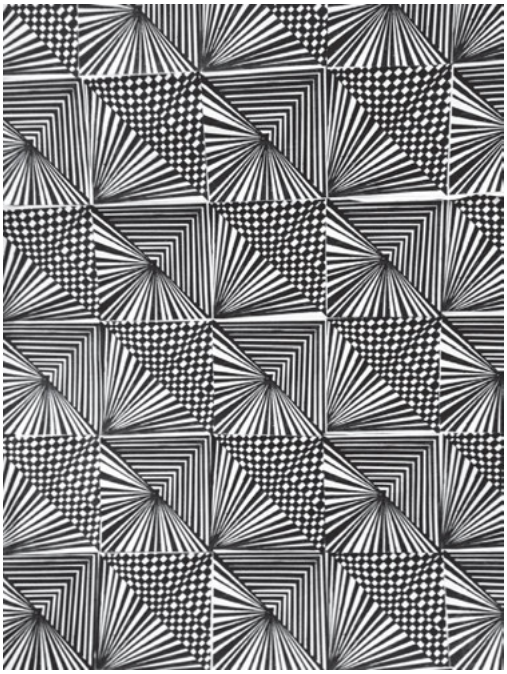


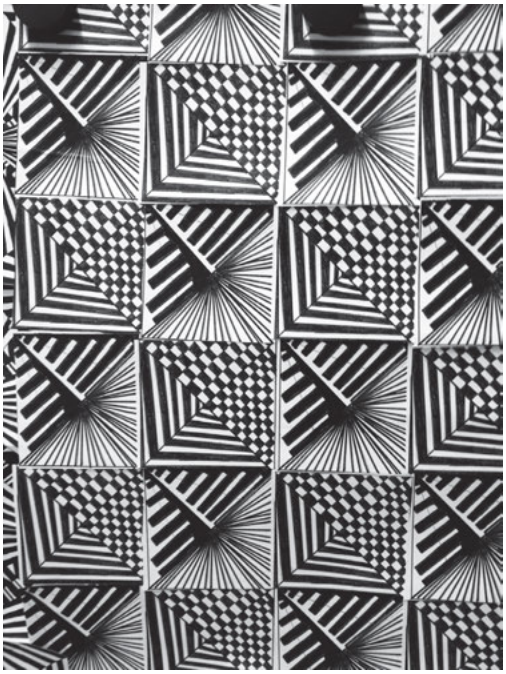
Figure 4. A set of 5 Op-tiles.

We applied the principle of modularity to constructing ornament. In art modularity occurs when several basic modules are combined to create large numbers of diverse modular structures (Jablan 2002, p. 268). Scientists are always searching for the basic building blocks of nature – in physics, chemistry, biology, and other sciences. In various mathematical fields the ability to recognize sets of basic elements and rules for the derivation of different structures are important. Various materials are used to create modular structures; for example, bricks in architecture.

One of the simplest modules in the history of ornamental art is the Truchet tile; a square divided by a diagonal into two black and white triangles (Jablan 2002, p. 289). An Op-tile is a square (or rectangle) with a set of parallel black and white diagonal stripes (Jablan & Radovic 2011, p 1046-1048). Slavik Jablan created an Op-tile set consisting of five elements, including the two curvilinear ones shown in Figure 4 (Jablan & Radovic 2014, p. 17). From these tiles it is possible to construct an infinite number of black and white patterns of the kind used in the twentieth century art form known as Op-Art. Op-tile patterns produce powerful visual effects that flicker and dazzle, thanks to the ambiguity that results from the congruence between their black and white parts. Op-Art used these kinds of visual effects abundantly.

Figures 8, 9 & 10. (left to right) (1) T-shirt Pauline Strasser, (2) T-Shirt design referring to her Ethiopian roots by Lydia Teshome, (3) Ines Belhaj, Valerie Neubauer, Anna Schwarzenberger, Elza Schäfer designing the recreation room. Image source: Ruth Mateus-Berr





Figures 5, 6 & 7. (left to right) Op-tiles by Anna Schwarzenberger, Sabrina Szukits and Ines Belhai: Class 4A Bertha von Suttner school Vienna.
Image source: Ruth Mateus-Berr

These ideas about modularity and pattern recognition can be adapted to suit students studying a range of subjects through elementary and secondary school and up to college and university (Jablan & Radovic 2014, p. 16-26).

Conclusion

The students' reflections on the lessons in their diaries revealed that they found the project fun and were pleased with their work. Dewey's "internal conditions" (1938, p. 42) were touched by this experience and it aroused curiosity, strengthened initiative and self-estimation. The students were able to see and make connections between art and math, perceive geometric patterns and understand their meanings and applications. They concentrated very hard on the math professor's lecture and were astonished they could follow the English. Whereas they liked working in groups making "funny labyrinths" and reconstructing the palace of Knossos, the follow up Op-Art activity was their favourite. No single pattern from a total of 25 was the same. They worked independently designing two tiles that were all completely different. After drawing two designs for patterns, the children were motivated to combine and expand them on a huge scale. The lessons inspired them to design T-Shirts with Op-tiles, and decorate recreation, break rooms in the school and their classroom. One student said she was impressed by their ability to imagine a complete design after working on only two different pattern-units. As the project is still in progress, the final results cannot be presented at the conference.

Over the past few years we have implemented many Op-tile workshops with teachers and students from different age groups, cultures and educational levels. They have always successfully integrated Maths and Art. However, it is important now to undertake longer-term studies of the consequences of integrating math in art classes.

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SCENES FROM AN ART SCHOOL: FOUR PEDAGOGICAL PRACTICES

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ABSTRACT

The author presents four pedagogical practices found in first year college studio art classes – orchestrating the physical space, structuring the creative process, initiating dialogue, and modelling ways of being an artist and citizen of the world – that emerged from recent research conducted at two art colleges in the United States. Using vignettes collected in diverse studio settings, the author illustrates a variety of ways professors at these colleges enacted these practices. In so doing, the author suggests that pedagogical practices in post-secondary studio art classes may be more effective when they are explicit rather than tacit.

KEYWORDS

Pedagogy, College, Studio Art.

Introduction

A review of literature revealed little research about teaching and learning in college studio art classrooms (McKenna 2011; Salazar 2013a, Salazar 2014). Moreover, most research into college-level instruction relies on what teachers say they do, rather than on actual observation of teacher practice (McKenna 2011). To address these gaps in the literature and better understand the kinds of teaching and learning that take place in studio foundation classes, qualitative research was conducted in 2010 at the School of Visual Arts in New York City and at the Maryland Institute College of Art in Baltimore, Maryland (McKenna 2011; Salazar, 2013a; Salazar, 2014). Data analysis of field notes, observations, and interviews suggested four categories of pedagogical practice — structuring the creative process, facilitating dialogue, orchestrating the physical space, and modeling being an artist and adult.

Introduction

Orchestrating the physical space

Orchestrating the physical space refers to ways in which faculty purposefully or intuitively arrange the physical environment during a studio class session.

Before his drawing class arrives, Louis places the chairs in a circle in the middle of the studio, just as he does for the beginning of every week's session. The first ninety minutes of every class meeting take place here. Louis sits with the students in the circle as they discuss experiences and share ideas. Later, Louis explains his reasons for creating the circle:

> *It's … the community that I'm wanting to build because [the students are] going to spend a year together in that room. And I want them to feel confident that … if another student says something that is really silly or makes a comment … I don't want them to be afraid of that. I want them to understand that this is a protected environment in which they're supposed to learn.*

After the discussion circle concludes, Louis' students assemble in front of a long wall for a group critique of everyone's drawings in-progress. Students cluster around the work under discussion and Louis stands next to it, in front of them – he is often the only one standing and always the primary discussant. In orchestrating the space in these two ways, Louis shifts the dynamic from a less hierarchical teacher-student structure in which students are encouraged to speak one with another, to a more traditional authoritarian one in which the conversation is between professor and student-artist while other class members look on.

In a different studio classroom, a very large table dominates the space around which class members sit or lean, after displaying their artworks on the two surrounding walls. Standing, or perhaps more accurately 'hanging out' at the head of the table, the professor, Ryan, reviews course plans and due dates. Then the class begin the critique process. Ryan and the students gather around one artwork at a time to discuss it. Ryan prompts each student-artist to stand next to

his/her artwork in front of the assembled group, while he stands amongst the students like a member of the audience. Ryan does this, he says, because it "levels the relationship," (hopefully) making his opinion and presence, more equal to that of the students.

Structuring the creative process

The six instructors in this study structure the creative process over the course of the studio sessions. That is to say they set parameters for how and when students will undertake steps in the creative process. The study identified three methods of structuring the creative process: learning by doing, crafting learning experiences and crafting a creative milieu.

Learning By Doing

All the teachers had the students engage with skills they wanted them to learn – such as mixing color, making and reflecting on drawn marks, and experiencing qualities of power tools. This was the case even in a studio course in which students did not make any work in class but engaged in dialogue about art ideas and processes. In this instance the professor identified skills in interpersonal conversation as a primary learning objectives. In addition to acquiring proficiency in skills, professors identified perseverance, developing a work ethic, paying attention or careful observation, and being "present in the moment", as hoped for outcomes of learning-by-doing.

Crafting Learning Experiences

Crafting learning experiences may be thought of in terms of the constraints or parameters, an instructor establishes. They were evident in steps or processes professors prompted students to take in order to accomplish a given assignment. They usually described the intention behind setting parameters as nurturing an appreciation for "the process," "the journey," or "the moment." One drawing professor structured a call-and-response drawing process in which he called out a prompt such as "use the side of your charcoal to make a mark from one end of your paper to the other" and allowed students only a few moments to enact a drawn response. In so doing, he hoped to "get them to focus on the notion of time, and how to spend time when working, as opposed to … [a] 'hurry-up and get there' [attitude]. By forcing them to slow down having this call-and-response action, [students] change their sense of time …"

Another professor who was teaching an interdisciplinary contemporary art course said:

> *This [class] assignment [is] – the first time they're working collaboratively – and they're supposed to perform what they wrote down as their ritual: personal rituals and the objects with them. They're in five groups of four, and they had a week to work on it … some of them are excited, some are scared to death.*

The sculpture professor described how he structured the creative process for a project involving joining pieces of wood this way:

> *Sketch it, the first step into reality. And then that sketch, [they wonder] is that really what I wanted? … Then what usually happens is I say to them, "I want measurements" so then they have to start deconstructing their idea. They have to see their idea in its concept, and then start breaking it apart. I believe it's a new way of thinking for the students … they're going to have to start thinking forwards and backwards. Then they'll go to the machine to cut it, and the machine's going to be whistling and high pitched. So it's, like, "the machine doesn't want to do that!" How are you going to get around that problem? And then we have to sit there and figure it out. So they have to really start paying attention to their environment … They've done everything they're supposed to do, but the reality of the material stops them. Now what are you going to do? Then that sketch and all that has gone before is gone. And then they have exactly what's in front of them … But all of that was necessary to come to this moment.*

Crafting A Creative Milieu

The professors valued different kinds of learning environments or milieu. Both the painting professors participating in the study expressed a preference for a studio in which students steadily make work, while the others sought to create a classroom milieu in which students felt safe, empowered and able to take risks. The drawing professor, for example, described a strategy he used to improve the technical aspects of a work in progress that was intended to increase the student's understanding and give her a sense of agency:

> *By using the eraser on her charcoal [drawing], and not … graphite, I'm making marks that are imminently changeable, correctable, so it won't interfere with [her] drawing and, later on, she'll be able to get rid of [my marks] to make sure it is her drawing in the end.*

The sculpture professor structured a creative process that incorporated chance obstacles and he exuded a playful, teasing demeanor so as to create a lively environment – a milieu, which he believed was conducive to students taking creative risks. "For me," he said, "safe is chaos. I come from [a home with] nine brothers and sisters; the house was always kind of nutty. I like a place where [students] can be free enough to do anything."

Initiating dialogue

The data suggested four ways in which instructors engage students in dialogue: through questioning strategies, one-on-one conversations, metaphorical anecdotes, and using warm tone and language. Five professors asked open-ended questions of students that generated oral responses. These open-ended and sometimes rhetorical questions were seemingly intended to deepen students' thinking or provide them with opportunities to practice articulating ideas. For example, during a class critique, the sculpture professor simply asked, "What constructive criticism can we give her?" A painting professor, standing over a student's work-in-progress, wondered aloud, "So, you feel like the shadows should be darkened?" And, when initiating a conversation about a work-in-progress, a drawing professor asked a student-artist, "What did you discover?"

All the teachers in this study engaged in one-on-one conversations with students, either while students were working or when students sought instructors out with a question or problem. Most conversations were about the studio subject matter at hand. Some instructors made a point of speaking with every student individually at least once during every class. For instance, one drawing and two painting professors kept a log of students they had spoken with to ensure they talked to them all during a five-hour session. This was not always easy. For one painting professor, the commitment to speak with every student necessitated walking between three campus buildings as the students undertook on-location observational paintings in settings of their own choosing.

A few faculty members told stories or jokes with metaphorical content: for example they suggested that getting to know materials is like dating, dedication to art making is like disciplining oneself to exercise every day, and appreciating diverse artworks resembles a relationship with Brussels sprouts. When I asked the sculpture professor to explain the Brussels sprouts story he shared with students during a critique, he told me kinds of stories deepen students understanding:

> *I can talk about Brussels sprouts … freshly prepared Brussels sprouts versus frozen Brussels sprouts. And, I talk about preparing them, and, you know, you can see the students thinking about cooking. Then I share with them the fact that I don't like Brussels sprouts prepared either way, but I can tell the difference between properly or well prepared Brussels sprouts and ones poorly prepared … and that, therefore, this notion of quality is not contingent upon taste, or personal like or dislike.*

I observed all six professors speaking to students informally in warm, friendly voices. The literature about college level instruction has identified this as characteristic of the 'best' college teachers (Bain 2001). Though some professors were verbose in class discussion and others were more reserved, they all maintained a positive tone of voice, even when they suggested improvements to students. The sculpture professor explained that the playful and exaggerated tone he sometimes used when giving instructions was intended to create a safe space for learning:

> *I sing, I dance, I do salsa, I talk Spanish to them. I want them to feel that this is a place where they can go anywhere they want. [I have] very natural tricks … inherent to my personality.*

Modelling ways of being an artist and citizen of the world

Through sharing stories of their professional and personal lives, studio professors modeled what it is like to be an artist and adult in the world. Speaking to his students, a drawing professor said:

> *I feel much more excited about the work I'm doing now, than I did ten years ago … it's more interesting. It's certainly more connected to what I have always wanted to do in terms of how all the elements in my life are working in my work … If I make a better piece now than I did three months ago, then that's good. The latest piece always is the best. But it doesn't necessarily retain that position.*

Another drawing professor let his students know that he was "a little bit older" and "a little bit more experienced in some ways," but "still doing the same thing" as the students. He said, "we have the same insecurities" but "we're still trying [and] that doesn't end."

In elaborating on why he visited nearby galleries and shared images of the works with his students, the sculpture professor said:

> *[By showing my students work by contemporary artists] I say, "hey, this artist is out there, this person is doing it … they're having a career! It's possible, guys. It's not just in books. It's not just in slides. But these people actually do it!"… I want it to be very real for [my students]. It doesn't happen to the 'other.' It happens right here.*

Conclusion

The four categories of pedagogical practice described in this essay – orchestrating the physical space, structuring the creative process, initiating dialogue, and modeling ways of being an artist and citizen of the world – emerged from studying practices these professors implemented intuitively. Prior to engaging in the study, most of them had neither consciously defined these practices nor considered the potential outcomes. At the conclusion of the research, several professors remarked that articulating their practices – what they did and why – was empowering. As one professor said, "I realize there is a method to my madness!"

I propose therefore, that encouraging professors to move from teaching intuitively to teaching intentionally enriches art teaching and learning. Awareness of pedagogical practices empowers professors to reflect on their teaching, modify or augment it and share their methods with others. In addition, describing one's own pedagogical practices – possibly using the four categories identified in this paper – may provide the missing vocabulary and language with which to articulate learning and learning outcomes. The assumption here is that professors who can talk about what they do in the studio will do a better job of engaging with and explicating learning outcomes and levels of achievement. Articulating tacit practice would enhance the ability of programs and institutions in post-secondary studio art to evaluate the degree to which deliver education that is valuable and worthwhile.

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The article discusses our **EXPERIENCE** with the interdisciplinary **DIGITAL MUSEUM** university course, which focuses on **COMPETENCE –** and **PROJECT-BASED LEARNING** in **REAL-LIFE SETTINGS**.

THE ARTICLE DISCUSSES OUR EXPERIENCE WITH THE INTERDISCIPLINARY DIGITAL MUSEUM UNIVERSITY COURSE, WHICH FOCUSES ON COMPETENCE- AND PROJECT-BASED LEARNING IN REAL-LIFE SETTINGS.

DIGITAL MUSEUM: A MULTIDISCIPLINARY UNIVERSITY COURSE

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ABSTRACT

Our “Digital Museum” university course was launched in 2010, as a response to the challenges and needs of museums in the information age. It is novel in several ways. Students develop museum projects in multidisciplinary teams. They are studying Design, Management, Education and Art Theory at our university and Programming at a Technical university, and are introduced to the latest digital technologies. They invent solutions that will turn museums into appealing, engaging social sites that are attractive to their generation. The course applies a problem solving design methodology. Problems are spotted and possible remedies proposed in brainstorming sessions, then the most promising ones are critically reviewed with respect to available resources and other matters, and a detailed design is produced. Students play different roles and are responsible for creating content and visual designs, programming and project management. At the end of an intense, one-term course, teams present prototypes for museum clients. Some student projects have been developed into applications in everyday use in museum settings. In this paper we argue the social case for the course, explain our methods and the lessons we have learned and present some projects our students have developed.

KEYWORDS

Museums, Design Education, Digital Technologies.

The case for reinventing the museum

We launched the Digital Museum course at our university in 2010 in response to the explosive developments in digital technologies, the need to change museum practices and and to identify new roles for art and design students. Museums sense the need to adapt so as to remain attractive for new generations (Anderson 2012, Simon 2010). And today many of them realize that digital technologies offer new means to achieving many of their goals. These include: whetting appetites for visits, turning an exhibition into a memorable experience, providing interactive learning modes, engaging visitors through games and multisensory experiences, making collections accessible to a broader public, enabling them to participate as responsible partners, encouraging visitors to contribute in a creative way, to give feedback, to reuse and remix content, to collect photos and information to take home; and exploiting social media for communication purposes. The need for change has been explored in conferences (e.g. MuseumNext, NODEM and MuseumWeb) and essays that have offered practical solutions. Admirable examples ranging from (mobile) applications to interactive sensory installations, can be experienced for instance at the Chopin Museum in Warsaw, Science Museum in London, and at Gallery One in the Cleveland Museum of Art.

New roles and challenges for artists and designers

Exploiting technologies necessitates understanding what is possible today, not just in a technological sense, but also how to use to create the new nonlinear genres of narrative in which visitors participate. Good installations achieve this in inventive, poetic even magical ways while communicating the central message of an exhibition and a museum's goals. Artists and designers exhibit the sensitivity, aesthetic taste and creativity that are necessary for inventing and designing these kinds of applications and installations, and can usefully supplement the work of specialist museum staff.

Unfortunately the way art and design students were taught work attitudes and skills in the past is inappropriate. They need to learn how to realise ideas in collaboration with experts in other disciplines, ranging from programmers, to curators and scholars. Traditional art and design courses at universities do not prepare them for this. They are not introduced to enabling technologies or given chances to work in multidisciplinary teams, and in most cases, are not exposed to the challenges of working and communicating in real-life conditions (Boud, Solomon 2001, pp. 3-17).

The Digital Museum Course

Our Digital Museum course responds to developments in competence-based education, and the challenges for art and design higher in education in the 21st century (Bowden, Masters 1993, pp. 44-63). When designing the course we had in mind that, students should be:

- Socially sensitive and able to contribute to the overall wellbeing of society;
- problem-seekers and problem-solvers;
- ready for interdisciplinary collaboration;
- fit to work in teams;
- able to make good use of newly developed technologies, particularly in ICT;
- motivated to act on an international professional scene.

The course gets launched annually, after we have set up a framework for collaborative partnerships with museums and identified mentors, we use a new set of 2–4 museums each time. The course is open to all MA and BA2 students from Visual Studies (Animation, Graphic Design, Photography and Media Design), Design Studies (Industrial Design, Textiles, Jewellery) and Architecture, together with students in the university's Theoretical Institute (Managers, Scholars of Art and Design, and Teachers). Additionally we accept students from the Budapest University of Technology and Economics who are studying Programming and Mobile Technologies. Although the museums determine the course content, the structure throughout the 12-week term is the same each year, and follows the same 'design thinking' methodology explained below (Fatima 2013):

1. Identifying problems museums face, an introduction to the potential of technology for renewing museum practices, and analysing international examples of good and bad practice.
2. Students visit the partner museums and become acquainted with the physical environment, people, programs and plans (e.g. for new exhibitions). The museums propose briefs specifying broad objectives and/or problems.
3. Students brainstorm, get feedback from mentors and museum experts, and present their own project proposals. (2 weeks)
4. In the framework of an 'auction' ideas get pitched, and interdisciplinary groups are formed to develop further the most promising and popular ideas. Care is taken to ensure that all the necessary competences – project management, content development, visual design, and programming – are represented in each team.
5. Teams set up work plans, decide roles and work accordingly, (mainly on their own), working to an online schedule and in face-to-face consultation with university and museum mentors. Iterative cycles of design – testing – refinement are performed to develop the concept, visual appearance of the application or installation, and the details of the technological aspects. The students collect relevant materials, study literature, consult experts, explore technologies, and consider legal and financial constraints. (6 weeks)
6. Towards the end of the course, each team prepares a demo, (preferably with a partially implemented prototype) and documents their project so it can serve as a reference for further elaboration

(e.g. for a grant application or full-scale realization).

7. In a final presentation session, the teams introduce their projects to representatives from museums and university lecturers.

Challenges

Below we briefly summarize the main challenges posed by a course that is multidisciplinary, collaborative and problem and project based. (Donnelly, Fitzmaurice 2005).

- Because of its multidisciplinary and collaborative nature, the course requires a more flexible structure than is usual at university level, for example, we have to make a common slot in the timetable available for all potential participants and to allow visits to external locations (Lee et al. 2014).
- Because the topic of each project differs, in line with museum briefs, the theoretical modules that provide the background knowledge about the domain vary. They all have to be integrated into project-based work in the form of research. This is the case also with technological aspects.
- A large number of experts are involved in the course from the two participating universities and outside. They often have to invest considerable time in providing specialist knowledge for a project. Managing collaboration is complex for the university, but on the other hand it is one of the main benefits of this course. Teams work on diverse projects and share access to experts and resources at different kinds of museums. It is difficult to establish a single channel of communication that satisfies partners from different age groups with different digital literacy skills. Novice users (both students and partners) sometimes mess the use of standard web2 content sharing platforms. While the students who adopt the team manager role are responsible for ensuring proper channels of communication, they often fail to do so.
- It is very difficult to evaluate teamwork, because the roles members take up are so varied. We use an inclusive assessment model and invite all the team members (the students, their teachers and mentors at museums) to participate (Lee & Lim 2012). We are not fully satisfied with this model, and keep experimenting with and improving it (e.g. by giving a 'sum' mark to the team, which they must distribute among the members).

Examples of projects

In the 5 years we have offered the Digital Museum course students have collaborated with 12 museums in Budapest and developed almost 50 projects. They have designed different kinds of virtual visit, games, installations and 'take-away' items, and proposed novel forms of PR and communication. They have completed projects for museums of Fine Arts, Applied Arts, Music, Literature, Theatre, Medicine and Jewish Heritage. In the following section of the paper, we will describe two

projects. We have documented others on a dedicated web page (TechLab Digital Museum projects 2015).

Musical Paintings

An inconspicuous side room in the Museum of Fine Arts is devoted to Dutch paintings, several of which depict groups of people making music. The brief from the museum was "to render this collection more attractive" to visitors. A group of students set out to design a tablet app to replace the museum's audio guide. Their playful app provide a multitude of information in the form of text, interactive images of 3D models of the musical instruments the pictures depict, and contemporary music written for ensembles like those in the paintings. Visitors are motivated to learn about the paintings in a game-like application in which they hunt for musical instruments in the paintings. The experience involves social encounters too since visitors can exchange their findings. The museum is a huge building and the students have proposed a way of orienting visitors to this particular collection. They located a lute maker from rural Hungary and a PhD student from the Academy of Music and drew on their expertise to help them identify and model musical instruments from the past.

Figure 1. Musical Paintings app. Users can explore 3D models of instruments they discover in paintings and share them with other visitors. Source: R. Sárosi.

Interactive Poetry

An exhibition entitled "Words Stirred" took place in 2013-14 at the Petőfi Literary Museum to commemorate the Hungarian poet Sándor Weöres. He is famous for the strong rhythms and musical effects in his poems as well as for his witty and inventive use of language. The museum commissioned us "to invent something that would engage the public other than a traditional showcase containing personal relics of the poet and first editions of his works." They wanted a response in line with the personal mission of the poet, who encouraged his audience "not to admire, but to use" his poems. Our team consisted of students who had already proven themselves on a previous Digital Museum course; alumni with various kinds of expertise (textile designers, an animator, a graphic designer, media designers) and programmers from the TechLab and beyond. Our exhibition was organized around 11 installations that invited visitors to experience poetry in completely new ways; for example by letting lines of poetry emerge on a touch-screen under a pen, listening to poems 'spoken' by light, textile sculptures of the fruit they mentioned, and discovering the poet's universe by travelling through a 3D galaxy. A film of each installation is available online (Weöres100 2014). Below are descriptions of two installations that give a taste of the designers' creativity.

Figure 2. Tangible Poems. The rhythm and music of poems are visualized in the form of 3D prints. When they are held in the hand, the dynamism and rhythmic patterns of poems can be sensed under one's fingertips. Source: R. Sárosi.

Tangible Poems

The poems were "printed in 3D" on the surfaces of cylinders, that enabled visitors to sense their rhythm under their fingertips, by physical touch. Smaller and bigger bulges correspond to the length and the height of each syllable of each line of text. The visual and tactile impressions give an overall feeling of the dynamism

Figure 3. Blown Thoughts. When visitors blow the dandelion, letters dance around and eventually settle to form lines of a poem. Source: WB. Samu.

and music of each poem. When a cylinder is placed on a certain spot, it reveals the poem: its textual form gets displayed. This multisensory learning experience helps to figure out principles of metric poetry in a playful way.

Blown Thoughts

The most perplexing installation is a dandelion head engraved on a standing sheet of plexiglass. It is not accompanied by any instructions. Visitors who want to recall childhood memories, can take a deep breath and blow on the dandelion wisps. When they do this, dancing letters emerge on the wall instead of seeds and settle eventually to form the lines of a poem. Visitors are amazed by the poems they create just by blowing and probably pay more attention to reading them than they would with a printed text.

Conclusions

Students praise the Digital Museum course because it offers them new experiences. They like working with students from other disciplines on designing solutions to 'real-life' problems and last, but not least, seeing their own ideas take shape and put to use. Their communication, writing and oral presentation skills improve a lot, since they have to present and discuss ideas at almost every phase of the project.

Almost without exception, the museums consider the students' projects very creative and pleasing to look at and are eager to see them realized. They learn about potential uses for digital technologies through collaborating with the university.

But problems have emerged that are inherent in the nature of complex cooperative schemes with content and methods that are novel for both students and the mentors.

- Students are reluctant to criticise each other and articulate differences in their dedication to the quality of their work.
- For the Art and Design students who are used to working alone and being assessed on their individual performances, meeting internal deadlines and following the communication protocols that are essential for successful collaboration is a huge challenge.
- Some students are not willing to accept constraints and criticism from partners from other professions (museums or programmers). They consider this a violation of their artistic freedom, or attribute problems to generational differences.

It has been interesting to listen to past students re-assessing difficulties in retrospect, stating that after gaining real work experience, they understand the importance of agreeing schedules, roles and communication strategies.

Recently our university – like many others – has been rethinking the role of designers and the best way to educate them. We are creating more space for courses like this one, involving interdisciplinary, project-based learning, cooperation with real-life partners, and learning through doing. Their proliferation poses further questions and challenges at university level.

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EDUCATING SECONDARY SCHOOL TEACHERS IN GAME DESIGN AND GAME-BASED LEARNING

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ABSTRACT

This paper will offer detailed insights into principles for teaching game design, game literacy and game-based learning to secondary school teachers. We have been researching how to instruct future teachers in the creation, use of and reflection on games in classrooms. The paper outlines some challenges this poses and describes teaching strategies and resources targeted at game literacy i.e. at improving teachers understanding of how to reflect on games with their students, their practical uses and game design methods. Challenges are identified in the areas of game literacy, technology, media reflection and game application in classrooms. The session will outline practical strategies and instructional materials for teaching game design.

KEYWORDS

Game Design, Education, Game-Based Learning.

Introduction

This paper offers detailed insights into teaching the principles of game design, game literacy and game-based learning to secondary school teachers. The goal is to establish an understanding of how to instruct future teachers to create, use and reflect on games in the classroom.

The author has extensive experience of instructing secondary school teachers at Bachelor and Masters levels. He teaches courses in rapid game development and modding[1], games and youth culture, game-based learning, and play-centered game design, at the University of Applied Arts Vienna and the Danube University in Austria. The students attending these courses finish with a degree that qualifies them to teach in secondary schools. Their specializations are diverse but the majority end up teaching either Arts or Informatics. Insights are also derived from a government-funded research project called Sparkling Games[2] in which students at three Austrian Schools create learning games, and in which game design methods are integrated into the Informatics curriculum.

This paper is written from a self-reflective perspective, drawing on my own teaching and work on the Sparkling Games project. It is structured around some challenges posed by using educational games. Each one is briefly outlined then followed with discussion of concrete solutions and teaching strategies.

Results and Discussion

Unfamiliarity with terminology and genres.

The first step in enabling teachers both to use and reflect on the use of games in the classroom is to establish base level of theoretical and practical knowledge. The first step to acquiring game literacy is to learn about the history of the medium and some specialist terminology and apply this knowledge in practical discussions. I introduce my students to fundamental literature on game studies including works by Huizinga (1955), Caillois (1958), Juul (2005) and Aarseth (2003), to name but a few. Importantly we analyse several definitions of the term game. They feature in group discussions of specific examples of games during which we examine their goodness of fit. Special attention is focused on the importance of game rules. In my courses I use modding to deepen teacher's understanding of game rules. In thought experiments, a strategy game like Civilization is modded to illustrate a specific social challenge such as hunger, isolation, etc. I use a selection of Tiltfactor's Grow-a-Game cards[3] to randomly assign these challenges among the students. During the seminar I give more examples of how to adapt the Grow-a-Game cards to different teaching scenarios.

Lack of experience and confidence

Many teachers feel insecure about using games in class because they assume their students will have more knowledge than them. My students' gaming experience varies enormously ranging from little or nothing to avid gamers. The first move towards leveling experience is a bring-your-game session in which students introduce games they like and play them together. I regularly use reflective play sessions throughout the semester to establish a broad perspective on the medium. I usually bring 5 games to a seminar and allocate 1 hour for play and 30 minutes for discussion. To cover as much ground as possible, they include AAA games, art games, independent games, learning games, serious games and mobile games. In general I split the time into three equal parts: one third for theory, one third for play and reflection, and one third for making.

Limited knowledge of programming and resources

From the outside looking in it might appear that making a video game is all about programming and technology. But many schools are not equipped with computers or tablets for every student and lack game consoles or state-of-the-art PCs. I work from the starting point that a lot of the methods needed to design a video game can be learned through analogue methods, as discussed by Fullerton and Swain (2004), and by using the tools provided by existing games. In my seminars I usually start by building prototypes of board games using pen and paper. I also use the Grow-a-Game cards in this seminar setting, and starting with a selection of verbs chosen to help students find a game mechanic. Other

analogue settings include the use of Legos and Plasticine, and the modding and extension of existing board or card games. Then we move on to using easy-to-access level design tools. Early examples include Minecraft or Trackmania Nations (for racetracks). More advanced examples are Portal 2, Warcraft III or Freeciv (an open source version of Civilization). Wikipedia also has a great list of games with level editing tools[4].

Misconceptions about games and violence

The association of games with violence is a hotly debated topic that is difficult to resolve. Many teachers with little or no gaming experience hold exaggerated fears about games promoting violent behaviour. At the same time it is important to help them judge which ones are most suitable for children from specific age groups. We address the topic of games and violence by discussing Stuart Brown's TED talk "Play is more than just fun"[5] and studies like Kutner & Olson's (2008) "Grand Theft Childhood". We also analyse the materials and recommendations published by the Austrian video game rating agency BUPP[6]. Similar materials have been produced by other international rating agencies. The goal is to establish a differentiated, impartial understanding of video games and their effects on children's behaviour.

Problems and how to address them

In general I try to raise awareness of issues concerning representations of gender, class and ethnicity in video games. To give an example, I address gender issues by watching and discussing episodes of Anita Sarkeesian's series "Tropes vs. Women in Video Games"[7] in class. Following a discussion with mixed gender groups of 3-4 students, each group picks a game example to analyze for homework. The Grand Theft Auto series is full of ambiguous examples situated between cliché on the one hand and irony on the other. Students are asked to identify stereotypical representations of gender, class or ethnicity and bring video excerpts or screen shots to the next seminar for a second round of discussion.

Which games to use and how to set them up

I regularly evaluate my seminars and the most important feedback teachers give me is they want something concrete and practical to take away and use in school. They would like to know which games to choose for which topic and want practical and technical advice as to how to set them up and use them. To tackle this problem I initiated a collaborative research project with students attending a year-long seminar at the University of Applied Arts. The project proceeded in four stages: the students collected examples of game (commercial and educational games), classified them, identified possible lesson content and related this to arts curricula. They reviewed academic literature to assist them analyse the games and found the principles of learning outlined in "What Video Games have to Teach us about Learning and Literacy (Gee 2014) particularly helpful. The outcome of this project is a 100 game-strong annotated collection of games for use in arts teaching.

Notes

1 Modding refers to the practice of modifying an object or software to perform tasks or functions different from their originally intended ones.
2 http://www.piglab.org/sparklinggames [last accessed March 31st 2015]
3 http://www.tiltfactor.org/growagame [last accessed March 31st 2015]
4 http://en.wikipedia.org/wiki/List_of_level_editors [last accessed March 31st 2015]
5 http://www.ted.com/talks/stuart_brown_says_play_is_more_than_fun_it's_vital [last accessed March 31st 2015]
6 http://bupp.at [last accessed March 31st 2015]
7 http://www.feministfrequency.com/tag/tropes-vs-women-in-video-games/ [last accessed March 31st 2015]

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Understanding the

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UNDERSTANDING THE SIMULTANEOUS VALIDITY OF CONFLICTING VIEWS IS ALSO A VERY IMPORTANT ASPECT OF INTERCULTURAL COMMUNICATION, WHERE THE CHALLENGE LIES IN THE DIVERGENT VANTAGE POINTS CREATED BY DIFFERING OR CHANGING CULTURAL BACKGROUNDS.

THE ARTIST AS AN UNRELIABLE NARRATOR: GLOBALIZED CULTURES AND POLYMORPHIC VIEWS

Monika FARUKUOYE
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ABSTRACT

Vladimir Nabokov claimed that his novel "Lolita" with its morally unreliable narrator reflects the loss of innocence caused by an exile-induced shift away from his "innate" way of conceiving the world and expressing himself through language. In film, unreliable narration became a trend around 1999 when films like "The Sixth Sense", "Fight Club" and "The Matrix" successfully provided viewer experiences that turned accepted truths within the narration upside down. Amar Kanwar's installations use unreliable narration to point to situations that governmental narrations conceal. It is a question of societal relevance to ask how much globalisation, extended migration and multimedia pervasion have brought along the need for artists to offer reflections on unreliable societal narrations, and artistic modes of educating audiences towards developing polymorphic views and counter-narratives. In opposition to other practices of violating expectations, the unreliable narrator creates the whole narrative framework for the expectations to be broken, and they are broken in such a manner that the framework itself is rendered invalid. This poses questions about how to deal with intentional deception, and beyond that with ever shifting frameworks of understanding and communicating that were less prevalent in the past.

KEYWORDS

Unreliable Narration, Globalization, Polymorphic Views.

Societal Challenges and Polymorphic Views

The term 'unreliable narration' refers to a set of artistic techniques in which the whole framework for expectations towards a narrative is conveyed to an audience as an unreliable entity in itself.

I want to discuss this practice especially with regard to the role of the artist as educator in these times of globalized media pervasion and increasing migration worldwide. I will argue that emerging societal challenges call for the development of a mindset that is open to polymorphic views and reflective awareness as to the narratives involved. I shall explore unreliable narration as a strategy for approaching necessary educational effects in this endeavour, by discussing examples from literature, film, and installation art and, by drawing on my own experience as a film artist.

Let me first take a closer look into the concept of polymorphic views.

A technique artists often use to render an object in three-dimensional space in a two-dimensional drawing is that of seeing negative spaces, of focussing perception not on the object they want to draw but the spaces surrounding it. In actual fact this technique engages with polymorphic perception at a visual level. The introduction of illusionary drawings brought this mental game or discipline into the sphere of the viewer. A well-known example is the "Reversible Vase" Edgar Rubin produced in 1915.

The phenomenologist Don Ihde used such multi-stable visual examples to describe mindsets as literal mindedness, if the image was interpreted by the viewer as only one of the possible figurations, and as polymorphic mindedness if both figurations could be perceived in simultaneity (Ihde 1977).

For most people – if they do not exhibit this kind of polymorphic mindedness from the onset – developing it is simply a matter of being informed of the other possibility and practicing, just as art students can practice the perceptual skill of seeing negative space. Deciphering an artistic expression using unreliable narration can equally be seen as an instance of practicing polymorphic mindedness and thus of raising awareness of unreliable or polymorphic situational narrations in more general societal contexts.

The underlying rationales for the Iraq war the U. S. State Department propagated are an example of unreliable governmental narration that 'emerged' into public awareness. The whole layer of social media with its aliases and virtual personae can be thought of as unreliable narration of space, time and identity. Nobody can really be sure of the accuracy of Wikipedia content. We know this, and yet we draw on this information, navigating a world that tells us less and less reliable stories.

Understanding the simultaneous validity of conflicting views is also a very important aspect of intercultural communication, where the challenge lies in the divergent vantage points created by differing or changing cultural backgrounds. Although there is a single superficial, and I would argue unreliable, societal narration of a single emerging globalised culture (that is basically western, U.S. dominated and consume-oriented), globalized media and migration bring into simultaneous presence uncounted sub-narrations with inherent possibilities of being understood differently in very diverse respective contexts and with varying cultural and intercultural contents.

Figure 1. 'Reversible Vase' after Edgar Rubin.

Strategies of unreliability in narrative art forms

This leads me directly to Vladimir Nabokov's novel "Lolita." I want to discuss it now in the light of Nabakov's inner reading of his own text. He related the theme of broken innocence in "Lolita" to the fact of his own having been torn out of his very own context and language. In his memoirs he calls it his private tragedy that he had to abandon his natural idiom (Nabokov 1967).

Vladimir Nabokov was born in 1899 to Russian aristocrats who considered themselves cosmopolitan. An English governess trained him, and English was frequently spoken in his household. And yet, when the family had to emigrate because his father's was an anti-czarist democrat, during the Bolshevik revolt, Nabokov was confronted with a world that from his new perspective as an exile presented itself quite differently to him than in the narrations of his childhood. Nothing seemed to make direct sense; everything had to be re-appropriated. His family actually had to flee twice, first to Germany, then to America.

Objectively speaking, "Lolita" is a story about paedophilia and child abuse that is brought to us in a mode of shifting and unreliable morality that finds its embodiment in the protagonist Humbert Humbert. Nabokov repeatedly asks the reader to pass moral judgement and then ridicules the very possibility of doing so or, encourages the reader to suspend moral judgement for various reasons and with various excuses. A brief quotation from the first chapter shows how he uses this technique:

> *She was Lo, plain Lo, in the morning, standing four feet ten in one sock. She was Lola in slacks. She was Dolly at school. She was Dolores on the dotted line. But in my arms she was always Lolita. Did she have a precursor? She did. Indeed she did. In point of fact, there might have been no Lolita at all had I not loved one summer a certain initial girlchild in a princedom by the sea. Oh, when? About as many years before Lolita was born, as my age was that summer. You can always count on a murderer for a fancy prose style. Ladies and gentlemen of the jury, exhibit number one is what the seraphs--the misinformed simple noble-winged seraphs--envied. Look at this tangle of thorns. (Nabokov 1997, p. 6)*

Towards the end of the novel, after having industriously and inventively drawn the reader into sympathising with the protagonist's perceptions and motivations, Nabokov lets Humbert reflect on the consequences of his actions as he watches Lolita playing tennis and displaying the kind of superficial behaviour she had developed by then "Her form was indeed an absolutely perfect imitation of absolutely top-notch tennis, without any utilitarian results." (Ibid., p. 231). He subsequently observes:

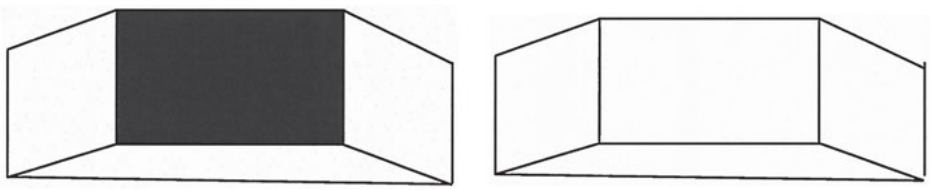

Figure 2. ' Multi-stable visual example' - hallway or pyramid.

> *Had not something within her been broken by me, not that I realized it then, she would have had on top of her perfect form the will to win and would have become a real girl champion. (Ibid., p. 232).*

So with all the unchartedness in morality that Nabokov evokes throughout the book, the reader does get to realise that the victim – as there clearly is one – has lost her will to win as a consequence. This can be interpreted as a will to live – her true authentic inner life force. We are given simultaneous readings, one an experience of "pure aestheticism of fancy," as Nabokov calls it in his "afterword to Lolita", and one a narration of real loss. While Nabokov's aesthetic response – turning to morally unreliable narration in a novel full of numerous, surprising stylistic twists – never seemed to alleviate his dilemma of loss, it provides educating insights into the techniques of his use of language, even to the reader while reading it. It made the fabric of narration itself visible.

Stanley Kubrick repeatedly used techniques of morally unreliable narration in his films. In "A Clockwork Orange" (Kubrick 1971) the audience is almost inescapably brought to sympathize and identify with the rap-

ing and brutalizing character of Alex. For some viewers the identification that was supposed to call forth a self-questioning attitude went too far. Stanley Kubrick withdrew the film from English cinemas after criminal acts that copied the style of the film's protagonist had occurred.

While morally unreliable narrations repeatedly sail close to the wind, ethically and with regard to author intention, some decades later a turn in narrative unreliability in films, towards the unreliability of the narrative setting itself, brought in new strategies for educating the viewer's responsibilities.

The film "The Usual Suspects"(1995) by Bryan Singer, which according to Martin Baker, "might have been made in order to demonstrate the effectiveness of the concept of the implied audience" (Baker 2000, p. 58) might be considered the starting point of this movement. Then in 1999 a significant temporal culmination of films like "The Sixth Sense", "Fight Club" and "The Matrix" very successfully provided an experience for the viewer in which the accepted truth of things was turned upside down. Others followed in the same vein. As these films were produced at roughly the same time, we might call this the manifestation of an artistic urge. Even if we argue that all these filmmakers were following the example set by "The Usual Suspects", the question remains why did so many artists employ techniques of unreliable narration simultaneously in different forms of filmic storytelling; and, why did they engender such a successful viewer response? Mere imitation for commercial purposes can probably be ruled out by the diversity of the stories being told.

I do not have enough space here to go into more detail and must rely on reader knowledge of the content of at least some of these films. But as a general observation, in all of them the filmmakers went beyond former practices of breaking expectations. They introduced the viewer to experiences where the whole narrative framework for expectations was challenged in such a manner that the framework itself was rendered invalid by the events and realisations of the progressing narration. As a result, everything experienced through, and brought to knowledge by, the film had to be reassessed by the viewer at an unexpected turning point.

To this day filmmakers use a range of strategies of unreliable narration. "Birdman" (Alejandro González Iñáritu 2015) is a recent example. Interestingly this film also addresses the issue of the validity and importance assigned to a person's image or persona in the virtual globalized space.

In his exhibition "The Sovereign Forest," the film artist Amar Kanwar used narrative textures to confront the unreliable narratives of authorities in Eastern India. In an artistic approach he calls "poetry as evidence" he used found and collected images, traces, records, fables, and personal stories in multiple vocabularies to surpass fact and reveal a richer, more fluid, and poetic perspective on reality and of the meaning of what is happening"(TBA21 2013, p. 5f). The central film at this exhibition, "The Scene of Crime," showed stretches of natural landscape that had been, or were about to be, dis-appropriated for industrialization, together with subtitles resembling diary entries of events related to a murder the authorities hushed up and ignored. The result was a multidimensional dissolved narrative about violent loss, questioning its own validity in apparent contradiction to the beautiful landscapes and inhabitants shown in an intimacy inspiring reduction of sound and speed. Kanwar's artistic approach "of sharpened senses, affection and reflection on one's own modes of seeing" (Ibid., p. 8) – of educating not simply by giving a counter-narrative, but of educating towards assuming a reflective and truly sovereign responsibility for the narratives formed and accepted – is what I would call direct polymorphic narration.

In my own short films "Henna" (2013) and "Minutes OFF" (2014) I use unreliable settings, as well as unreliable assessments of situations and characters. Even the narrative cohesion of these films is subject to unreliability and calls for active reflection on the viewer's part. As is the case with optical illusions, reception experiences result in cases where viewers take in one or another possibility of understanding the film as the intended way of viewing; but time and again open themselves to polymorphic views, even allowing themselves to conceive an understanding that accepts there may not only be one or the other narration, maybe both of them can exist at the same time. Some viewers told me they experienced a new feeling of aesthetic freedom and empowerment from partaking in the formation of the narrative.

Battles are being fought between cultural narratives and counter-narratives that seek to imperialise our globalising world. I understand it as a necessity that people living in contemporary societies find ways of integrating these abundant polymorphisms, if they are to avoid ending up with broken identities – broken with respect to a capacity for authentic inner motivation and assessment – broken identities that finally will have nothing to cling to but superficial affectations analogous to Vladimir Nabokov's Lolita.

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DESIRED
PROBLEMS

DESIRED PROBLEMS.

DESIRED PROBLEMS: AN ARTISTIC APPROACH IN THE FIELD OF NEURAL NETWORKS

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ABSTRACT

New models of educational research must take due account of the progressive integration of the arts within the framework of the scientific disciplines (STEM to STEAM). In this context art education practices are understood as sites for channeling and developing many forms of knowledge and know-how, and artistic methodologies are viewed as essential for defining criteria of excellence, innovation and technological development. The STE(A)M movement offers a new conceptual framework that takes 'desired problems' as a starting point, and in which curiosity becomes the driver and guide of knowledge acquisition, and acts a springboard for exploring multiple solutions in an ongoing quest for personal satisfaction. The new model empowers imagination and draws attention to the process of experimentation, or 'making'. In this paper we describe the practice of designing and developing neuron prototypes, using simple low-tech resources that are easily replicated across learning environments. This project enabled us to understand how simple neurons are, and how to configure the networks found in biological organisms in different ways. It has also encouraged production of pieces of technological art and provided material for reflection and development in scientific publications.

KEYWORDS

Cross- Disciplinary Practice, Making, Curiosity-Driven Learning.

Introduction

In 2006, Georgette Yakman coined the term STEAM (Science, Technology, Engineering, Arts and Math) as a conceptual framework for education that integrates all these disciplines. Following this approach, new models of educational research should consider the progressive integration of the arts into the framework of the scientific disciplines (Resnick & Rosenbaum 2013).

In this new educational and research context artistic practices, and specifically those associated with art education, must be understood and valued, from a propaedeutic perspective, as an environment within which learners can prepare for effective learning; and as stimuli that encourage them to acquire the capacity to synthesize, redirect and develop a range of knowledge and know-how. Consequently, the effective application of art education strategies may increasingly become essential for defining methodological excellence, innovation, and technological development.

Desired problems[1]

Scientific research rooted in aesthetics (STEM TO STEAM), or its mirror image artistic research rooted in the sciences, is a new learning paradigm rooted in desired problems in which the thirst for knowledge and curiosity are driving forces and guiding principles of knowledge construction and act as a springboard for exploring diverse solutions in quests that are linked to personal satisfaction. This kind of education calls for an integrated multi-disciplinary approach to learning that sets out to solve real world problems (i.e. problem-based learning). The nexus between Art, Science and Technology facilitates the creation of links across the curriculum that goes beyond current conventions and establish new and unpredictable relationships between curriculum themes and competencies.

Recently a Do-it-Yourself culture (DIY) has conjured up a 'garage science' of inter-connected individuals who focus their attention on producing prototypes with personalized designs (thereby emancipating themselves from consumer models of mass production). In this culture what counts above all else is experimentation and exploration of the new media of subjectivism, supported by a genuine interest in technology and a desire to search for alternatives to mere consumption. This trend is characterized by the use of low-cost components and low-tech as well as high-tech solutions (whichever works better) and is constantly in creative dialogue with materials.

Tinkering as methodology:

This new teaching-learning approach moves away from the "Too Much Information" model (TMI) with too many instructions, interruptions and interferences, to one centered on "Think, Make, Improve" (Libow and Stager 2013).

This methodological shift embraces making as the main point of interest and as part of a process in which

students play, construct, tinker, experiment, try out strategies and materials, pool knowledge and document their learning.

Tinkering is a mode of intuitive thinking that makes it possible to integrate the Arts into teaching and learning in natural ways. In this regard it is helpful to look at Resnick's approach to learning in kindergartens. Inspired by play school he proposed "a spiraling process in which children *imagine* what they want to do, *create* a project based on these ideas, *play* with their creations, *share* their ideas and creations with others and *reflect* on their experiences – all of which leads them to *imagine* new ideas and projects" (Resnick 2007, p. 1). Tinkering offers a working method that is the opposite of planned/programmed learning that is organized, directive and rational. Consequently it tends to be under-valued in educational circles. However, an open working approach that flows bottom up enables constant dialogue with the materials involved in the process. It is in harmony with the interests of users and has become more than reasonable and significant in contemporary contexts in which our future and capacity for adaptation no longer depends on what we already know, but on the skills we develop to think and act flexibly and creatively.

Figure 1. Critical Care (Art Installation), 2014. Augusto Zubiaga

Problem-solving in a cross-disciplinary curriculum context traces maps of discovery and is driven by the process of finding out what one wants to know. These kinds of routes to learning need an ecosystem in which to thrive. Brennan, Monroy-Hernandez and Misnick (2010) argue that young people must be given opportunities to be creators as well as consumers of interactive media and stress the need to facilitate access to educational contexts in which they can develop in this way. "Makerspaces", also popularly known as "fablabs", are communal spaces in which people share resources for designing and constructing knowledge and prototypes of objects. They are spaces in which production and peer-education take place. These kinds of spaces are being set up independently by an increasing number of individuals with common interests and by a wide range of organizations of different kinds. They constitute an educational model in which a culture of 'listening' is transferred to one of 'doing' understood as a source of knowledge and innovation.

Desired problems in practice

We want to flesh out the conceptual framework for learning sketched above with a practical example that illustrates the key characteristics of this kind of initiative.

We are currently developing a practical procedure, which stems from our interest in the generic theme of neuronal networks and connectionism[2]. To be specific, the project explores the possibility of integrating basic resources from analog electronics, optics and biology into knowledge in sculpture, in order to create objects that can help us better understand and become familiar with basic aspects of these fields of knowledge.

Our project hinges on constructing imaginary space, searching for information, empowering learners to use technical and procedural resources and implementing various technical and theoretical strands of development. Specifically it focuses on the design and development of a series of neuron prototypes and their possible connective virtuality in programmable networks and applications using the resources of low-tech analog electronics (Figure 1).

The content for the discovery-learning process would have to be easily intelligible, replicable and amenable to modification in normal learning environments. This is why we feel it might be interesting to develop and display it as an open-ended proposition that is tentative, incomplete, and not as closed expert knowledge (a black box). This mental state is familiar to everyone who has experienced a pure creative impulse in which imagination produces a thinking style akin to play. Imagination fills in the knowledge gaps that prove inaccessible for effective learning (know-how), with implicit understandings that drive a narrative forward in a framework in which reality and fiction intertwine – as in a game of charades in which everything is possible a priori.

In summary, 'our game', using an approach oriented by active curiosity, is to invite others to understand the principles of how neurons function and diverse configurations of networks in biological organisms. Along the way we are creating "technological art pieces' that are shown in art exhibitions and we believe are food for thought and reflection in scientific publications (Zubiaga, Cilleruelo and Tobar 2013).

Discussion

The concept of STEAM education makes it possible to envisage the teaching-learning process as an active zone driven by experiment and play; it breaks down barriers between disciplines and offers numerous possibilities at intersections between art, science and technology. Learning based on tinkering enables one to access complex approaches in intuitive ways directed by personal interests, since it provides new frames for re-reading conventional ways of working and facilitates creative processes (Gordon 1961). Apprehending intuitively, viewing data adequately and, above all, feeling able to operate with them with the help of others (that is to say, to control and redirect them) can promote self-esteem and interest in areas of knowledge that seem a priori to be obscure and abstract.

All this calls for an educational research space that is cross disciplinary and trans-personal, supported by physical and virtual communities (makerspaces) and the key to which is open access to knowledge oriented to shared peer-learning. For this to work it is vital to increase resources and networks based on personal interests and curiosity and develop personal knowledge. To legitimate art education practices and methodologies academically, we urgently need new spaces and contexts for art practitioners in which they feel useful and are recognized beyond the so-called 'art market'. It is not just a matter of coming up with answers, but of finding questions that seduce us as researchers and invite us to explore new worlds.

Notes

1. 'Desired problems' has a poetic meaning. It refers to feeling curious about something and searching for the desired answer to solve the problem.

2. Connectionism is a movement in cognitive science that hopes to explain intellectual abilities using artificial neural networks (also known as 'neural networks' or 'neural nets'). http://plato.stanford.edu/entries/connectionism/

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VISUAL LITERACY, UNDERSTOOD AS A SET OF VISUAL COMPETENCIES, CAN BE ASSESSED AT DIFFERENT LEVELS – FROM BEGINNING TO INTERMEDIATE TO ADVANCED.

VISUAL LITERACY: A UNIVERSAL CONCEPT?

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ABSTRACT

ENViL is a network of researchers and curriculum developers with more than 50 participants in 11 European countries funded by the European Commission (www.envil.eu). ENViL is developing a frame of reference for visual literacy that describes the knowledge, skills and attitudes students have to obtain (and own) to be considered visually competent. The competences are related to specific situations in daily life as well as domain-specific competences. The framework will be inclusive and embrace different historical, societal and ideological contexts within a normative agenda defined by Human Rights and UNESCO's development goals. In 2014 ENViL carried out comparative research into how visual competences and their dimensions are understood in Visual Arts curricula in 13 European countries. This paper will present and discuss the current results of ENViL's research with regard to the following: (1) the comparison of European visual arts curricula; (2) the framework for visual competences; (3) the possibility of transferring this framework to museum education, heritage education, civic education and education for sustainable development.

KEYWORDS

Visual Literacy, Curricula, Europe.

Comparison of European visual arts curricula

Competence is based on knowledge, skills and attitudes and can be described as the disposition to act or perform successfully and responsibly in a certain domain. The visual world, the world of images and art, is the domain of visual competencies that have to be learned in the school subject of "Visual Art" (in this paper "Visual Art" stands for the many names our subject has in different European countries). Visual literacy, understood as a set of visual competencies, can be assessed at different levels – from beginning to intermediate to advanced.

As part of ENViL's research programme (Wagner 2013 b) Folkert Haanstra and Constanze Kirchner asked experts from each European country to complete a questionnaire, enquiring mainly into the use of competencies in developing curricula and any competence-models taken into consideration. The questionnaire included some open-ended questions also about policies and processes that lead to the design of curricula (Haanstra, Kirchner 2013). The outcomes of this survey have been used to draft a common structural competence model.

The two main dimensions of learning that appear in all European curricula are: (1) responding (appreciating, sensing, spectating, apprehending) and (2) making (producing, expressing, creating, realizing, constructing etc.) (see Figure 1). In some countries making is called 'production' and responding is called 'reception' (of images, works of art, and the visual world).

Some curriculum models use three dimensions. In addition to 'making' and 'responding' they include 'reflection' or 'creative thinking' (see Figure 2).

Many models emphasize the fact that the dimensions, whether there are two or three, are interrelated or overlap (see models in Figures 3 and 4 from the Netherlands and Australia).

The comparison of approaches in different European countries revealed a surprising congruence with respect to the main conceptual structures – beyond the hugely diverse terminology and despite the different pedagogical approaches. This congruence applied to the way the curriculum domain was defined also. Respondents in every country agreed that the domain embraces not only visual arts (traditional, modern, and contemporary) but also 'the visual world' (ranging from nature, to applied arts like architecture, design or media, traditional crafts, and youth culture).

Framework of visual competences

This finding enabled us to shape a common model that can be used as a reference point for the other models in different situations. At a first level this model has to demonstrate that the different aspects of competence (knowledge, skills and attitudes) belong together, that they cannot be separated and that competence is always demonstrated or shown in a specific

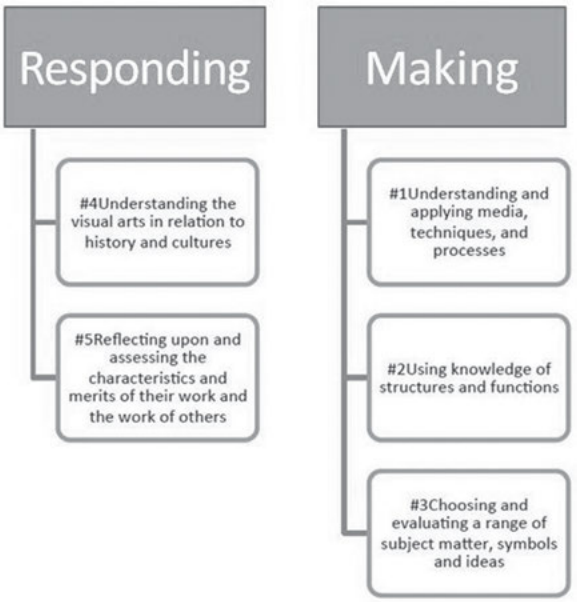

Figure 1. „Responding" vs. „Making". Source: Ernst Wagner

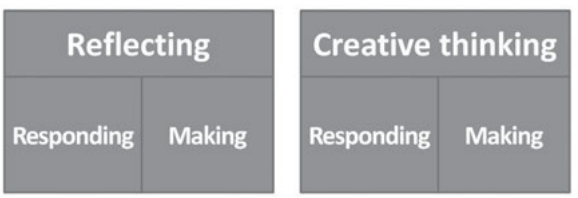

Figure 2. "Reflection and Creative Thinking". Source: Ernst Wagner

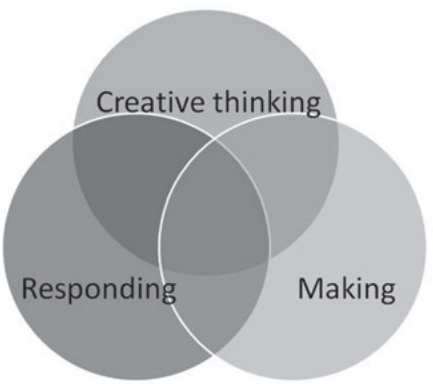

Figure 3. The Dutch competence model. Source: Ernst Wagner

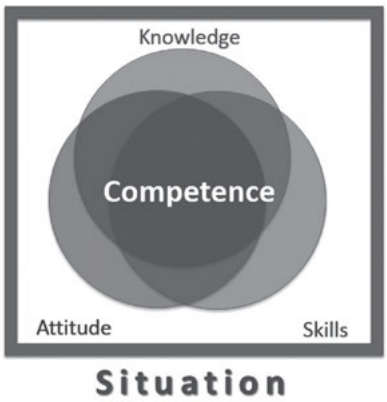

Figure 4. Common competence model – relationship of knowledge, skills and attitude. Source: Ernst Wagner

Figure 5. Common competence model – sub-dimensions and contexts. Source: Ernst Wagner

situation, relating either to solving an assignment at school [Wagner, 2013 a.] or a real life problem out of school (see Figure 4).

This means that the competence of, for example, 'being able to interpret a piece of art', must be viewed as a combination of (1) knowledge (about history of art, genres, methods of interpretation, the impact of context on the function and meaning of art works, etc.), and (2) skills (being able to assign a piece of art to the right period, to interpret it from different points of view, to define the correlation between material/medium, content and form, to [re-]construct previous and current spatial contexts to discover the intentions of the artist, commissioner, recipient etc.); and (3) attitudes (curiosity and open-mindedness towards art, awareness of distinguishable points of view, readiness for a structured workflow and cognitive endeavour, willingness to adopt a personal position etc.). We can observe this competence, or whether a student is competent, and/or is 'able to interpret a piece of art', in a specific context such as a museum where he or she presents an interpretation to other pupils.

At the second level the model requires individuals to demonstrate their competence in some form of communication (for example, while delivering a message to another person or dialoguing with themselves while drawing a picture). It also demonstrates that it is possible to distinguish sub-dimensions in visual literacy (like being able to 'create/shape', 'communicate via images', 'interpret/investigate', 'perceive and judge'), and that in the context of education, using metacognitive strategies is essential for learning (Figure 5).

This important aspect of metacognition needs further explanation. Metacognition can be understood as the process of developing and monitoring one's own learning and working strategies as well as the possibilities of relating this to domain specific demands. It includes understanding the rules, structure, 'grammar' and limitations of the field of 'visual communication'. We (ENViL) understand metacognition as a third dimension – beside making and responding – of the conventional models used throughout Europe mentioned above.

At the third and last level the three-fold model explains four main aspects of competence: self-competence, competence with regard to a specific domain, social competence and methodological competence (Figures 6 and 6b).

With respect to 'interpreting an artwork,' self-competence can be defined, for example, as the ability to determine one's own position and to reflect on an interpretation in terms of individual interests and preferences. Domain specific competence covers, for example, the skill of assigning a piece of art to an historical and cultural context and/or using adequate scientific methods etc. Being able to present and justify an interpretation refers to the social aspect, whereas the skills of researching sources, choosing, deciding and reflecting on a strategy, and considering the chosen point of view address methodological aspects. Methodological

and domain specific competencies are especially important when it comes to interpreting an artwork.

This kind of visualisation shows us that the sub-dimension 'interpreting an artwork' requires a specific set of competencies (self-competence, competence with regard to a specific domain, social competence and methodological competence). 'Creating a picture' on the other hand requires another set, for example, more self-competence, less social competence. So one could use this model to demonstrate these differentiations.

Transfer to other fields

As part of its research programme ENViL is working on a broader concept that will situate the concept of competence at the center of an all-embracing conceptual framework. This framework will connect discussion about the domain, normally the most controversial issue for art educators, with another discussion about situations where visual literacy is necessary. We will develop an instrument that specifies levels of competence so as to facilitate the essential diagnostic work of teachers and give it a solid base. It will be helpful for diagnosing learning problems, appraising and evaluating respective levels of achievement and designing problem solving strategies with pupils. The framework will also draw attention to the significance of assignments and all the questions we associate with assessment, some of which will have to change when they are viewed through 'competence spectacles'.

While we were working on this concept with our partners from different European countries it became obvious that this conceptual framework has huge potential. It could be used as a 'frame of reference' for every country in Europe, and perhaps for more countries in the world. A large group of high-level experts in language education developed a 'Common European Framework of Reference for Languages' (CEF 2001) more than 20 years ago, which has been adopted by nearly all the European countries. Similarly, a 'Common European Framework of Reference for Visual Literacy' could work as a useful scientific foundation and a helpful instrument for stakeholders in our field such as curriculum developers, teacher educators, textbook authors, teachers and pupils. This is probably the reason why the European Commission decided to support these efforts within the 'Lifelong Learning Programme of the European Union' (Comenius).

But this use of kind of methodological thinking about Visual Art education could be transferred to other domains also. Museum and Heritage Education are examples of domains that are closely related to Visual Art education. It would be easy to adapt the approach to them. The biggest challenge then will be to convince the community – or communities – of the benefits of this work. The second challenge, which will be time consuming, lies in describing the sub-dimensions and domains in ways we can all agree on. It is interesting, and intellectually attractive also, to consider the possi-

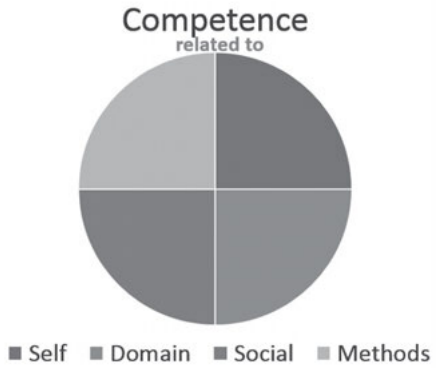

Figure 6a. Common competence model – the aspects of self-competence, competence with regard to a specific domain, social competence and methodological competence. Source: Ernst Wagner

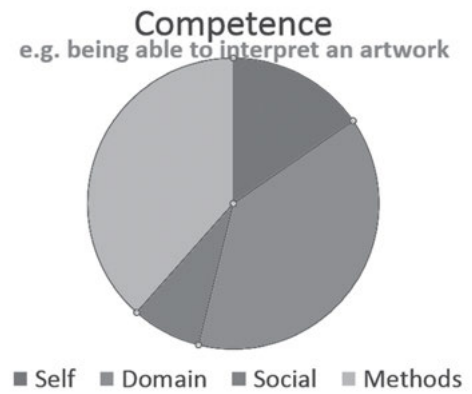

Figure 6b. Common competence model – the different aspects with regard to a sub-dimension. Source: Ernst Wagner

bilities of transferring this exercise and our experience to more distant political realms, further away from our field, such as Civic Education or Education for Sustainable Development (ESD). In the future there will be much to do.

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WHAT'S NEXT IN ART EDUCATION?

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ABSTRACT

The Next Art will be the art of the Next Society. Sociologist and cultural theorist Dirk Baecker coined the term Next Society (Baecker 2007) in order to describe a society based on the computer and built his argument on the assumption that nothing influences societal structures and cultural forms as significantly as the respective dominating media technology of their time. In the long run, the introduction of the computer will affect society as dramatically as the introduction of language, writing and the printing press. Art and Art Education will not be unaffected. Drawing upon Baecker's ideas – and hence in asking for adequate reactions in the field – the invention of a Next Art Education attempts to transfer common approaches in art education to future cultural contexts. To address this 'terrain vague', we suggest a serious shift of focus in favour of "the now" and constant consideration of the potentials of the future. The article presents nine fundamental propositions for a NEXT understanding of Art Education and discusses these and the consequences in more detail focusing on two particular aspects: 'risk' as a potential of the possible, and 'shifts', instead of turns, in knowledge production.

KEYWORDS

Next Art Education, Shift, Risk.

Next

The Next Art is the art of the Next Society. Sociologist and cultural theorist Dirk Baecker introduced the term Next Society (Baecker 2007) in order to describe a society based on the computer as its leading media technology. Baecker built his argument on the assumption that nothing influences social structures and cultural forms as significantly as the respective dominating media technology. In the long run, the introduction of the computer will impact on society as dramatically as language, writing and the printing press. Art and art education will not be unaffected. Drawing upon Baecker's ideas – and consequently asking for adequate reactions in the field of Art Education – a Next Art Education, attempts to transfer common approaches in Art Education to future cultural contexts. What will this Next Art be like and what must Art Education hence become?

To address this 'terrain vague', we suggest a serious shift of focus in favour of "the now" and a consequent consideration of the potentials of the future. #Next, #Shift, #Risk are three out of more than 500 hashtags that help navigate through a book which gathers many ideas for many possible futures (Meyer, Kolb 2015). In this book, 120 texts by 141 authors draft partial scenarios and try to offer contemporary concepts for a Next Art Education. The following section of this paper presents nine fundamental propositions for a Next understanding of Art Education and discusses them and the consequences in more detail focusing on two particular aspects: 'risk' as a potential of the possible, and 'shifts' instead of turns in knowledge production.

Nine Essential Theses on Next Art Education

1. Next Art Education must be radically based in the future. We live in proto-times. It is about becoming, not being. This is best achieved by focusing seriously on "the now".
2. The sovereign subject of the modern age is an outdated role model for educational projects. The hero of the Next Society – neither the intellectual of the Enlightenment who appeals to public reason, nor the critic who appeals to reason is sole judge over real and ideal – it is the hacker.
3. Along with the computer as the leading media technology comes a surplus of control. Next Art Education's focus is on the cultural techniques that are necessary to deal with this. The artists of the Next Society are in control of the cultural techniques of their time. Their art buzzes within the network and vibrates in the media. The artists of the Next Society do not have to be IT experts, but they maintain a creative use of coding techniques and control projects.
4. Next Art Education breaks with the history of art as a grand narrative of Eurocentric high culture. It operates on uncertain ground. It opens up to the unknown, to Next Art, and attempts to think in terms of Post Art. Next Art Education is recognizably connected to the field of art, but is thinking beyond it. Next Art Education knows Next Art does not remain unaffected by the world in which it arises. It deals with current aspects of contemporary life by utilizing current methods of presentation and operating on the current ground of everyday culture.
5. The dominant culture of the Next Art Education belongs to digital natives. This culture is emerging at this very moment. We do not have any experience here. It is foreign to us. Respect for the natives of this Next Society commands our special attention.
6. Next Art Education must be based on the principles of cyberspace turned inside out into real life: the connection of everyone with anyone, the creation of virtual communities and collective intelligence. The issues, problems and phenomena about which students of Next Art Education should be educated must be placed in front of a backdrop of the digital networked global society. This means that academic institutions can no longer maintain the outdated modern educational goal of critical and contemplative work with books and images. They must be based on dispersion in the networks and the operational handling of complexity.
7. For the Next Society, time is no longer an outstretched line that spans from yesterday to tomorrow and causally joins past with future. History belongs to the age of modernity, as does teleology. For the Next Society, time is an instance – what is essential is the present. In geometric terms: a dot instead of a line. The cyberspace turned inside out is becoming the medium of a global 'contemporariness'. Cultural globalization therefore is a constantly present layer of reality.
8. Next Art Education knows that Next Art no longer considers the image as the goal of art, but as its raw material. It no longer strives for the one grand masterpiece, but deals with the plurality of images. It produces deep knowledge of the codes structuring our reality and develops the ability to interactively adopt culture in the form of sample, mashup, hack and remix. And it senses that control over our global reality of life can only be attained through forms of participatory intelligence and collective creativity.
9. So this requires a very thorough rethinking of the basic reference points of Art Education: Next Art Education has left behind the opposition of art and technology originating from the 18th and 19th centuries, and has also moved past the related opposition of nature and culture. There is a new kind of nature in the global contemporariness, a culturally emerged nature implying all born and grown things as well as all the man made things, which are beyond our control. The 'homme naturel 2.0', as a starting point for Kulturkritik* as well as for the educational projects of the Next Society, is man in the state of Next Nature (van Mensvoort 2002). According to the concept of Next Nature, the role model of the artist in Next Art Education projects must be considered very carefully with respect to the depth of its rooting in academic reasoning, using Immanuel Kant's premise 'updated' with the concept of Next Nature: "Genius is the innate mental aptitude (ingenium) through which [next!] nature gives the rule to art" (Kant 1790).

Risk

The cynicism of post modernism, its calculated pessimism and fundamental attitude of denial will no longer have a place in the future. When we consider all the current challenges, like the Internet of things, sharing economy, climate change, global corporations, big data, cyberterrrorism etc. (to mention only a few), life will be far more about seriously identifying potentials for action within these complex structures and hence about learning to control these. Next Art Education is post-ironic at most and actually addresses topics previously held at a comfortable intellectual distance. (Hedinger 2012, p. 112).

The seemingly uncontrollable complexity of networks is increasingly affecting individuals' daily lives.

The persistently changing circumstances of life are neither distant horror scenarios in an unknown future nor utopias we can choose not to accept. We are already in their midst. Everything we refer to as part of the future is already potential reality and the resulting complexity is possibly the only thing that really lasts. From this certainty arises the necessity to realize what is long overdue: To finally apply our everyday experience to education and consciously establish its value.

Education – as we understand it – accepts the future as an immediate responsibility. It needs more than knowledge, the access to it or its intelligent application; above all, it requires agency – agency of individuals and networks. In the light of constant change, readiness to take risks and courage becomes a constant endeavor and the mantra of continuous self-imagination. Courage is, without a doubt, the precondition of any future.

Risk – as we understand it – is a form of calculated loss of controllability (Klein, Schütze 2015). It lies beyond 'absolute safety' in a place where everything is only possible and nothing is probable – where fiction meets reality. Taking risks inevitably means aiming for potentials and hence stretching for the limits of what we are able to control and think. Those who wish to affirm their status as actors in society have to take risks constantly. Going for ventures, searching, failing, searching more and failing again, exercising active loss of control.

Art – as we understand it – still demonstrates the attraction of the conflictual in many aspects. It traces declinations of the other, works with variations in form, and offers opportunities to steer its course towards what has not been thought before. By testing out new limits and taking new paths, art functions as both observer and commentator. By taking a stance, it becomes the catalyst of brave decisions. By confronting observers with problems, mysteries and incomprehensible things in self-evident ways, it challenges them to reinterpret reality and to embrace complexity instead of ducking out.

Education, as we understand it, equals continuous self-conquest and therefore relies on courage. A serious education recognizes art and art teaching as practice fields and rehearsal grounds, as indicators of possible interfaces and as a catalyst for change, as expanding boundaries and surviving occasional crash tests. It is a subject that cannot be categorized, that squeezes in-between the other subjects and teaches essential skills for the future – courage, risk-taking and entrepreneurial spirit. Education, when understood and forcefully pursued in this way, is a constant test of courage and aims to develop a strong sense of the potentials of the possible instead of the probable.

Shift

With this Next Art Education in mind, one would expect a radical turn in contemporary thinking about art education. In postmodern logic, turns were radical changes (for example, the linguistic, iconic, accoustic, curatorial, educational turn). A turn replaces a former system and provides a new view; it changes conditions by claiming that the former system needs to be replaced by a new one. Is this really the way we want to think about changes in favor of a NEXT Art Education?

As a result of the PISA study, European schools have undergone various reforms, such as the strong focus on so-called literacies. María Acaso uses the term micro-revoluciones to maintain that changes should happen within the microstrucures of a school – delivered by individual teachers – in order to make paradigm shifts possible (Acaso 2013). What is important here is that individual teachers can do these small changes. Therefore, we need to think of turns as shifting patterns on a micro-level.

A practical example: Imagine a seminar in contemporary art education, in which future art educators investigate their prospective knowledge: Which questions would be relevant to them? How would these questions change (or hack) their current understanding of knowledge and ways of learning? In other words, "what can we learn from this seminar beyond what it wants to teach us" (Rogoff 2012, p. 33)? The following questions were answered or elaborated on within the seminar by the use of different exercises such as a pre-enactment of a future art educators' congress, through researching literature, reflecting on their biographies, conducting interviews with other teachers or students, or within staged, experimental workshops (for more output, see: http://aligblok.de).

> *How to hack a curriculum? How can I communicate about art I personally don´t like? How can I encourage children to do what they want, if I still don´t know what I want? What does "critical" mean? Who talks about art and how? How is art education related to science fiction? Why is it still important to learn drawing at school? How can I learn to be a good art teacher? What are we going to learn in this seminar? Who owns artworks students create in a collaborative process? How can I evaluate such collaborative results? What do pupils in elementary schools imagine art lessons to be? [...]*

Why are the above questions related to a shift rather than another turn in art education? Any critical or theoretical thinking aims at sharpening awareness in the analyzed situation instead of just solving a problem (cp. Rogoff 2007, p. 37). The ability to collectively raise questions on a not yet fully known subject can be the first step towards a micorevolution. Knowledge, not yet taught but already questioned – as it finds itself in a constant state of crisis – can be understood as a starting point for a process of continuous transformation: #shift.

So, what are the questions you would raise towards a Next understanding of Art Education?

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AT THE CONFERENCE, THE PERFORMANCE LECTURE ACTIVATED A PROCESS OF DISAPPROPRIATION AND RESIGNIFICATION OF A PARTICULAR SEGMENT OF INSTITUTIONAL HISTORY THROUGH THE EMBODIMENT OF SPEECH. THE PROCESS OF RESIGNIFICATION WAS ACTUALIZED AND INSTITUTED THROUGH BODIES, VOICES, WORDS AND WITHIN THE CONTEXT OF A PARTICULAR ACADEMIC AND HEGEMONIC SPHERE.

UNCANNY MATERIALS. ON RESEARCH AND (UN)LEARNING HISTORY IN ART EDUCATION

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ABSTRACT

In the German speaking context, Education in the Arts has not adopted critical approaches towards canonical positions in its history, nor reflected on the entanglements between its histories, discourses and practices. What does researching and teaching the history of art education involve? How should we use art education research and transfer it into other contexts? How can we develop the kind of critical approach that researches with rather than over history? How can we (un) learn histories using collaborative and investigative methods? In 2011 as part of a taught course, we researched the history of our own institution. We uncovered information about the foundation of the 'Meisterschule für Kunsterziehung' at the Academy of Fine Arts Vienna in 1945 under the rectorship of Alexander Popp, who was a member of the Nazi Party (NSDAP). The students researched the archives in groups. They used educational and curatorial strategies to examine the circumstances in which the institute was founded and the implications of this. The findings were disseminated at an Arts Education Conference in Salzburg in the form of a booklet, audio installation, blog and performance lecture.

KEYWORDS

Research, Teaching, History, Art Education.

Uncanny Materials. On Research and (Un)learning History in Art Education

In the German speaking context, education in the arts has neither adopted critical approaches towards canonical positions in its history, nor reflected on upon how the histories, discourses and practices intertwine.[1] What are we doing when we engage in research into the history of art education in 'on' our teaching? How can we develop a critical and involved approach that does not research 'over' history, but 'with' history? And how can we produce modes of (un)learning histories through research, collaboration and investigation?

In this paper, I will ask what it could mean to learn and unlearn history of art education canon in the arts using the example of a course I taught together with my colleague Anna Pritz in 2014/2015. Moreover, I will try to offer a description of what it might mean, 'to adopt an attitude of inquiry' in teaching. I will speak about research in education not as exploration of art, but as a self-reflective and performative mode of inquiry within an institutional setting.[2]

In 2014, while preparing a course entitled Uncanny Materials. On the (Un)learning of History[3], my colleague Anna Pritz and I examined the history of the institution we are working for – namely the Institute for Education in the Arts at the Academy of Fine Arts Vienna. We uncovered documents about the foundation of the 'Meisterschule für Kunsterziehung' in 1941 under the rectorship of Alexander Popp. He had been an illegal member of the Nazi Party since 1935. In 2015, (almost seventy-five years after the 'Meisterschule für Kunsterziehung' was established) the circumstances of the school's foundation, the historical-political debates that characterized its first years and the ideological implications of this for the subject of art education have not been revisited yet.

The discovery motivated us to engage more seriously with the history of the institution we work for. The collaborative mode of inquiry we chose also defined how we approached the 'uncanny' subject matter of our project. The project was transdisciplinary in that it was poised at the intersections of art education, historical research and curatorial studies and set out to present the results publicly at an Arts Education Conference in Salzburg in 2015.

The Archive

The students on the course mainly researched the archive at the Academy of Fine Arts Vienna. But what does it mean to research an archive? According to the French philosopher Paul Ricoeur archives have three characteristics: First, they are 'a set, an organized body of documents' (Ricoeur 1978, p. 66). Second, they are closely connected to institutions: they are a result of institutional activity and as collections of documents they refer to an institutional context. Third, they preserve and maintain archival documents. Archives follow a certain logic, they stem from preliminary

decisions about what is/not important and/or useful. According to Ricoeur, documents preserved in archives are not neutral material evidence; but they are involved in power relations: 'What makes a monument suspect [...] is its commemoration of events that its contemporaries [...] judged worthy of being integrated into the collective memory. Conversely, the document [...] seems to possess an objectivity opposed to the intention of the monument [...].' But on the contrary, 'documents turn out to be no less instituted than monuments are, and no less edifying as regards power and those in power (Ricoeur 1978, p. 68).'

For archival researchers this necessitates accepting that documents are not material evidence of truths. Indeed, our research into the Academy of Fine Arts archive revealed documents that could not be assembled into a coherent narrative of a particular history. My colleague Anna Pritz and I experienced this when we studied the archive the first time and later, with the students. The students read past reports, correspondence and curricula and made joint discoveries. Some files (precisely those that promised the most interesting information) were missing or yielded little or no information about pressing issues. The reports of meetings, notices and protocols in official language revealed seemingly insignificant administrative processes, and left the real questions unanswered. The absence of expected answers to our questions turned out not to be a 'lack'. Rather, we learned to consider gaps in the information in the archive as a constitutive component of the archive itself.

It is important to stress that the investigative process was not linear, symmetrical and uniform. The ups and downs of unknown questions, and doubts were integral to the research process together with discussion, arguments and negotiation between students in their groups and with teachers.

Moreover, the fact that the students and teachers were, and are, embedded into a specific institutional context at the Academy of Fine Arts Vienna with a particular history played a central role for the project.

I think this kind of involvement is significant both for the perspective it sheds on the subject as well as on possible research results. After all, we were not studying just any random segment of the history of art education but the establishment of a singular institute in 1941. The attitude towards inquiry was developed out of an institutional framework of people and practices and at the same time was dedicated to the history and conditions of the very same institutional context.

Of course, this reflexive gesture refers to the discourse of institutional critique in contemporary art (see Buchloh 1999), and even more to the concept of criticality formulated by Irit Rogoff.

In the historical study of art education I am sketching we could not be outsiders. We were always in the midst of the conditions we investigated at one and the same time: As Rogoff says, "in 'criticality' we have that double occupation in which we are both fully armed with the knowledge of critique, able to analyse and unveil while at the same time sharing and living out the very conditions which we are able to see through" (2003)[4].

In the project *Uncanny Materials* this embeddedness played a central role. We were examining and critically interrogating the history of a particular institution while at the same time were (and are) living and sharing the very conditions of this same institutional context. These ramifications and their significance for the learning and unlearning of history in teaching have yet to be investigated in full.

Conference and Presentation: Performing the Archive

The Federal Congress of Education in the Arts takes place regularly in the German speaking countries. It was the stage for the presentation of our research outcome. The students[5] presented the results in the form of a performance lecture and on a blog, short publication and audio installation. The following questions were shared with an audience of experts in this way. Why was the institute for Education in the Arts set up under the Nazi regime in the middle of World War II? Who initiated the foundation of the institution and with what intentions? What ideological implications and consequences for the discipline of education in the arts can be traced through the establishment in 1941?

The lecture performance consisting of sequences of quotations from documents in the archive as well as research notes was central to the presentation. The script was assembled collaboratively. After a few rehearsals, a group of students mingled with the audience and performed the script as a lecture. 'Performing the archive' is a format 'where the archive is transformed into a dynamic and self-reflective medium that intervenes in and challenges its own ontology' (Borggreen, Gade 2013, p. 25). Following this idea, I want to argue here that the students' lecture performance dis-appropriated and re-appropriated a particular segment of institutional history by asking how and for whom that history is constructed and told.

Theoretically, perfomativity is understood as a mode of exploring, shifting and queering conventions and norms as well as seemingly objective assemblage. The word 'performativity' means to act, carry out, settle and position something and it refers to the production and construction of reality through action. This notion brings us back to the philosophy of language and to discourse in cultural studies that took John Austin's theory of speech acts as their point of departure. According to Austin speech acts are 'performantive utterances'. They are self-referential and they constitute reality (see Austin 1962, p. 12–25). Erika Fischer-Lichte stresses, that Austin's concept of the speech act can be applied to bodily actions since they are self-referential and they constitute reality (see Fischer-Lichte 2004, p. 34). However, Judith Butler instigated a central turn in the discourse about this topic when she discussed the performative power of social practices. Following

Butler, a speech act can be transformed into an act of resistance, if it is disappropriated. Butler emphasizes that the possibility of a disappropriating speech from its social framework lies in the repeatability and variability of signs. It is exactly this ambivalence between social conditionality and subversive effectiveness that enables the speech act and hence performativity to disappropriate and to reconstruct meaning (see Butler 1997, p. 60–65). This is exactly, what I think happened at the Arts Education Conference in Salzburg when the students performed a lecture based on archival research. Performativity, in Butler's sense, is a useful term for evolving the possible meaning of the performance lecture as a format. At the conference, the performance lecture activated a process of disappropriation and re-signification of a particular segment of institutional history through the embodiment of speech. The process of re-signification was actualized and instituted through bodies, voices and words in a specific constellation of time and space and within the context of a particular academic and hegemonic sphere.

On the (Un)learning of History and Learning with History

What might it mean to look into history more closely? And what might it mean to think of processes of unlearning and learning from this perspective?

In this part of my contribution I will refer to Irit Rogoff and Nora Sternfeld who have explored the idea of unlearning, informed by postcolonial theory, in the context of visual culture and critical art education. Knowledge involves organizing, sorting, collecting, distinguishing, delimiting, comparing, merging, and includes skills, the body, experience, perception, recognition etc. We understand learning therefore not just as an abstract appropriation of knowledge. It is not just a cognitive process; we learn physically, emotionally, consciously and unconsciously. Learning is both individual and social and not just focused on content. By learning we also learn what is not obviously visible. This means, that we always also internalize what is socially valuable and what not, and we appropriate power relations when we learn (see Sternfeld 2014, p. 12).

Therefore unlearning the history of art education canon in the arts implies becoming aware of the way certain interpretations and constructions canonize history. Unlearning is not so much an individual process but it aims at a deconstruction of the powerful knowledge and of the hegemonic production of historical evidence. In addition, unlearning is not just a reflexive process, but a performative mode (see Sternfeld 2014, p. 19). Because learning and unlearning are bodily processes, our values, norms and beliefs are embodied also.

So what did we learn and unlearn in the context of the project *Uncanny Materials*? From my point of view, as teacher, participant and observer, I think we learned a lot about structures and protocols involved in the production of knowledge: researching archives, analysing documents, libraries, reviewing literature, comparing material and presenting outcomes. However, it is important to point out that negotiating the what, how and whereto of the research as well as an experimental mode of dealing with the material from the archive became more important than simply trying to detect answers.

Thus, history became less the subject matter of the research; more importantly, the questions it raised became the vehicle for trying to unlearn and share what we already thought we knew about the history of education in the arts. Although it is the case that the students, my colleague Anna Pritz and I did some research on history, I argue that our investigation was equally, or even preferably, embedded in and with history.

Closing Remarks

Many tangled up issues in this project remain unresolved and have even become even more complicated. Questions such as: Who and what determines the outcome of research in and on art education? What does the application of specific models of research and curating tell us about the researchers? Research and teaching do not only indicate possible subject matter, but also state something about the researchers themselves, their context, and about the procedures and structures and the methods and goals of such a research.

Finally, what have we learned and unlearned from doing this project? We unlearned the idea that history is out there just waiting to be excavated and can be found in archives. We started to deconstruct an art education canon of historically acknowledged positions, norms and values. We learned that researching history means engaging in and with it in the Here and Now. And we learned that learning and research develop through certain protocols – be it the framework of a course or seminar, the institutional context the way teaching is informed by disciplinary restrictions and rules. Finally, we learned that the history of an institution materialized in documents, structures and processes influences what and how we learn in the same context today.[6]

NOTES

1 These are shared observations of the international research network called Art, Education, History. It members are: Sidonie Engels, Jan Grünwald, Gila Kolb, Barbara Mahlknecht, Anna Pritz, Anna Schürch, Bernadette Settele, Nora Sternfeld. They have taken on the task of critically illuminating the canonization of the history of education in the arts and incorporating history into their teaching in new ways.

2 The concept of research within art education merits further examination. In the following remarks, I am referring to discourse about artistic research that has emerged recently. See Elke Bippus (2012) and Sybille Peters (2014) among many others.

3 I would like to thank Sidonie Engels, Jan Grünwald, Gila Kolb, Anna Schürch, Bernadette Settele, Nora Sternfeld for coming up with the idea for the title of the course.

4 Irit Rogoff: From Criticism to Critique to Criticality [cited April 18, 2015]. Available from: http://eipcp.net/transversal/0806/rogoff1/en.

5 The students who participated in the course are: Maren Blume, Maria Ettel, Nora Hofbauer, Fabio Otti, Hajrudin Diman, Michael Lueger, Veronica Schramek, Paul Türk, Eva Eisner, Lisa Großkopf, Julia Moschen, Lisa Stumbauer, Caroline Fertl, Theresa Kohler, Martina Kogler, Donata Kuess, Letafat Tavakoli, Birgit Knoechl, Anja Kohlweiss, Viktoria Mayer, Raffaela Mayerhofer and Elisabeth Pfalzer.

6 Irit Rogoff wrote: "My current theoretical articulations locate the artists' work within a set of cultural debates in which the visual artist rarely finds representation. It assumes the form of a practice, of a "writing with" an artist's work rather than writing about it, a dehierarchization of the question of whether the artist, the critic, or the historian [...] has the final word in determining the meaning of a work in visual culture." (Rogoff, 2008, p. 104). Using Actor-Network-Theory we could even argue that the construction of history is not only a human action but an interplay of human and non-human entities also.

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How does one
TRANSLATE
a VISUAL WORK
of ART into
WORDS?

HOW
DOES ONE
TRANSLATE
A VISUAL
WORK OF ART
INTO
WORDS?

THE ARTIST AS WRITER

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ABSTRACT

Writing about art and art practice poses a wide range of questions. Frequently it is a challenge to describe a work in a way that allows readers to see and discover it on their own terms. A substantial part of the problem lies in the fact that visual imagery has a language of its own. It exists without words. It often develops as a process that is intuitive and silent. How then does one translate a visual work of art into words? This paper draws parallels between the process of writing and Lev S. Vygotsky's discussion of "inner" and "exterior" speech, as defined in his seminal text, "Thinking and Speech," published in 1934. Vygotsky likened "inner" speech to a field without words and argued that a child's consciousness develops as it bridges its "inner" and "exterior" speech. Consideration of Vygotsky's theory in the context of writing about art practice, suggested analogous processes that could prove useful for developing new and creative teaching strategies.

KEYWORDS

Writing, Art, Post Graduate Theses, Vygotsky.

Introduction

Writing texts about art concepts, visual imagery and studio practice is a significant component of MFA programs today. As the number of PhD programs grows, this is likely to increase. It is important that art educators highlight some of the issues that can arise writing a master's thesis. A number of questions tend to emerge once students begin to write about their practice as it unfolds in the studio. What is the best way to describe the work? How much detail should they provide? Which words should they choose to explicate the artistic process as this relates to content? How can they hold the reader's attention throughout the text? How much should they reveal? Is it better to write a personal narrative or adopt a more theoretical approach? What is the best way to contextualize their work in the contemporary art scene? These are just some of the questions students' face writing a thesis and preparing an oral defense. Translating a studio process into a written or oral presentation poses many dilemmas. The following analysis of issues of translation is informed by the seminal text, "Thinking and Speech" published in 1934 by the Russian Psychologist and Social-Constructivist theorist Lev Vygotsky.

Lev S. Vygotsky's Theory

Lev S. Vygotsky (1896-1934) has played a key role in the development of pedagogical theories leading to dialogic, experiential and social-constructivist teaching. Central to Vygotsky's work is the argument that language plays a central role in the development of consciousness. His text "Thinking and Speech" (Vygotsky in Rieber and Robertson 2004, pp. 65-110), which is referred to throughout this essay, examined inter-relationships between what he called 'inner' speech (defined as speech for oneself) and 'exterior' speech (speech for others), and how the two inform the development of individual consciousness. He argued that Inner speech is "speech carried out almost without words" (Ibid., p. 99). On page 80 he explained, "what this concept actually refers to are all the internal processes that occur before the act of speaking, that is, the entire internal aspect of external speech". A child develops inner speech during encounters with its surroundings, and with parents, siblings etc. As it develops, it creates the kinds of abbreviations, shortcuts and codes that enable the mind to move swiftly between layers of consciousness. Vygotsky understood inner speech as "a thought [that] may be compared to a cloud shedding a shower of words ... Precisely because a thought does not have its automatic counterpart in words, the transition to thought from word leads through meaning" (Ibid., p. 107).

Creative Expression & Studio Practice

Art practice and working processes in the studio are often based in intuitive investigations of form as this relates to content. Moving back and forth between art making (which is intuitive and involves letting the hands do their work and allowing elements of chance to play a part) and analysis (which involves stepping back, observing, and analyzing what is there) are both important parts of the process. However, if the process is guided too much by the analytical part of the brain, there is a danger the work becomes too literal. If one lets the controlling side of the mind take a back seat, creativity is bound to emerge. This mental state brings to mind Vygotsky's metaphor of a cloud shedding a shower of words – a process that occurs before speaking and implies a state of mind without words. Where students are asked to present work formally and write a master's thesis, it is possible to argue that there is a sense in which they are being challenged to create a bridge between their inner and exterior speech. There is potential during this process for one to inform the other; or, as Vygotsky proposed during his discussion of inner speech: "Any thought has movement. It unfolds. It fulfills some function or resolves some task. This flow of thought is realized as an internal movement through several planes, as a transition from thought to word and from word to thought" (Ibid., p. 72).

Writing as Form (Exterior Speech)

Questions soon emerge once students begin to translate the artistic process into words. The challenge lies in the dichotomy between being clear (following the dynamics of text) and open-ended (mimicking the process inside the studio) so as to allow readers to discover the work on their own terms. Once a text is in place, it functions as a link between the inner-intuitive and exterior-analytical languages that enable dialogue with a reader. Returning to Vygotsky: "The relationship of thought to word is not a thing but a process, a movement from thought to word and from word to thought. Psychological analysis indicates that this relationship is developing process, which changes as it passes through a series of stages" (Ibid., p. 72).

Artistic Expression and Text

The processes of moving from thought to word and word to thought, or from visual expression to literary form, feed one another and assist student self-analysis. Searching for words to describe their work can help students define the aspects that are most important for them. But back in the studio, these same definitions may prove too narrow and in need of alteration. This movement back and forth between intuition and analysis stimulates the process so they develop their work in new, unforeseen ways. As Vygotsky pointed out: "the relationship between thought and word is a dynamic process. It is a path from thought to word, a completion and embodiment of the thought in the word." (Ibid., p. 108).

Methods

The creative teaching methods presented below foster a supportive learning environment and assist students to develop their writing skills.

Free-Writing/Journaling: Ask students to write for three-five minutes every day. The goal is to consider their work and the process while journaling but not to pay attention to a possible reader. They should write by hand with no breaks for analysis, in a manner similar to activating Vygotsky's concept of inner speech. This exercise, thus, allows the students to work with their 'inner speech' and let it flow freely. It is a closed dialogue in which the words are not intended for anyone else's use.

List of Words: After a couple of weeks of Free-Writing, ask the students to pick out words from their journals they find most useful for describing their work and artistic process. Choosing words helps them with the next step, which is to ask, "how do these words read to an outsider?" It opens up the realm of inner speech to an exterior one that involves multiple potential readers.

Interviews: Ask students to pair up and prepare questions for an artist interview. They should consider words, ideas and questions that will assist them in a discussion of their work. These interviews function as a bridge between the inner and exterior speech. As Vygotsky stated: "Oral speech occupies a middle position between written, and inner speech in this respect." (Ibid., p. 97)

Literature: Ask students to collect references, develop a bibliography and review literature on a topic that is relevant to their work. They should read and present the findings in class and explain how they link. This assignment helps students to position themselves in the wider context of contemporary art practice. It also means they have to study how other artists speak and write about their work.

Multiple Drafts: The process of writing is likely to inform new work in the studio. Multiple drafts allow for such practice to fully unfold. Ask students to write their texts in sections and present each part for peer review. Discussion in class can include consideration of the author's use of words and how to develop an individual literary voice. They should also discuss their own experience of transitioning from visual to written language.

Mock Defenses/Public Presentations: Finally, practicing public presentations and mock defenses through peer review in class serves to familiarize students with the format of formal presentations.

Conclusion

In summary therefore, searching for words to describe processes of art making may help students to define aspects of their work that are important to them. But back in the studio, those definitions sometimes prove too narrow and need to be altered. Moving back and forth between intuitive and analytical modes of thinking stimulates the artistic process and enables work to develop in new and unforeseen ways. In the words of Vygotsky: "the relationship between thought and word is a dynamic process. It is a path from thought to word, a completion and embodiment of the thought in the word." (Ibid., p. 108).

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TEACHING AND LEARNING AT THE INTERSECTION OF POVERTY AND DESIGN EDUCATION

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ABSTRACT

The Baltimore Design School project has raised fundamental questions about design education in urban secondary schools where the majority of students are African American and come from poverty. The Design school, which is entering its fifth year, has brought together a community of art and design educators and design professionals who are engaged in on-going dialogue about design education. They are questioning how to deal with issues such as what constitutes core learning in design, how to develop discipline specific investigations and design learning strategies with poverty in mind. This paper elaborates some of the issues, questions and teaching strategies that are being explored within this context and considers how they might inform post secondary design education.

KEYWORDS

Design, Urban Settings, Secondary Schools.

The Intersection

The Baltimore Design School, or BDS, is among a handful of new secondary schools in the U.S. specializing in design education. BDS serves 6th through 12th graders, thereby combining middle and high school. The school is just finishing its fourth year, and presently serves 450 students in grades 6-10. It is an urban city school and ninety percent of the student population are of a low socio-economic status and African American. The school has a strong partnership with the Maryland Institute College of Art. As such, BDS functions as a laboratory for rethinking design education and learning how to teach with poverty in mind. It was originally conceived as having three specializations at the high school level: architecture, graphic design and fashion design. The curriculum begins in the 6th grade with two strands. The art strand focuses on drawing skills, basic media and material explorations. The design strand introduces students to computers using Adobe Creative Suite, involves project-based learning, and orchestrates design explorations in preparation for choosing a specialisation in high school.

The School Board of Trustees consists of representatives from architecture and graphic design firms, fashion houses, and colleges that prepare designers. During a retreat, we talked with them about the paths that had lead to their chosen fields. Many spoke of discovering design through childhood play and being taught how to make things by family members. Opportunities to take special classes or workshops, to visit museums or travel, and cultivating interests with family were reported to be formative.

But what if your student population has not had these advantages? How can design education be shaped by play, opportunity and affirmation so that students from poverty can begin to envision themselves as designers? Given that some will not become designers, what is the real value of design education? While we continue to explore these questions, this paper reports on what we have learned thus far and shares some of our most effective teaching strategies.

Starting with Empathy

Empathy is a key attribute of a good designer (Lawson 2005) and is essential for teachers with poverty in mind (Jensen 2009; 2013). For Lawson (2005) the essential difference between an artist and designer is that the latter must consider the needs of a client. It is empathy that enables designers to set aside their egos, listen closely to others, understand where they are coming from, and respect the constraints of a given problem or project. Designers must earn the trust of their clients, ask good questions, think about problems strategically, and exchanges ideas in ways that lead to the best solutions.

Empathy is the key attribute also of teachers who work successfully with students from poverty (Jensen, 2013). Since most teachers of disadvantaged students come from a different race, culture and class, teachers have to earn their trust. These students have often been let down by adults and this is not easy to accomplish. Successful teachers are caring, well-centered, patient, open, forgiving, and fully able to grasp ways in which poverty compromises young peoples' lives on a daily basis. Furthermore, they work relentlessly to create a safe learning environment while developing the mindset, skills, behaviours and knowledge that support transformational growth. The strategies discussed in the next section of the paper may have value at higher levels of education and in different socio-economic and cultural settings.

Putting Learner Mindsets First

The term 'student-centered' is frequently associated with elementary and secondary education and not with higher education. Perhaps post-secondary students' needs, interests and values are overshadowed by expert assumptions about the skills and knowledge that are assumed to be critical for entering a design field. In the case of BDS, middle school students earn entry through a lottery and their reasons for choosing the school may not have anything to do with design. Or the choice may be based on a genuine interest in 'making things,' constructing, and designing. Even for students with a clear sense of the field they want to pursue, our first priority is to make design seem an engaging way to think and learn. Further, we want to broaden their horizons by helping them discover new abilities, interests and possibilities. It follows that the curriculum is organised initially around project-based explorations. Moreover, the projects are student-centered – that is, based on their interests and carefully designed to allow for choice and personal meaning making. As is the case in the professional design world, the design process is cyclical and returns frequently to reflection. Students are encouraged to periodically reflect on what they are learning about themselves and their peers, as well as what they are learning about the world of design.

Carol Dweck's (2006) psychological research revealed that students are likely to come to school with one of two mindsets. She describes a fixed mindset as one in which students hold a limited view of their potential, and assume they are less smart than their peers and are sure to fail if they try something new or hard. A growth mindset embraces risk and assumes that growth results from new challenges, in spite of possible failure. The first step is to help learners identify their mindsets and understand how to develop their brains by adopting a growth mindset. It is startling how many adults believe intelligence is a fixed attribute. In fact, addressing mindset among college students might be just as

important as in secondary urban education. As Graff (2004) reminds us, in the title of his book, students will be "Clueless in Academy" unless we help them understand how to perform well. We cannot simply assume disadvantaged, or even advantaged students, know how to be successful learners. Addressing mindset, teaching study skills, emphasizing how to do the work well, and developing thinking processes can transform disengaged students into successful and confident learners.

Playful Investigations

Both the new national standards for art education and recent literature (Burton 2000; Walker 2001) suggest the U.S. is shifting from a teacher-directed to a more student-centred approach to learning. Teacher-directed learning leads to predictable results and to students making the teacher's art. In contrast, student-centered learning relies on investigations of materials and ideas in which students find their own voice and meaning. In the beginning, we (at BDS) believed it important in 6th grade to focus on developing specific skills and discipline. However impressive the resulting work, our students clearly found the labour-intensive skill-based assignments boring. We are now rethinking how our middle school curriculum might orchestrate the kinds of playful investigation that ignites imagination and literally 'hooks kids on design through play.' A number of recent publications offer useful models for structuring play as part of the learning process (Smith 2008; Lupton 2006; Gude 2010; Salazar (2014). Our teachers now include play, experimentation and research as part of the art or design process that so these processes become habits of mind.

In some ways we are trying to compensate for the lack of childhood play in the disadvantaged students' lives, because such play with processes and materials, and role playing, are where affinities, interests and abilities are often discovered. However, our interest in play is broader than that because a sense of play seems to be valued and encouraged by highly creative design firms. Therefore, how to infuse a sense of play into a design curriculum is a question colleges might entertain as well.

Building Art and Design Vocabulary Backwards

Formal approaches to teaching elements of art and principles of design continue to be pervasive in U.S. schools and colleges. This practice makes one or more formal concepts the center of an assignment. An alternative approach inverts the process. Instead of starting with an art element or design principle, work is motivated by a challenge, an investigation of material, an existential question, or an open-ended problem. Discussion of how form creates meaning comes later in analyzing and decoding of the work, in process or at its completion. The resulting vocabulary tends to be richer and more contemporary than the foundational language proposed by Arthur Wesley Dow (1924) and his followers in the early 20th century. Richer language and concepts can be drawn from nature, science and human behavior (Roukes 1988) and contemporary art practice (Gude 2004).

So why do so many college foundation courses still draw on Dow's "Elements of Art and Principles of Design"? Even Johann Itten's (1975) much richer language, based on explorations of contrasting opposites, seems to be largely ignored (Carroll 2011). Peter London (1989; 2003) advocates using prompts and/or existential questions to generate meaningful self-reflective work. Sandra Kay (1997) proposes shaping elegant problems so that students arrive at elegant solutions. The central idea of both these authors is that students who become more deeply engaged and find personal meaning and value in the work will invest more effort, craft their work with greater care, and trust their own intuitive aesthetic sensibilities. Moreover media and skills are mastered more quickly because they are essential for telling students' own stories and expressing their ideas. When this happens, work exceeds teachers' expectations.

Building Agency through Dialogue

Art and design teachers at BDS use structured dialogues to develop critical thinking. This has the larger purpose of building agency among a population that is too quick to respond emotionally or lacks understanding of how to exchange differences of opinion. Beginning in grade 6, students are taught to share feedback using the strategy "Praise, Question, Polish" (PQP). The first response is praise for something perceived as good. This is followed with a question (possibly a request for more information, the reasons behind a choice, or intent). The last "P" stands for polish (a suggestion or idea that might assist the development of the work). This simple strategy shapes critical feedback by making it positive and supportive and facilitates a safe learning community. It models the way artists and designers talk to each other, and enables learners to open up conversation with each other.

Rebecca Belleville, who teaches 8th grade studio art, employs strategies such as "Claim, Support, Question" drawn from Project Zero (Ritchant 2015) that are especially useful for developing higher thinking skills. Claiming means describing what one perceives or understands to be the case. Supporting that claim with evidence follows next. Forming a question refers to identifying something one wants to know more about. Belleville reports that learners are encouraged to trust their perceptions as well as their capacity to decode

meaning through the practice of forming a response, supporting an argument, and becoming curious to learn more.

Asking student makers what kind of feedback they would like about their work, or how they want critical dialogue to proceed gives them additional agency. Critical feedback often falls on deaf ears. However, when students ask for help they are more likely to hear what is said. There are other ways to structure feedback. For example Liz Lerman's process (Lerman & Borstel, 2003) has four-steps for shaping a dialogue between a maker and respondent. The last step goes like this: The respondent says to the maker: "I have a suggestion. Would you like to hear it?"

Using such strategies over time has long-term benefits in that habits become routine, natural, and automatic. Moreover, they parallel the steps in critical thinking academic studies value. Importantly, they lay the groundwork for a mutually supportive learning community in which individuals contribute to their peers' development and benefit from peer-feedback. Additionally they learn how to initiate conversations when they want to explain work or talk with professionals.

Professional Exposure

Meghann Harris, who has a BFA qualification in graphic design, teaches both middle and high school students at BDS. In reflecting on her training she says her internship in a design firm gave her a much better sense of what it means to be a graphic designer than years of college coursework. Hence, she makes it a practice to get both middle and high school students out into the real world to work alongside college students on projects or to shadow professionals in the field. Harris reports that this kind of exposure enormous impact on her students. They return energized and more focused in their work. These experiences are formative for a population with few previous opportunities, beyond television, to imagine what the professional world is like. However, we should not assume more advantaged populations have a better sense of that world. All students gain from exposure to authentic experiences that sharpen their understanding of the knowledge, skills, and behaviors they need and that broaden their horizons.

Questions of Breadth, Depth and Choice

The Design Arts High School (DASH) in Miami has developed a curriculum model with tracks leading into Media Arts, Industrial Design, Architectural Design, Fashion Design, Graphic Design, and Studio Art. It was founded 25 years ago and offers programs for grades 9-12. BDS is different in that it starts at middle school level with an exploratory curriculum that leads to a specialization at the sophomore or junior level. As we continue building and refining the curriculum year by year, we have been asking ourselves how broad it should be, what additional electives and specializations to add, and how deep study in the major specializations should be.

Lawsons' research (2005) found that each design area uses different materials and processes and necessitates acquisition of specific forms of knowledge as well as the command of different technologies, tools and equipment. At the same time, design fields are also expanding in new and divergent ways. Our students tell us they want access to coding, animation, robotics, gaming, app design, and more. Our capacity to present a repertoire of options is tempered by limited resources. Our challenge is to design a program that combines breadth with depth and is sufficiently flexible to address individual interests. These conversations must be going on in higher education too.

Real Problems, Social Issues

Finally we return to Jensen's (2013) advice about teaching with poverty. He suggests we engage students in real and relevant problems and in projects that address the issues they care about and have meaning for them. While young people are naturally enamoured of design stars and want to be rich and famous, the world of contemporary design is becoming more socially engaged and increasingly focused on using design for positive change (Lawson 2005; Kay 2015). It seems especially fit that young people who have experienced the ravages of poverty could use design thinking as a way of investigating the past, exploring the present and imagining the future. Further, design offers a tool kit of techniques, strategies and expertise for proposing interventions and creating solutions. A design school that trains young people to produce consumer goods has some value. However, the greater good may be found in helping young people see how design might make the world better for everyone. To accomplish this, students need a rich academic preparation through which they gain a deep understanding of history, power and politics. It is worth mentioning that the line between art and social design is blurring. Higher education must be debating similar issues, especially when it seeks to attract and empower diverse student populations. These kinds of conversations are also evident in the world of professional design where sustainability, social impact, and social justice are shaping practice.

Concluding Thoughts

Adolescents from disadvantaged and diverse communities have a lot to teach us about how to make design education engaging, meaningful and worthwhile. They are challenging us to examine preconceived notions about how students learn, what kinds of real and relevant problems resonate with and empower young people, and how design education can become a vehicle for social change. We are learning about the importance of developing empathy with and among students, addressing student mindset, incorporating playful investigations, structuring investigations to lead to personal meaning-making, building agency through structured dialogues, engaging students with real and relevant design problems, offering opportunities to discover what professional designers do in real life, and shaping a program with breadth, depth and choice. Such ideas may serve higher education as well, especially as it seeks to embrace and empower students from a broad range of socio-economic and cultural backgrounds.

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EVOLVING THIRD CULTURE THINKING IN ART AND SCIENCE

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ABSTRACT

A recent joint meeting of the National Science Foundation and National Endowment for the Arts engaged influential thinkers in exploring various forms of inquiry that concern the fields of art and science, with a focus on the academy. Discussion focused on opportunities for advancing scientific knowledge and new forms of artistic research, output and collaboration and this suggests that building a sustainable platform for cross-disciplinary discourse and activities that advance third culture thinking is timely and relevant. This presentation will explore selected curricula, research models, fellows programs, and collaborations that support creative work and research at the intersection of art, science and technology with a special focus on a recent Mellon Foundation funded vertical seminar and Art/Science Fellows group. In this seminar faculty and doctoral and MFA students considered the realms of science and art with a view to challenging the notion these are incommensurable realms of knowledge. Science historian Thomas Kuhn proposed that it is most productive to explore art and science as products of human activity; and stated that while images are the inevitable outcomes of art making, they function as tools only when they used to advance scientific knowledge. This assertion has been challenged, and art and science post-graduate and PhD programs exist in numerous research institutions internationally.

KEYWORDS

Art, Science, Technology, Third Culture.

Introduction

Science inspires and informs the arts and the arts inspire and inform science. A recent joint meeting of the National Science Foundation and the National Endowment for the Arts engaged influential thinkers and leaders in exploring various types of inquiry that concern the fields of both art and science, predominantly in the academy. Discussion focused on opportunities for advancing scientific knowledge and new forms of artistic research, output, engagement and collaboration. The results suggest that building sustainable platforms for cross-disciplinary discourse and activities that engage both domains is timely and relevant.

The reciprocal relationship between art and science has fostered creative work, discoveries, entrepreneurial thinking and innovation through exchanges of ideas and collaboration under the umbrella of evolving technologies. In addition, the problems associated with a world continually challenged by globalization, technological advancement and shifting socio-political landscapes are so open-ended and complex they resist any singular approach or resolution. The life sciences, biotechnology and nanotechnology in particular, are generating new conversations and collaborations between artists and members of the scientific community. Such partnerships have the capacity to incite reasoned debate on controversial issues associated with advances in science and medicine and to expand possibilities for understanding the impact of science and technology on the human condition and all living systems.

This presentation will highlight recent collaborative projects inspired in part by "The Art I Sci Fellows Program," and the "Vertical Seminar Program." These two programs promoted a rich exchange of ideas between academic divisions at Washington University in St. Louis and the university and other academic institutions in the U.S.

The Art I Sci Fellows Program

The Skandalars Center for Entrepreneurship recently provided generous funding to launch a new fellows program to serve as a platform for serendipitous conversations between artists and scientists across campus, and to function as an incubator for future collaborations, creative work, entrepreneurial initiatives and new research. The program initially brought together a group of thirteen faculty members and four MFA dissertation and PhD level students from across campus to share their work and research activities. Notably, it also bridged the Danforth Campus (which houses seven separate schools) and the Medical Center and campus, in addition to serving as a conduit for collaborations between Art, Design and Architecture on the one hand and divisions such as Medicine, Biology, Psychology/Neuroscience/Philosophy, and Engineering on the other.

Group members met approximately ten times over the course of the semester to share work and research. Presentations centered on such diverse topics as: the

split-brain phenomenon and its relationship to consciousness; architecture and the anatomy of space; the study of the parietal cortex in processing visual spatial information; the influence of optics on eighteenth-century theater; anatomical modeling in early modern Italy; and the neuroscience of mental imagery. One intended outcome of these exchanges was to establish a core of stakeholders keen to develop stronger ties between the sciences, humanities and the arts, and formalized programs integrating arts and the sciences at Washington University. These outcomes are already being realized with emerging partnerships among fellows and between institutions, notably Washington University and the University of California Los Angeles (UCLA). In the words of one faculty participant, Professor Rebecca Messbarger: "This is exactly the kind of pioneering, cross-disciplinary teamwork that, I believe, should define our university culture."

One of the new initiatives that emerged as the semester progressed was a team-taught, interdisciplinary medical humanities course. The "Art of Medicine," was shaped more precisely through discussions that transpired in the Art I Sci Fellows group. It was supported by an interdisciplinary teaching grant from the University Provost and was a major influence on the conceptualization of a Medical Humanities minor.

The syllabus for "Art of Medicine" is as follows:

> *This interdisciplinary, cross-school course at the intersection of the humanities and medicine offers students a singular encounter with the changing art and craft of western medicine from ancient times to the present day. The course engages a variety of texts, including primary works and scholarship in the history of medicine as well as artworks and literary and dramatic narratives that represent the body, disease and healing care. A principal aim is for students to learn to see medicine as a social practice deeply implicated in the beliefs and struggles of particular cultural and historical contexts (Syllabus, p. 2).*

The Sci I Art Fellows program also included Architect Sung Ho Kim, who collaborated with two plant scientists on original research into integrating biological and architectural materials. Their work extends pre-existing architectural discourse and research on green projects and additionally re-engineers single cell moss, which filters harmful pollutants, into new living architectural forms.

Professor Kim believes it is critical that designers use knowledge from other scientific fields. Cellular transformation research uses cross-disciplinary approaches and advances in engineering and biology. He asserts that whereas research development has been relatively static in architectural design it has evolved more rapidly in engineering and biological sciences. Kim recently commented (in an email to this author) that their "research methods are designed to allow for more collaborative practices to emerge, with designers, engineers and biologists brought together at the beginning of the design process, rather than in the final stages of a design project, as is usually the case." An integrated model combines digital design exploration along with conceptual understanding of the principles underlying biological architecture, with a particular emphasis on the structures and processes responsible for complex architecture within cells.

Finally, Kathy Miller discussed the power of images in relation to rapidly evolving methods of visualizing the organization and dynamics of tissues, cells, and sub-cellular structures, and explained how this has revolutionized the type of information biologists can gather. Novel imaging techniques and new technical advances have resulted in experiments that address questions in ways that were unconceivable in the past. Her presentations highlighted some of the ways in which imaging has revolutionized biological research, specifically in the field of cell biology of structural components. From the conversations they generated, several program participants discovered a common interest in picturing organic forms and structures and have discussed the idea of an "Artists in Labs" program and future collaboration between Art and Biology.

The larger, overarching aim of the Art I Sci Fellows Program was to develop a formally recognized institutional relationship between Washington University and UCLA by establishing a memorandum of understanding (MOU). Professor Victoria Vesna visited our Art I Sci Fellows group in the fall and became a key collaborator in the development of a partnership. Upon obtaining the MOU, the Art I Sci programs at both institutions jointly conceived co-sponsored programs. A symposium and catalogue project entitled "Art + the Brain: Stories and Structures," convened last November at UCLA's California NanoSystems Institute, was attended by six fellows from Washington University and three faculty members from UCLA.

Mellon Vertical Seminar: The Role of Arts Practice in the Research University

As an artist who frequently investigates intersections between art and science, I recently served a three-year term as a member of a national task force developing communication strategies and case-making documents for the Alliance for the Arts in Research Universities (a2ru). The Alliance, launched in 2012, is a partnership of approximately 30 research institutions from across the United States designed to advance the role of the arts in the academy. A central mission of the task force is to transcend the instrumental arguments that are typically used to reinforce the utility of art to other disciplines and articulate its intrinsic value as a unique form of knowledge production.

Inspired by a2ru's ambitious undertaking, I accepted an invitation from the director of Washington University's Vertical Seminar Program to teach the last in a series of five seminars. (This program is a Mellon Foundation funded initiative to support innovative approaches to collaborative research that includes scholars and practitioners at different levels.) In "The

Role of Arts Practice in the Research University," we explored original creative work produced in collaboration with high-level research activity, as well as ways in which arts practices are integrated across research disciplines, especially the sciences. The seminar also examined the model of the research university that is superbly equipped to facilitate creative and scholarly exchange and align conventional and interdisciplinary research so as to support new and challenging endeavors.

The seminar was open to scholars and practitioners at all academic levels, from junior and senior faculty to postdoctoral fellows and dissertation and Master of Fine Arts students. The Mellon Foundation grant supported release time for participating faculty and seminar stipends for dissertation students, and the Provost's Office supported the extension of the seminar meetings into a separate program after the seminar ended.

Over the course of the fall semester, eight vertical seminar participants and approximately twenty occasional guests from across campus convened weekly to explore arts practices and their relationship to research in the academy. Participants examined various manifestations of visual art, interactive art, performance art, theater and performing arts, creative writing and translation, design thinking, social and situated practices, and hybrid/trans-disciplinary and collaborative practices. Many of these referenced biology, neuroscience, the social sciences, design thinking and health care, and visualizing data. The seminar further considered how such practices are perceived, engaged and utilized in the research environment.

Guest lecturers included Dr. Graeme Sullivan, who authored the book "Art Practice As Research." He presented methodologies used in practice-led research and research-led practice and proposed a framework for the former that includes dialectical, conceptual, theoretical, and contextual approaches. The lecture examined various domains of inquiry typically opened up through artistic research undertaken in studio contexts within university settings.

New York-based performance and interactive media artist Toni Dove also presented her work, which she describes as part art and part research. The research-based aspects often explore areas of new technology that impact on the culture around us. 'Mesmerism,' for example, specifically references psychoanalysis, historical and contemporary formulations of the subconscious/unconscious and role in shaping models of subjectivity. Dove also discussed some of her most productive collaborations with individuals in academic settings. In addition, her presentation addressed problematic aspects of formal research collaboration. For example artists are sometimes pressured into appropriating their work to suit research methodologies of other disciplines and this can inhibit innovation.

Finally visual artist Ellen K. Levy from New York spoke about art, science and technology and her work with a neuroscientist at Columbia University. Their recent collaboration, in which their research methodologies were aligned, was an experiment in inattention blindness. In this case the experiment was conducted in the context of an art exhibition as opposed to a laboratory. "Stealing Attention" investigated the potential of art as a vehicle for studying attention and attention disorders. It was modeled after a movie produced by Simons and Chabris.

After fifteen weeks, the eight core participants in the vertical seminar stated that their knowledge of the history of art and science collaboration and of the current climate of government support for such endeavors was greatly enhanced. Most significantly the seminar was generative and forged new relationships and collaborations. The participants indicated that their understanding of the intrinsic value of arts practice in research institutions had significantly deepened and broadened. In order to lay the groundwork for future conversations and collaborations, faculty participants requested the meetings continue and that the class produce a book with contributions from distinguished visitors in addition to each participating member.

In summary, perspectives on art and science education are changing dramatically in the academy and beyond. The "Art I Sci Fellows Program" and "Vertical Seminar Program" articulated the intrinsic value of art practice, examined new research models and helped to fortify the domain of art and science in the research setting. They also seeded the ground for new interdisciplinary and cross disciplinary collaborations in which artists, designers, architects, and professionals in the life sciences are required to address common questions. More broadly, both programs supported the university's commitment to innovation and discovery at the intersections of art, science and technology and aligned the institution with a consortium of others that are also evolving the third culture.

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THE CASE FOR INTER-DISCIPLINARY ART AND DESIGN EDUCATION

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ABSTRACT

Fundamental innovation in universities and research institutes has changed the world – particularly where collaboration between disciplines is involved. Innovations are driven by collaboration, interdisciplinary research and work, which is challenging. The incentive system in academia rewards in-depth singularly focused research and discourages people from exiting their own (often narrow) fields. Despite this, we are involved in an innovative collaboration between the University of Applied Arts Vienna and the University of Economy and Business with the aim of fostering innovation in the crucial area of clean tech and incubate sustainable start-up companies. This paper describes two methods (the Applied Design Thinking and Lean Start-up Methods) we applied in a project with students from the Departments of Strategic Management and Entrepreneurship and of Art and Design. When the Art and Design students collaborated with Business students, they generated ideas faster and their ideas were more thoroughly grounded socially and economically. Consequently the likelihood of their applications having lasting impact increased. This paper describes the on-going project, focusing in particular on topic development in teams and argues a case for students to gain insights into interdisciplinary applied work.

KEYWORDS

Interdisciplinary, Business, Art & Design Education.

1 Introduction

1.1 Overview & Aims

Interdisciplinary teaching and learning generate ideas. Entrepreneurs use these to create economic growth. Artists and designers are by definition entrepreneurs, singlehandedly creating and marketing their work. Similarly, art & design educators often experience periods of part-time self-employment before starting to teach. Feedback from art school alumni revealed that during their studies they missed out on learning how to build their own start-ups and work independently. To date, student councils have been offering 'first aid' on entrepreneurship for alumnae. Our project set out to alleviate this lack within the art and design student population. At the same time we wanted to teach the method of Applied Design Thinking to business students.

1.2 Approach

To achieve these aims we set up an interdisciplinary project called 'Startup Building in the Energy Industry.' This is a collaborative venture between the Vienna University of Economics and Business and the University of Applied Arts Vienna. Teams of 3-4 students from both universities worked together to develop and potentially commercialize clean tech ideas (solutions that will help to reduce CO_2 emissions). The class was set up to help students successfully establish their own venture project. To ensure high quality standards, it drew on external expertise and team exercises and provided continuous internal feedback. Most importantly for its success though, the class worked intensively with Applied Design Thinking methodologies. To clarify definitions and create a common understanding among the different student populations, we used terminology associated with current discourse about interdisciplinarity, transdisciplinarity and multidisciplinarity within the art and design fields.

According to Klein (2010, p. 17) an interdisciplinary approach to problem solving stimulates innovation and "... almost all significant growth in knowledge production occurs at the borderlines between established fields". This mirrors current developments in innovation. Major centres of innovation in the Anglo-American world, such as California's bay area, at Stanford and UC Berkeley and Oxbridge universities in the UK explicitly promote an interdisciplinary approach. We believe this is of particular value in the case of complementary knowledge .

When a university seminar links Applied Design Thinking with entrepreneurship both student populations – design and business students – benefit. It offers complementary knowledge of both disciplines and teaches interdisciplinary cooperation. Universities that allow space and time for experimentation (and the inevitable mistakes that result) are an ideal context for such risky endeavours.

1.3 Organization

The project involves two different universities; one with a specialization in arts and design, and the other in economics and business. Despite the organizational complications, this ensures a wide network of knowledge input into the project.

Student participants in the class are carefully chosen – based on their motivation to learn about clean tech entrepreneurship in a design context and ability to create something themselves. They come from Austria, Bulgaria, Canada, Croatia, Germany, Italy and Ukraine. The core team selected to set up and guide this kind of project had to reflect the diversity of the student body and be aware of the challenges of interdisciplinarity. Overcoming these challenges presupposes a certain level of trust, since decisions within the respective institutional environments had to be made quickly.

1.4 Research Question

The Austrian economist Joseph Schumpeter has significantly shaped current understanding of the relationship between entrepreneurship and economic growth and of why innovation is the key element for growth in modern economies (Schumpeter 1934). Innovation needs teamwork at the interface of disciplines (Kelley & Littmann 2001, p. 121). The same holds true for the cooperation between academia and practice: Some of the most interesting research happens at the interface of and beyond disciplines (Newbury 2011, p. 381-382).

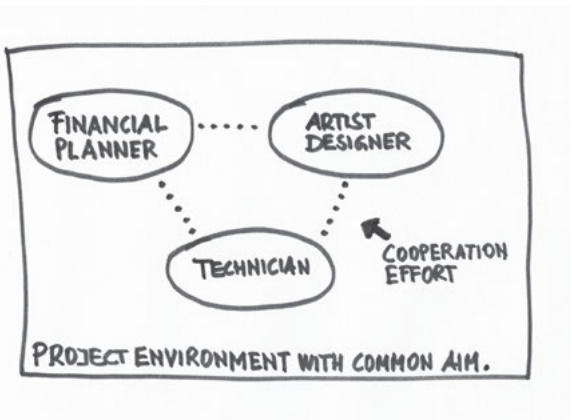

Figure 1. Interaction between different fields lacking interdisciplinarity. Source: Albrecht Karlusch, Ruth Mateus-Berr, Wolfgang Sachsenhofer

Despite this, the majority of university seminars continue to be organized in separate research fields. In the rare cases where they are interdisciplinary, the setup and teachers usually do not incentivize students to work across specializations within class. Students are trained to think and work as specialists and therefore naturally mainly search for solutions within their specializations. Critical abilities, such as developing a cross-specialist language, trust, relationships and norms are emphasized very little and usually never

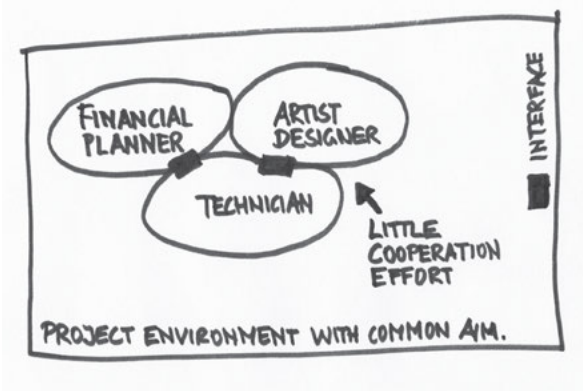

Figure 2. Interdisciplinary approximation (opening gates, interfaces) Source: Albrecht Karlusch, Ruth Mateus-Berr, Wolfgang Sachsenhofer

Figure 3. Applied Design Thinking Workshop Source: Ruth Mateus-Berr

fully evolve (Nahapiet 2011, Bourdieu 1983). People who have not learned to work this way cannot reap the huge benefits of collaborating across disciplines – not just students, but also teachers, artists, employees or entrepreneurs.

Previous research has highlighted some difficulties working in interdisciplinary teams (Ruwe & Leve 2001). So we asked ourselves "what is the best way to design and implement seminars so as to increase the benefits of interdisciplinary learning and working for students of different disciplines"?

Accordingly we decided to conduct a case study of the interdisciplinary seminar we designed for students at the University of Applied Arts Vienna and the University of Economy and Business. The culture, norms, values and languages of these two universities differed greatly, giving us an excellent opportunity to investigate interdisciplinary learning.

2 Methods

2.1 Applied Design Thinking Method

Roger Martin, a professor of Strategic Management, believes that "innovation is about seeing the world not as it, is but as it could be". He describes Design Thinking as focusing on "accelerating the pace at which knowledge advances from mystery (...) to heuristic (...) to algorithm (...)" (Martin 2009, cover). In summary he suggests it is about wondering and guessing rather than simple observing (Martin 2009, p. 64).

With this in mind, we developed the methodology for our class. It started with creative team play, followed with information about team skills and proceeded with the core methodology ADTL (Mateus-Berr 2013, 2014) for the class. The objective of ADT-M is to teach students to empathize with each other and understand each other's needs in-depth. Every participant undergoes a sequence of design habitus defined as: empathize, define, ideate, prototype and test, with several iterations in a very short period of time. Failure is to be expected – therefore trust is critical for creative development (Weingart 2004). Participants show and (mostly) don´t tell, by building simple prototypes of their ideas. This fundamentally critical part leads to more in-depth idea exchange than is typical of normal classroom conversations. "The notion of play that incorporates participants being willing to fail and try again as a means of solving problems, can result in their minds being freed through play to function creatively" (Zimmermann 2009, p. 395).

2.2 The Lean Start-up Method

In recent years, a new methodology called the Lean Start-up (LS), has replaced old paradigms of how to develop new companies (start-ups). The LS method is characterised by the very early and intense involvement of customers and continuous adaptive changes towards them. The LS method uses the Business Canvas (Osterwalder & Pigneur 2010) that divides the start-up firm in nine building blocks outlined below.

Starting with the value proposition, an entrepreneur is required to identify relevant customer segments. These customers must be willing to pay a price that exceeds production costs. In consequence, the entrepreneur develops hypotheses for all the other building blocks. These are verified / discarded during interviews with potential customers and experts. The results are used to enhance the product idea and business model, which is tested again using interviews. Using this iterative method, an entrepreneur can quickly improve the quality of an idea and business case using real-time feedback.

Even though a number of business skills are necessary in order to create reliable assumptions within the blocks, they are not important for understanding the strategy and relations between the blocks. In the interdisciplinary context, the main advantage of this method is its simplicity and the fact that a common understanding can be arrived at quickly.

2.3 Synthesis of Methods

Before we could apply ADT and the LS method in class we had to modify and integrate them. So we developed a synergistic solution – the Art & Design Canvas (ADCanvas). Whereas it identifies art and design as the starting point for developing sustainable business solutions, it requires know-how, empathy and willingness to collaborate from both disciplines. We think the learning opportunities it offers for the collaborators are fundamental – and that analytics and creativity are often ideal matches. The important thing to emphasize here is that Design Thinking should not be a service that is bought onto the open market at some point in the development of the startup (outsourcing). To reap the described benefits, it needs to be firmly embedded in the development process from start to finish practitioners and academics have pointed out that the logic of the CANVAS based LS method has a critical flaw in its development phase. The most crucial function in the overall start-up creation is the first phase of developing a value proposition that closely mirrors customer needs. Currently business ideas are often developed without taking into account fundamental customer needs due to inadequate tools. In this class we have been able to synthesize a powerful method for idea development and customer centricity (ADT) with the rigor and implementation focus (LS method).

3 INTERIM RESULTS

To help us build the fundamentals for interdisciplinary work, we have invested much time and effort in team exercises and get-togethers, and in creating informal and formal spaces for students to meet and talk in groups and one-to-one. First results of the interdisciplinary approach emerged during our so-call 'market place of ideas' session. Students from the two universi-

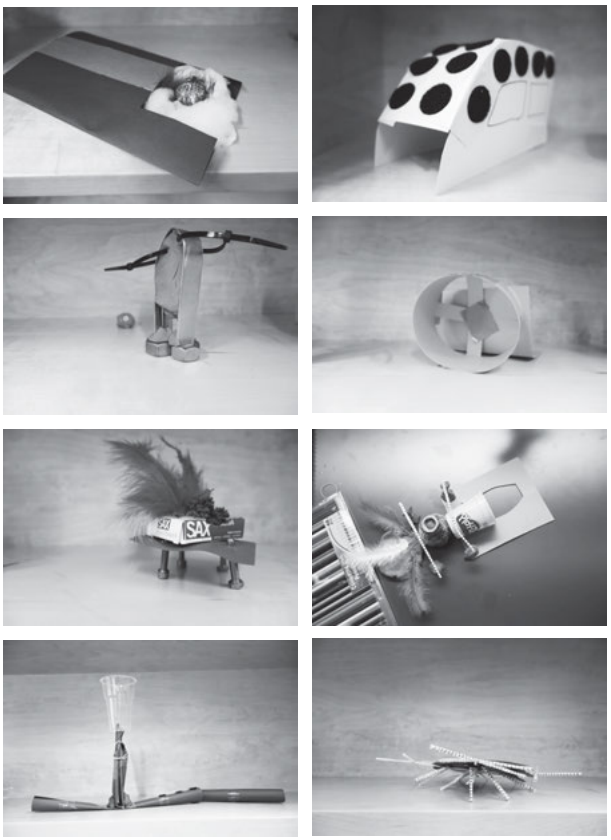

Figure 4. Applied Design Thinking Prototypes
Source: Ruth Mateus-Berr

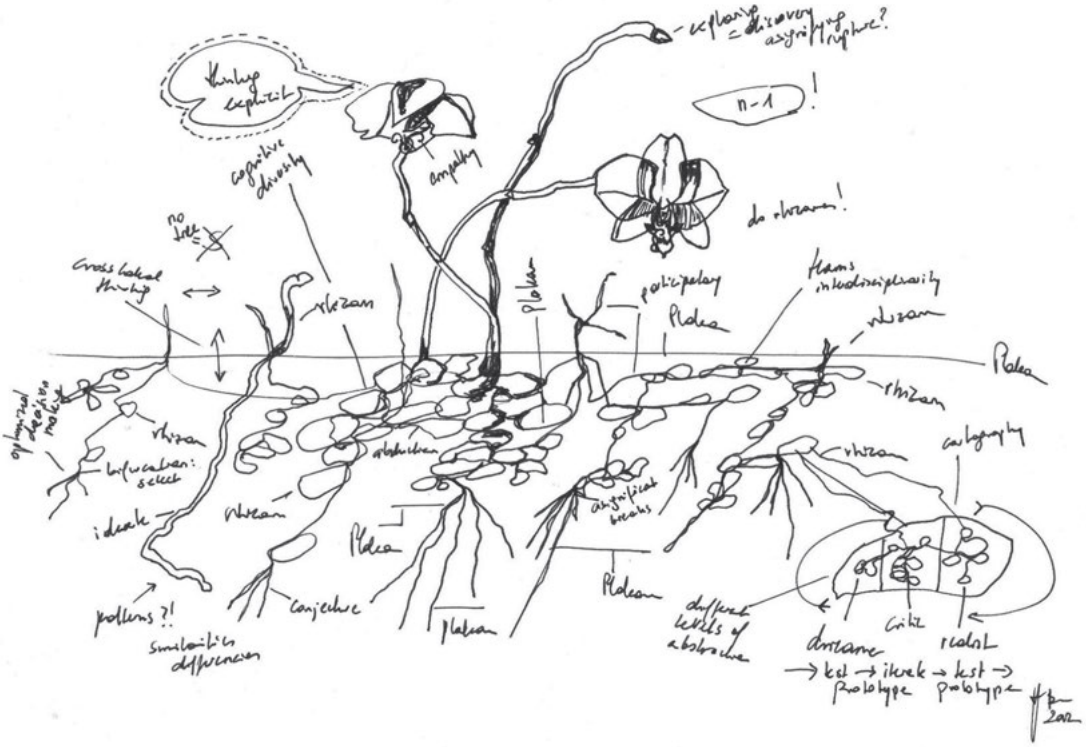

Figure 5. Design process from the Artists Viewpoint: Designrhizom. Source: Ruth Mateus-Berr

Business Model Overview				
Key Partners	Key Activities	Value Proposi-tion	Customer Relations	Customer Segments
	Key Ressources		Channels	
Cost Structure			Revenues	

Figure 6. Business Model. Source: Albrecht Karlusch based on Osterwalder & Pigneur 2010

ties participated enthusiastically in mixed groups and passionately discussed ideas and implementations. In the end very heterogeneous groups emerged.
Knowledge transfer was accelerated as well. Students moved freely between the distinct disciplines of Entrepreneurship, Energy Strategy and Design and discussed issues in ways that blurred the borders of formerly distinct subjects.

Furthermore, we found similar levels of motivation within student populations. (This was remarkable given that in an initial survey "motivation and planned engagement" was 20% lower among the art and design students than business students.) Moreover the art and design students were responsible for 60% of the ideas, suggesting that more than half of all art and design students were able to convince the others and support their ideas with problem-solutions, vs. only 15% of business students.

4 DISCUSSION

The case study reported in this paper used the Applied Design Thinking and Lean Start-up methods as methodological underpinnings. A finding was that seminars for students from several universities can be designed in such a way as to train them in interdisciplinary abilities and skills and, that competencies in art, design and architecture can be successfully transferred into a business context within higher education. The results so far indicate that the seminar enables students from different disciplines to develop competencies and skills for cooperating outside the limits of their respective fields. This project has shown that agreeing on a common language and coding system reduces students' natural tendency to mostly look within their fields for cooperation. As a result, the overall effort necessary for cooperation between heterogeneous groups is reduced. Thus, it has contributed to existing knowledge about how an interdisciplinary approach can be used to realize common project aims. Further research should be conducted that enables generalisations to be made and the long term effects on the development of knowledge and skills must be evaluated.

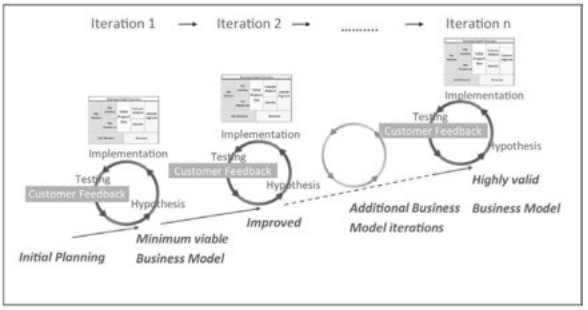

Figure 7. The Lean Start-up method that enhances the idea and business model. Source: Albrecht Karlusch, based on Blank, 2013.

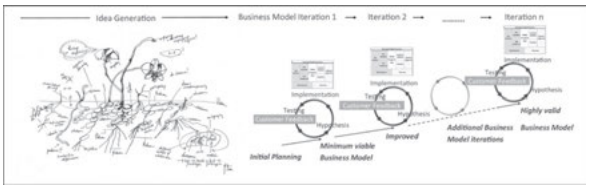

Figure 8. The ADCanvas method in an interdisciplinary context. Source: (l-r) Ruth Mateus-Berr, Albrecht Karlusch

Figure 9. Team work "Grow your Energy" Idea Pitch. Source: Yannes (Jan Philip) Ley, Greta Zaia, Noor Fakhari

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ASPECTS OF SPACE: ARCHITECTURE FOR NON-ARCHITECTURE STUDENTS

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ABSTRACT

The paper will discuss a program called "Aspects of Space", a format for teaching architecture to non-architecture students. The program adopts a theoretical and practical approach to architectural problems and has developed tools and strategies to shape the idea of space. Students learn that intervening architecturally means taking up a position in spatial as well as political terms. This presentation will focus on three projects that have already been executed and published: Body tecture is a research-based project involving architecture, structure, performance and choreography. It deals with reconstructing built architecture by means of body language. Students come to understand spatial behavior and communication structures, as well as the geometry of buildings and the structural performance of built objects. As a conceptual tool, it is a 3D version of blind drawing. Surface_volume opens up structured surfaces and transforms them into space. Folding enables the surface to become volume without being distorted. Originally organized like Millefleurs, the 'molecules' cluster and become tectonic – ultimately forming an urban agglomeration. Massive_void deals with boundaries of form and space. Fragmenting the constituent elements of space allows for reinterpretations of spatial boundaries as volume. Consequently, a particle develops into a space of "Piranesian extend".

KEYWORDS

Architecture, Spatial Behavior, Learning.

Introduction to the teaching format

The "Aspects of Space" program was developed to teach architecture to non-architecture students (Falkeis 2010). Fine Arts students, Arts and Education students and students from various other disciplines are accepted on the course. These students do not share a common (architectural) 'language' and the program cannot be built on the skills and qualifications architecture students gain during their foundation courses. So it cannot follow the logic of regular architecture programs. Architectural drawing skills, CAD-software, structural design and architectural history do not play central roles. Instead the program focuses on the driving architectural momentum: SPACE.

Architecture Thinking

A critical reading of architectural definitions of space confronts students with fundamental questions of architecture and allows for participation in contemporary theoretical discourse. Fundamental architectural questions of scale, structure, context and materialization, as well as questions about form-finding processes and design strategies are the focus of discussion. Developing architectural interpretations of space involves students into a certain kind of design strategy that I call "Architecture Thinking".

"Aspects of Space" adopts a theoretical and practical approach to architectural problems that goes beyond questions limited to dealing only with the built structure itself. The program works with space as the basic fundamental material of architecture. Therefore it deals with qualities. The aim is to conceive tools and strategies that shape the very idea of space. It is about experiencing and formulating individual architectural ambitions. Substantiating these ambitions is the ultimate goal and is what defines the process of project development. It gives students a chance to understand architecture as a means of adopting a position – in spatial as well as political terms.

Abstraction

Abstraction is one of the most powerful tools in Architecture Thinking and is essential for transforming diverse concepts of space into spatial behavior. Since spatial quality replaces the concept of program – a spatial organizational scheme – abstraction offers the means to converting qualities into spatial desires. In this regard, behavior and desire attribute personality to space – it becomes a character. Consequently, architectural spaces are treated like living organisms that develop an inherent logic of behavior. Conceptualizing an entire world of particular spatial behaviors underpins the design process and functions as a tactical device throughout the process of development. It is the crucial tool for decision-making.

The Unexpected

'Abstraction' and 'The Unexpected' are driving forces in these projects. Since thinking in abstract terms enables conceptualizing spatial behaviors, the notion of 'The Unexpected' sustains the process of exploration (Falkeis 2013) and provides access to architectural problems at a meta-level. Architecture is about entering new territories. 'Architecture Thinking' provides opportunities for students to discover a whole set of new tools with which to shape the idea of space.

Examples

The range of projects stretches from the limits of materiality and habitation (as in Floating City) to re-scripting urban space (as in the Notation Projects). It reaches from reconstructing built architecture by means of body language (as in body_tecture) to fragmenting the constituent elements of space (as in massive_void).

The Notation Projects (Vienna and Nanjing) are about representing the city's physical body through analyzing our construed perceptions of it. This project is about the process of transposing the cityscape into a soundscape focusing on the interrelation of space and sound. This interaction of all the acoustical phenomena produced in and by the space creates the unique soundscape of a city. The identification of the descriptive characteristics of all the different quantities and qualities is represented in a 3D-code system: the city score.

The Nanjing Notation Project (Falkeis 2014) – an experimental studio conducted at Nanjing University of the Arts in China – set out to develop strategic tools of notation for describing the interrelation between space and sound and between cityscape and soundscape. Since the research phase included field studies the students got deeply involved with the city of Nanjing – on both a personal and political level.

body_tecture

was a research-based project interconnecting architecture, structure, performance and choreography. Students reconstructed built architecture by means of body language. The aim was to describe the spatial behavior of a building in a way that extends beyond established architectural discourse. This unique approach offers insights into the internal and external communication structure of the built object. Interpreting the geometry of a building by means of body language reveals unexpected spatial qualities and structural performance in terms of tension flows. As a conceptual tool, it is a 3D version of a blind drawing that eliminates visual control of the action. Like drawings produced by the unconscious, body_tecture produces a 'speechless' figure-ground relation.

surface_volume

opens up structured surfaces transforming them into space. Folding allows surface to become volume without being distorted. Originally organized like Millefleurs, the 'molecules' cluster and become tectonic – finally forming an urban agglomeration.

massive_void

deals with the boundaries of form and space. The fragmentation of the constituent elements of space allows for a reinterpretation of spatial boundaries as volume that describes an in-between space. The monumentality of the dividing borders transforms into a spatial continuum. Consequently, a particle develops into a space of 'Piranesian extend'. Fantastic labyrinthic structures, by Giambattista Piranesi (1720 –1778) — represent distorted Kafkaesque spaces.

Figure 1. body_tecture. Source: Lisa Mijsbergh

Conclusion

This teaching format can be translated or used, literally, for teaching art and related fields. Stimulating creative processes through 'Architecture Thinking' provides insights that could be productive for other fields.

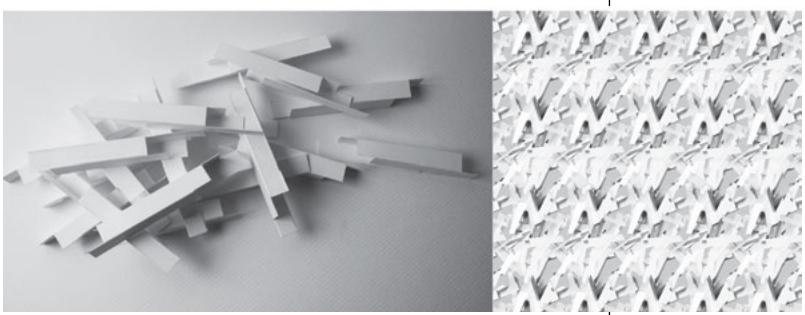

Figure 2. Surface_volume. Source: Sylvia Hirschvogel

Notes

1. "Space of Piranesian extend" refers to the work of the Italian artist Giambattista Piranesi (1720 –1778). His famous drawings of fantastic labyrinth structures, "Carceri d'invenzione" (Imaginary prisons), represent distorted Kafkaesque spaces.

Figure 3. massive_void. Source: Clelia Baumgartner

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PEDAGOGY AS SPAGHETTI JUNCTION!

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ABSTRACT

This presentation argues that teachers of art in higher education in the future will need to re-imagine their pedagogy in terms of a complex system of crossroads, a confluence of thinking and action flowing in multiple directions. Such re-imagining will involve teachers' abilities to reflect on their own personal lifeworld experiences as these are focused in practices of inquiry, imagination and aesthetic sensibility. The new demands of college/university level teaching will fold in knowledge of the developmental and socio-cultural lifeworlds of students as these emerge in the relational practices of maker and material. Future teachers will have to re-think clichés, conventions, elements, techniques and skills, envisioning materials in more hybrid terms and student' practices as sources of meaning, questioning and knowledge construction. The multidimensional role of the college/university art educator as maker-teacher-learner-researcher will be embedded in reflective action that conceptualizes the continuity of the artworld in terms of a diversity of contexts that offer both legitimacy and also epistemological grounding that moves forward to the artistic future.

KEYWORDS

Reflection, Development, Materials, Art Education.

I wish to untangle some of the complex strands that interweave the discipline of art/design and education as these inform the skills and insights students bring with them to the study of education. To do this I want to take the perspective of an educator of students learning to teach visual art to infants, children, adolescents and young adults. In their untangling, I will suggest, the strands reveal significant fissures in student insights about their artistic discipline and that this has profound consequences for the teachers/instructors they will become.

1. Reflection as a fundamental tool of art practice

For the most part, students enter programs of teacher education with repertoires of insights and practices acquired in art school. It will be this repertoire that forms the fundamental base upon which their pedagogical actions will be built, it is this repertoire that constitutes their discipline. In the best of circumstances learning to teach requires students to reflect upon their artistic repertoires, acquire understandings of artistic development, conceive materials in terms of voice, position the past in the present and envision art practice as a vernacular language that hold powerful currency broadly within society as a whole.

As students begin to reflect within their established repertoires on insights about art and its practices that might be drawn upon to shape the learning of others, this often exposes rather inflexible or vague ideas about the nature of practice itself. Interviews with students suggest that during their art school years they are rarely invited to reflect deeply within the context of their own understanding on the basis that close scrutiny incites a self-consciousness that inhibits creativity. This is certainly true if reflection does not carry with it purposeful acts of inquiry, a probing of what is and what might be otherwise, a kind of inner dialogue that leads the mind to delve into its own active and tacit knowledge making new material available to the imagination.

Such skills of inner reflection and familiarity with dialogical inquiry are essential to the construction of pedagogical practices and, I would suggest, to the forward movement of artistry itself. It is the absence of this skill of reflection that is of concern to those of us who work to shape responsive teachers. For repertoires of practice that are superficially and inflexibly constructed do not open to the kind of deep probing necessary for the exploration of a diversity of pedagogical possibilities, or envisioning artistry within the broader settings of activism and normative practice.

Implications for art school instructors

Today, skills of what I am calling dialogical reflection have no clear trajectory in content or practice for they are buffeted by the winds of change. By now it has become almost a cliché to note that all fields of endeavor are inflected by a rapidity of change that is startling. In its tsunami like momentum change not only heralds

the new but at the same time also challenge the roots and grounds of our knowledge and the purposes of our practices.[1] Studio art instructors, historians of art, critical theorists and so on can no longer simply teach out of well established 'personal content' or established 'practices' but must learn to become what Schön (1989)[2] calls 'reflective practitioners', or Mezierow (2000)[3] calls 'transformative learners'. However, whatever influences our fast paced world bring with it, the skills of deep dialogical reflection allow for the fashioning of the kinds of perspectives that inform the intermingling of personal knowledge and practice even as they change and evolve.[4]

In the best of worlds, then, reflection offers a flexible palette of possibilities that transcends change, and from which art-school instructors can reach out to students who are already formed by a diversity of ideas and experiences, and become collaborative learners with them. Most importantly, perhaps, art school students themselves need the same challenges to reflect upon the evolution of their own insights, practices and skills in order to move forward their own artwork and also to nurture that of others.

2. Understanding student development as a tool of reflective insight

I would like to underline that knowledge of student development is a critical tool in the arsenal of dialogical reflection for both art school instructors and future art teachers. In the research we have carried out at Teachers College it is knowledge of development that is least understood among college instructors and art teachers, yet should be of most concern.[5] For knowledge of development invites instructors and teachers to ask particular kinds of questions about the life of the mind as this emerges over time and as the arts become its vehicle of communication and expression. As we envision the 'life of the mind,' brain research offers us a useful metaphor, that of a cross roads through, around and across which neurological structures carry messages and memories of an enormous variety of specificity.[6] The flow of mind-material originates in sensory, emotional, social and cognitive experiences which are layered over time and form into a diversity of perspectives or viewpoints on the world (the spaghetti junction mentioned in the title!). As Damasio (2012)[7] points out, the emerging 'sense of what is' coalesces within this complexity in terms of knowledge that is relationally structured and shapes self and other identities in the world.

A brief journey into the life of the mind suggest that artistic development draws upon multiple and diverse resources from which repertoires are fashioned. However, while knowledge is relationally constructed and layered in conceptual complexity it nonetheless retains a high level of sensory-affective material that offers flexibility to the forward movement of practice. Thus, making spaces for minds to roam imaginatively across different arenas of knowledge encourages students to push boundaries, deal with ambiguity, attempt risk, explore processes of transformation and change, and build upon serendipitous occurrences and the interpretations and points of view of others.

For art school instructors, thus, knowledge of development allows them to probe, and ask questions of their own repertoires, for resources from which to build imaginatively upon what students bring with them to their formative years. It is important to note that this is a far cry from the kind of direct cloning that we often encounter in art school training wherein the style and concerns of the instructor become those of the students. Rather it is an alert sensitivity to the questions and interests of students that becomes the tool of inner reflection for the instructor. For art teachers in training too, a flexibly constructed art repertoire allows them to back-track within the layers of their own formation, and distill from it those insights and practices that support the diversity of building blocks necessary to the development of their pupils.

3. The discipline of art practice resides in knowledge of materials

A consideration of artistic development, whether among art students or pupils in schools, is critically and dialogically entangled with how materials are envisioned and worked with. The notion that materials have distinctive 'voices' constituted by their qualities and properties often gets lost in art school training. The 'voices' of materials become subservient to the 'application' of materials to particular kinds of content or style. Here, learning the skills of application often sidetracks the kind of dialogical interactions between materials and experiences from which ideas emerge and are layered as personal meaning is constructed.[8]

It is important to note that the growing complexity of student insights and understandings frequently outstrips the conventions and elements that too often compose and rigidify their repertoires. What we learn from earliest infancy is that foundational insights about materials and their possibilities emerge from play and exploration and are inflected by sensory and bodily knowledge. Research now suggests that openness to play and exploration remain essential to the emergence of complex and flexible artistic repertoires along the life span.[9] For play permits a special kind of open ended dialogical engagement with materials and processes that opens the mind to an array of new possibilities and choices. Such acts of playful inquiry in sustained engagement with materials allow young people to invest themselves bodily and intellectually in their work. As they engage with materials, young people also explore ideas about nuance, fit and appropriateness and, working within their already constructed repertoires, make personal decisions about the organization and transformations that will make their work their own. This is not just a stylistic conceit for, as Maxine Greene (2000)[10] points out, such personal aesthetic decisions about the inner relationships within a work open minds to new knowledge. By highlighting, dram-

atizing or making vivid certain aspects within a work, the aesthetic moment carries the mind beyond connotations of beauty and value, beyond conventions and elements, to entertain ways in which things might be otherwise and freshly understood.

4. Understanding of the past limited to now: diversity, objects

An understanding of development and the role of play in keeping open and flexible the layered trajectory of artistic repertoires enables reflective action. However, this must also be nurtured within an artworld envisioned in terms of a diversity of contexts and practices. Over the past century the dematerialization of the art object and increasing role of theory in shaping how artists practice and audiences respond resulted in questioning traditional hierarchies of value and their sources and challenging relationships to the past. History seen through the far end of a telescope was thought to offer both artists and students in art schools the needed distance, freedom and flexibility to be creative, unencumbered by ideas and practices of the past, and students were urged to keep their minds open and free.

There has been considerable revision to this posture, however, as a combination of evidence from research studies and artistic practice raised questions about the legitimacy of such disjunction and the undermining of the value to the present of a sense of continuity with the past.[11] The understanding that there is no such thing as a tabula-rasa, minds unencumbered by their past, or complete and unfettered originality, has led to a commitment to examine history afresh, as a search for continuity and the epistemological roots in and against which to enlighten the present.

The search for roots and historical memory has opened spaces for the voices of underserved and previously understudied populations of practitioners and theorists. The introjections of vernacular and gendered voices from around the world have challenged stereotypes and staked out multiple positions from which the textured fabric of art history can be viewed.[12] The repositioning of the past has created a sense of continuity within and across diverse histories creating a networked space in which history itself is conceived less in linear terms and more as interconnected vantage points enabling complex and sometimes contesting dialogue to take place between, past and present, the old and the new. Art students, in particular, need to be aware of being, and understand themselves to be, contributors to this discursive field and discover within it the groundings of their own commitments.[13]

Beyond art school

Some re-thinking is important now for art school instructors to inspire the kind of artistic repertoires and insights students bring with them to nurturing others. Flexibly constructed repertoires provide the grounding for understandings about development, the voices of materials and the changing world of culture that, in dialogical interaction, become tools of reflection themselves. Within the fast moving and networked community, students own artistic repertoires, fluidly and flexibly constructed, become foundational pedagogical tools that promote diverse and sustained approaches to learning and artistic practice. Moreover from the grounding of their own practice, students will need to understand that artistry is both personal and social, both within the province of the gifted and a critical vernacular skill that is available to all.

Note

It is important to note that in this paper, the term instructor is used to refer to those teaching in art schools, colleges or university departments of art; the term teacher is used to refer to those who are either in training or who are teaching in elementary or secondary schools. Similarly the term student applies to those young people attending art schools and the term pupil to those attending elementary or secondary schools.

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THE CHANGING EDUCATION OF THE ARTIST

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ABSTRACT

Art practice and art education have gone through momentous changes in which hybridization, specialization, and professionalization were key drivers. These changes are apparent in the revised role of the arts at research universities, including the recent debate about PhD qualifications in studio art as the new terminal degree for college art teaching, and movements toward increased accountability throughout higher education. Art schools used to be vocational schools, organized in a vertical hierarchy and self-contained as silos; within a changed learning and research landscape they have opened up and become horizontal. These developments in higher art education are an international phenomenon and consistent with what is happening in other areas of culture and knowledge production. Where knowledge used to be discipline-based and hierarchical, it has become fluid. Where art making used to be grounded in skillful dialogue with a specific medium, it has been freed from disciplines and become part of a cultural practice that is all-encompassing. The consequences for the artist's role in society, art education and education in general are significant. This presentation will address these shifts in the learning landscape and how art education is recalibrating.

KEYWORDS

Higher Education, Educating Artists.

Discussion about the educability of the artist is as old as the education of the artist. Despite the seeming impossibility of reconciling the different voices and interests that shape this debate, and the practical complexities of playing it out at a local level, it is a discussion that is indispensable in order to determine positions and critically reflect on the beliefs of those involved. For Ernest Chesneau, an early voice in the debate, "education alone makes an artist" (Chesneau 1886, p. xv). Others, like John Baldessari or James Elkins, take the opposite stance, arguing that art cannot be taught. When he was asked for evidence, Elkins pointed to the fact that we do not know when knowledge is transferred.[1] While we could ask, doesn't this apply to all teaching and all learning, and for that matter to any symbolic transaction between people, Elkins' skepticism is refreshing and causes us to think about meaningful ways to educate artists.

The Dilemma of Art Education

Some of the difficulties in the debate about educating artists are directly related to the perplexing ambivalence that professorial faculty in art schools bring to teaching art. Asked for faculty names to participate in an exhibition on artists as educators, the dean of a prominent art school in New York told me that her faculty would likely not want to be identified as teachers, since this might debase their merit as artists. It seems that the dual roles of artist and teacher have become increasingly difficult to combine in a world where both fields – art and education – are charged with expanding professional demands and which, as an unfortunate consequence, pit demands against each other instead of investing in their synergy. Another dilemma is posed by the reproduction of pedagogy informed by the past instead of intrigued by the future. This stems from the frequently mentioned conundrum that how art is taught today is "conditioned by the beliefs and values regarding art held by those who advocated its teaching in the past" (Efland 1990, p. 1).

The struggle that lies in teaching art for those in the business of teaching it is exacerbated by the subject matter. Art is in flux and continually changes. The fact that it is unstable and we don't really know what art is[2] poses a challenge to a field in which all sides constantly have to make decisions about what type of skills and ideas (if any) a meaningful, effective and timely education should offer. The definition of art as an open-ended concept Morris Weitz put forward in 1956, describes the conundrum on a philosophical level only. Open-ended art is abundantly visible in the contemporary art world in the ways hybrid practices have sidelined and displaced traditional disciplines and disorientated age-old genres such as painting and sculpture. Despite their dismissal as contemporary practices, the old struggle about their place continues to bedevil art education today.

With the decreasing significance of the master-apprentice model, the education of the artist has lost direction. Schools housing this model have become the stuff of history (see de Duve 1994): for example, the 19th-century academies with their belief in talent and skills, teaching by genres and set canons of beauty; and the 20th-century Bauhaus with its emphasis on creativity, medium and invention. While we still see remnants the huge influence of the Bauhaus at work, particularly in foundation teaching and the renewed convergence of art and design, changes in the learning landscape have rendered this model largely inconsequential. The driving forces for these changes have been interpreted in various ways. I consider the impact of forces like hybridization, specialization, and professionalization especially significant. For the sake of focus, I will leave out technology, which affects us on too many levels to address here.

Changes to the Field

A number of authors have discussed the way hybridization of media and art practice has driven art education to change (Knobel and Lankshear 2008, Jenkins 2008, Madoff 2009, Buckley and Conomos 2010). Although hybridization of media is not new, it has achieved new levels of pervasiveness with the digital revolution in the past 20 years. Hybrid art characterizes the increasing influx of technology and digital media in art making as well as its presentation, all of which are continuously evolving. The current maker-movement and the trend towards alternative learning spaces and digital fabrication labs are notable examples of continuous reorganization in the field (Jochum 2015).

Hybridization is a powerful change agent because it transforms old disciplines and creates new ones while constantly reworking old forms into new versions.[3] Hybridization refers very generally to mixing genres, materials and concepts. This begins when artists dialogue with the work of their predecessors, whether those are contemporary or historical, dead or alive (Allan 2009). Thus, all making derives from appropriation. The convergence of high and popular culture, with its remixing and mash-up strategies, is blurring the line between amateur and expert. Visual culture has reshaped artistic practices and the curriculum much in the same way as social design is transforming art education today. Julia Kristeva introduced the concept of intertextuality (Culler 2002, p. 114) to delineate the way texts build meaning on one another, and hybridization outlines a similar phenomenon in the field of art. This is a challenge for art education, because it reinforces the idea that art is open-ended and is a field that never rests.

It is harder to pinpoint the role specialization plays in driving change because it is not as intrinsic to the artistic process as hybridization. Whereas hybridization reflects continuous change in art practice as this pertains to concepts and materials, specialization reflects change in the environment of art practice. While it is clear that art making does not take place in a vacuum, it cannot be overemphasized that the art world is not separate from the real world. Artists and art education

largely operate in a society that emphasizes services, information and research rather than manufacturing, production and goods. The effects on art education and art practice are multiple and are often underexposed. In a highly specialized, complex, information and post-industrial network society, art education is also becoming more specialized, more complex and more networked. We can see evidence of this in larger shifts, such as the confluence of art and research or the aforementioned convergence of art and design; and, more concretely, in the many new degree programs being offered in art schools around the globe (with Savannah College of Art and Design being one of the flashier examples).

In a world in which knowledge has expanded exponentially, artists have taken on roles that mirror the specializations of a highly complex society, and have become researchers, theorists, critics, and even activists responding to an environment at risk. This has consequences for the organization of art schools, many of which have become part of a larger academic system and relinquished some of the autonomy they enjoyed as vocational schools. Now that they are part of a comprehensive higher education system, they have given up their operational closure (Luhmann 1992) for a structure that is more horizontal and collaborative, leaving the vertical model to the few elite art schools that can still afford to operate as self-contained silos for high-stakes art stars.

Specialization in art does not have to mean succumbing to isolated disciplines. On the contrary, artists often engage in precisely the opposite, making connections and creating crossroads or interstices. By understanding themselves as mediators and agents of change who connect and unify fractured experiences – not only aesthetically but also in complex, inclusive projects – artists reveal one of their particular strengths, namely foregrounding imagination in the service of transformation. Art has been good at disrupting compartmentalization and bringing back what was excluded and split off. As John Dewey said, art allows the unification of experience. "In a work of art, different acts, episodes, occurrences melt and fuse into unity, and yet do not disappear and lose their own character as they do so" (Dewey 1980, p. 36).

Increasing demands on educational systems have resulted in the professionalization of learning. Professionalization, which is closely connected to specialization, is another driving force that is reshaping art education. It is apparent in the revised role of the arts at research universities, and in recent proposals that PhD studies in Studio Art and Doctorates in Fine Art (DFA) become the new terminal degrees for college art teaching and in movements toward increased accountability in higher education. Accountability, particularly in places that put a high price tag on schooling, reinforces the notion of education as a commodity that is bought and sold. This is a real concern for art education in the United States today and has inspired an increasing pursuit of alternative models.

Opportunities

Hybridization, specialization and professionalization are happening across higher art education internationally, which is consistent with developments in other areas of culture and knowledge production. Where knowledge was once seen as distinct or hierarchical, it has become fluid. Where art making used to be based in skillful dialogue with a specific medium, it has been freed from disciplines and is a part of an all-encompassing cultural practice. This probably aligns with what Allan Kaprow had in mind when he advocated "taking art out into the world as a way to keep it alive and purposeful" (Madoff 2009, p. 109).

The integration of art schools into a larger research landscape, as is taking place in Australia, Europe, and the USA, offers art education new opportunities to provide the specialized system of education that artists need. To achieve this aim, art schools have to increase curricular freedom and allow students to make choices. The incorporation of research and social practice into art education reflects the hybridization, specialization, and professionalization described above. To open themselves to this changing world, artists need education.

Conclusion

The learning landscape has changed. The way we react to this may, or one should say *must,* differ from school to school, culture to culture; however, it affects us all. I have described some influences and stressed the importance of seeing challenges as opportunities rather than obstacles. While recent debates about de-skilling and unlearning may be valuable for encouraging us to rethink our learning environment and curriculum, they cannot replace the hard questions that art educators face. Knowing that neither talent nor skills are sufficient in themselves to produce meaningful art, we must not let go of the possibility of nurturing people who choose a career in this field. The question of how best to educate students and teachers alike remains valid[4]. As Cornelia Sollfrank said aptly in a conversation, it is important to remind ourselves that "art education is not about the artists who are teaching. It is about the students."[5]

The proliferation of new educational models, including alternatives to the traditional brick and mortar art school, is intriguing. The increasing prominence of art school as a theme for exhibitions, conferences, panels and books, and the trend toward art as a social practice suggest that artists could take on a greater role as educators at large. This might help to counterbalance the blatant corporatization of education.

Institutions of higher education struggle to educate artists. James Elkins' argument that the connection between teaching and learning is too arbitrary to allow for a meaningful exchange of knowledge is too extreme. It implies capitulation rather than recognition of our ability to promote talent and inspire imagination. Teaching is not just about transmitting knowledge, it is also about human connection (Rose 2009).[6] We can still study what we don't know yet, or respond in-kind with art. This is what art practice and educational research is about.

While it is important to understand the multiple interests and stakeholders in teaching and learning art, the changing education of the artist takes place in learning environments that are hard to compare to each other. Chesneau's assessment that "much is to be done" (1886, p. 58), continues to hold true today. Most of the doing, though, takes place in environments that are local. Classrooms are messy places, and so are studios, and so is the world.

Notes

1. "[T]eachers do not know or do not control the moments when essential information is imparted, and students don't know when they should listen for that information" (Elkins 2012, p. 2, and 2001). While I agree with the evidence Elkins put forth, I do not see how it validates his conclusion.

2. "There really is no such thing as Art. There are only artists." (Gombrich 1995, p. 15).

3. "[T]he hybrid of today is the likely standard genre of tomorrow. All creation is re-creation; every revolution marks a new return." (Schnapp and Shanks, in Madoff 2009, p. 151).

4. Asking himself "What is to be done?" Chesneau said, "given two artists, equally endowed with the feeling for the pictorial—or the sculpturesque—the one an educated man, the other illiterate; I say that the former is better equipped than the second, and ought to be able to take far greater advantage, and in a higher sense, of the means which nature has bestowed on him, and which education shall have developed." (Chesneau 1886, p. 74-5).

5. Source: http://eipcp.net/transversal/1210/buden-interviews/sollfrank.

6. "In our time, teaching is acknowledged as important but is often defined as a knowledge-delivery system. Yet teaching carries with it the obligation to understand the people in one's charge, to teach subject matter and skills, but also to inquire, to nurture, to have a sense of who a student is." (Rose 2009, p. 168).

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As a final outcome
the project ultimately seeks
to address the **POTENTIAL**
for **SPACES** to become
RESPONSIVE
to the **DIALECTICAL**
EXCHANGE
between a **USER** and an
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AUTOMATED EXPERIENCE: PROTOTYPING ADAPTIVE ARTIFACTS IN ART & DESIGN PEDAGOGY

Eduardo BENAMOR DUARTE
Rhode Island School of Design.

ABSTRACT

The ability to learn how to digitally generate and analyze art & design information and then use it directly to manufacture buildings, products or art projects, fundamentally shifts relationships between conception and production – it provides for an informational flow from ideation to implementation and experience. While on the one hand the unprecedented production capability of digital technologies has increased the ability to generate and process information, on the other hand it increasingly detaches users from direct experiences with social or material events. This paper seeks to find out if procedure based approaches towards digital technology applications in art & design education can provide new forms of augmented learning and social interaction mediated by sensor based kinetic architecture. A procedure-based approach engages the informational flow as animated form, and relies on a combination of associative, memory-based and experiential learning methods. The processes in this model contrast with traditional disciplinary-based processes in that the simulation method focuses on students' experiential knowledge and goes beyond explicitly embracing the generative capabilities of computational algorithm. Examples of procedure-based learning methods include the design and fabrication of sensory responsive components carried out at the Rhode Island School of Design. The case-study Adaptive Cork Screen combines the increasing proliferation of generative algorithmic processes with the largely accessible control of automated-environments in the electronics industry. The integration of a new type of control, based on the movement of the user's body, enables the user (student) to generate (and associate) various degrees of privacy and publicity in real time. The project ultimately aims to take architecture beyond the creation of static forms and into the design of dynamic social, transformable and ephemeral material experimental processes.

KEYWORDS

Automation, Fabrication, Social, Environment, Pedagogy.

Introduction

The relationship of Architectural Design practice to digital technology faces two paradigmatic shifts. On the one hand the relentless application of digital fabrication processes has generated recurrent criticism about the loss of materiality or haptic value in contemporary architecture (Kennedy 2011). On the other hand it is possible to verify the emergence of the notion of design for industry towards design for customers. While the former presupposes the existence of standard forms of traditional production processes, the latter takes advantage of forms of automated customization provided by algorithmic design processes and computer control numeric machines. As such users may participate in the definition of design variables (scale, size, color, material, etc.) within a precise set of parameters. This fundamental shift leads to the creation of a new social protocols between designers, producers and users. (Gramazio & Kohler 2008; Lynn 1998, Cache 1999).

Kennedy (2011) refers to the need to evaluate contemporary digital design methods that suppress the ability to find manufacturing capabilities that are able to respond to initial proposed designs. This position advocates the use of full-scale models or prototypes as the form in which concepts, generative process and material techniques may be translated from a digital interface to physical reality. This paper discusses and seeks to identify possible ways in which users can actively shape design solutions in real time according to particular sensory data.

Rather than engage the manufacturing capabilities of digital technologies to translate precise information from the computer interface to material processing, this paper sets out to propose a procedural approach to the creative process manifested through a direct correlation between user, design and fabrication inputs. The goal will be to reclaim the haptic presence in architecture and position user motion at the core of morphogenetic research. This paper is organized in five parts. The first three frame the notion of a procedure based design approach to the creative process by distinguishing two ontological variations in definitions of the design process: namely a solutions-oriented approach and a problem-oriented solution. While the former involves a deductive process, the latter uses a set of inductive strategies to solve a design issue.

The fourth part reports on the emergence of a production paradigm based on a new social protocol between a designer, producer and user. The fifth and last part analyses the findings of a case-study in which a full-scale 1:1 interactive prototype was developed through sensor based motion form. The purpose of this research, undertaken at the Rhode Island School of Design, was to investigate how active motions of designers and users determine the morphology of an automated screen divider in a domestic environment. The research involved the generation of an automated system based on the relationship between material, form and interactive systems of control.

1. A procedure based design approach to the creative process: The dialectic between problem and solution-oriented approaches

The notion of procedure is inherent in the creative process in the principle of flow between rational and subjective states as identified in theory of creative cognition (Finke, Smith & Ward 1999). The ability to relate a number of attributes between a series of materials and the abstract procedures applied in their transformation, shifts our conception of the design process. Architectural designers can use contemporary advances in digital technology knowledge as a combinatorial generative process – that goes beyond a strictly morphogenetic approach to the creative process and engages with a systematic transmission of a disciplinary body as an evolutionary design tool. Understanding the combinatorial relationship between, material, language, shape and performance through the notion of architecture procedure is the key to promoting the study of the creative process in architecture design education.

Wynn and Clarkson (2003) argue that the dialectic between problem-oriented and solution-oriented approaches is at the core of the creative process in architecture design. They observed that designers often face the challenge of adding, or preventing, preconceived ideas to formulate design problems. Some authors (e.g. Hillier 1989) understand the design process (as defined by the emergence of a pre-structure) as a step towards a solution. This is often described as the capacity to use knowledge gained from previous experience to inform and create the solution.

2. Merging problem and solution-oriented approaches

The concept of problem and solution oriented design in the creative process in architecture was developed further by March (1984) in a model capable of becoming simultaneously a deductive and inductive tool. The model focused on a set of production – deduction – induction processes (PDI) and offers the possibility of both analytical/evaluative and productive generative capacities. March described it as an iterative design process with three phases (production – deduction – induction) that begins with the designer using an existing body of knowledge to generate (produce) an hypothetical solution. He identified the next phase as the opportunity to foresee (deduce) and study the hypothetical solution and speculate on it according to contextual (physical, cultural, social, economic) factors. His third and last phase is the emergence of inductive reasoning, or implementation of methods that may contribute to a better performance of a defined solution and to the production of an artifact.

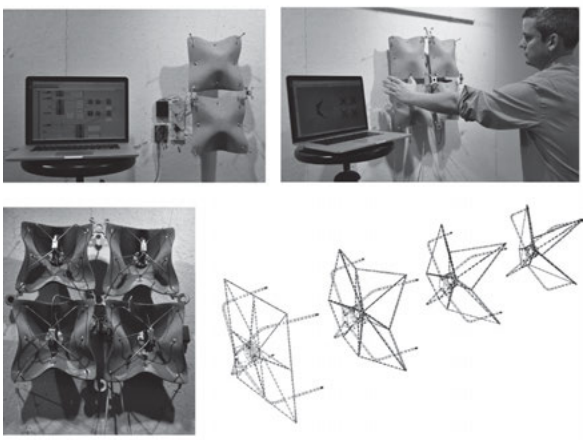

Figure 1. Adaptive Cork Scree: Kinetic research on adaptive screens through sensors and arduino micro controllers at the Rhode Island School of Design. (Lead researcher: Eduardo Benamor Duarte. Research Assistants: Iok Wong and Eun-Shin Kim.). The graduate students participating in the project as research assistants collaborated in planning, programming and fabrication prototypes. They managed and implemented the research project, coordinated the research work schedule and contacted suppliers to purchase the tools and material supplies necessary for project implementation. (Acknowledgement: Eduardo Benamor Duarte, 2014).

3. A procedure based design approach to the creative process in architecture design education

The creative process in architecture design education occurs within the process of flow Csikszentmihalyi identified in 1997 – namely a flow between field, domain and the person itself. In architecture design education this process may be manifest at the intersection between the direct and indirect transmission of information from the field to the student; the student's processing of generative design models and; ultimately the validation of their concepts through processes of exploration according to the discipline's conventions.

In order to further develop critical understanding of the challenges that the creative process is facing in architecture design education, we need to understand the rapid change it is undergoing. The current proliferation of CAD CAM tools opens up opportunities to translate generative design solutions as an open customizable platform for pedagogical practice. As such it it's important to identify new pedagogical models that will nurture the creative process, rather than continue to use existing ones with the risk that creative design education may end up being merely vocational or, a nostalgic representation of a historical canon.

The research referred to in this paper focused on the construction of a theoretical model apparatus for pedagogy situated at the core of the student's experiential creativity. It distances itself from educational models that focus on analogy, or teach by association and /or factual acquisition of information. Rather than learning through memory based processes or indirect transmission of knowledge, the new model establishes a methodological platform for expanding and absorbing architectural knowledge. The methodology is based on the idea that iteration embedded in generative and algorithmic processes is incorporated into a reflective tool to assess how the experimental process may generate and accumulate novelty so as to become verified in the discipline's material and expanded context. The goal is to test out if and how the generative robustness of an algorithmic design simulation approach can be implemented beyond simulation. It attempts to simulate such a process beyond the digital interface towards an actual physical construction.

4. The new social protocol between designers, producers and users

The impact of mass-customization, or the architecture of the non-standard (Koralevic 2008), is of considerable interest when addressing the relationship between designers, users and producers. As much as parametric design processes may convey simultaneously variability, and a literal transformation of digital input in material through computer control numeric processes, users may also participate (or provide input) towards the customization of design processes. This phenomenon could help designers, users and producers to customize

and identify contextual differences during the process of customizing and optimizing the generation of building components during the algorithmic design. These may be evident in the design of structural elements or they can provide the most advantageous shapes for natural ventilation systems to better optimize the building performance. This kind of process may include the future user, thereby opening-up opportunities for customization to a larger societal group.

If the incorporation of digital tools enables the production of increased variability and more complex forms and structures, how many of the intuitive and uncertainty driven processes inherent in art based practices are lost? The case study research analyzed below sought to engage automated systems inherent in sensor based motion hardware to simulate the designer's decision-making process beyond the computer screen and towards the actual physical prototype.

5. The Adaptive Cork Screen (ACS): an automated reflexive environment for domestic space

The central focus of the project is prototyping an adaptive wall screen that changes the configuration of space while responding to movements of the user's body. The study engages with technology to create an automated spatial prototype that can become adaptive to its occupation and reflexive to its environment. Central to this project is the duality between spatial adaptation and empathy through a performative appropriation of signs of affect and familiarity commonly associated with systems of ornamentation. The space in the research setting is divided by a screen that adapts its shape in reaction to the user's distant presence rather than any physical contact. As a final outcome the project ultimately seeks to address the potential for spaces to become responsive to the dialectical exchange between a user and an architectural element, whereby they both model and influence each other.

ACS is a space divider that dims sight and sound in response to human movement. The research draws on the intrinsic acoustical and elastic properties of cork composites to absorb sound and bend under relative pressure. The point of departure is based upon research developed in the cork composites industry and previous collaboration with cork manufacturer Amorim Cork Composites, before the construction of the award winning public installation Onion Pinch. The research into ACS has addressed the following issues:

What kind of screen structure might be the most appropriate in accommodating formal transformation of cork composite sheets;

How to implement an adaptive system for formal transformation; and ultimately

How to control the adaptation of the structure in response to the body movement.

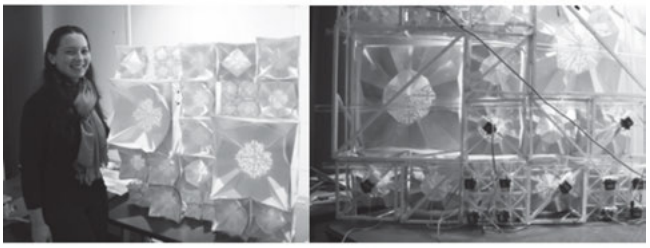

Figure 2. Adaptive origami skin: Kinetic research on adaptive screens through sensors and arduino micro controllers developed at the Rhode Island School of Design by student Eugenia Rieutort-Louis & Professor Eduardo Benamor Duart. (Acknowledgement: Eugenia Rieutort-Louis)

ACS has the ability to become both visually opaque and permeable in response to the user's distance from it and motions. ACS ultimately may generate a new kind of space-use protocol for domestic environments based on a flexible relationship between shared private and public space. The screen is constructed from a cellular organization of cork composite panels in which units are repeated along a 5'-0" x 5'-0" area. Each panel is automated to open and close individually, based on the user's movement, to reveal the space on the opposite side. The goal is to give users the opportunity to be a catalyst of change in the morphology of the screen and offer them the possibility to tune the visual and acoustic privacy of spaces at either side of the screen.

The research project is undergoing development in two prototyping phases[1]. Phase 1 (Parametric Interface & Physical Actuator) consists of shape optimization, connecting deformation data of a physical model to a computer model. The physical model is constructed from a sheet of composite cork panel and measured according to the degree of flexibility to pressure under the power of external electrical forces. The digital tools, based on Rhinoceros software and Grasshopper plug-in parametric interface, are utilised for the purposes of defining various forms of shape adaptation to different degrees of permeability. The parametric modelling information is transmitted as electrical output to a physical model that allows for a real-time data flow and reversible shape optimization between the parametric model and the flexibility of the physical model.

The research process was drawn from an online community of users working on the development of Firefly (and the work of software developers Jason Kelly Johnson and Andy Payne), a set of comprehensive software tools dedicated to bridging the gap between Grasshopper and the Arduino micro-controller (an open-source micro controller that makes the application of interactive objects or environments more accessible). Phase 2 of the project consisted of planning the motion sensing and shape adaptation so as to determine the aperture and location of panel cork composite prototypes in a wall assembly based on the

distance to the user's body. This phase processed the shape optimization developments in phase 1 through an interactive system based on a feedback-loop measured from a kinetic motion sensor. In order to identify body movements based on depth and distance the team will connect the data processed from the Kinect motion-sensing device to Processing and Arduino so as to provide electrical input to the assembly of the cork composite panels and control the degree of visual and acoustic privacy.

6. Conclusion

The intention to identify a procedure-based approach to the architecture design process that responds to the need to analyse how changes in the production of architecture design solutions are manifested in the design process. The increasing utilization of computer numerical processes in design and fabrication shortens the distance between generation and implementation. The designer's set of tools can enable simultaneously one of the broadest sets of generative processes as well as a close approximation to actual making.

For this reason a procedure-based approach to the design process is a hybridization of simulation and making-based models constantly actualizing an ideation process in material form. This systemic definition of procedure-based process continues to merge the problem-oriented and solutions-oriented approaches referred to at the beginning of this paper (March 1980).

ACS project seeks to generate new possibilities for enriching human-environment interactions now that the control of automated-environments is increasingly accessible. ACS proposes a new type of control based on movements of the user's body that are capable of directly generating various degrees of privacy and publicity in the domestic space.

One of the main contributions of the project has been to carry out a research experiment with potential for further development in the classroom. Its pedagogical potential for addressing questions and implementing decisions that arise in prototyping an interactive screen offers opportunity for students to further expand the research scope of human-environment interactions.

Notes

1. The skills students require to participate in the project included digital modelling, fabrication and computer programming of physical interactivity during prototyping; motion sensing & shape adaptation; as well as the ability to manage the project schedule and complete deliverables.

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VISUAL PERSPECTIVES on ART EDUCATION

PERSPECTIVES ON ART EDUCATION

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Curator for contemporary art

The painting ‘The Tortoise Trainer’, by the Turkish artist Osman Hamdi Bey, is dated 1906. We see five tortoises moving slowly towards a dervish who is holding a small kettledrum, a fife and a ney flute. Clearly, these animals are receiving some sort of music education. Painted at the turn of the 20th century, Bey was addressing the conflict between tradition and modernity. The creature’s slow movement symbolizes resistance to education as this was being promoted by dawning Kemalist efforts at modernization. The deeper appeal of the painting lies in the dervish’s persistent, yet futile attempt to provide aesthetic education – a quest that can never come to completion. In the light of current political events, ‘The Tortoise Trainer’ is topical once again. Culture and knowledge have long been incorporated into capitalist modes of production and are currently under fire for being just that. Attacks on historic cultural sites and museums are explicit expressions of a conflict in which knowledge is viewed as an instrument of power, and not a part of cultural heritage.

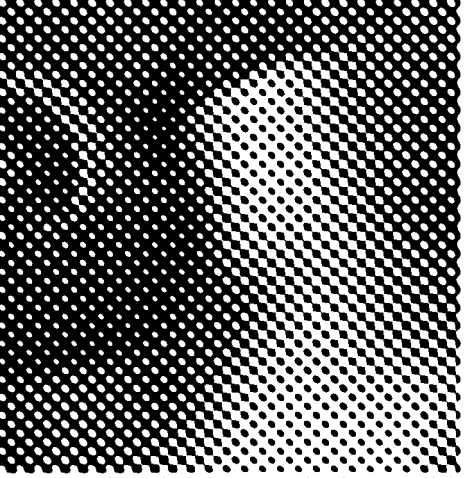
In ‘The Tortoise Trainer’ we see overlapping educational concepts – education as a authoritarian process on the one hand and education as an aesthetic form of communication on the other. Art education as we understand it today is a blend of the aesthetic and cultural forms and often based on divergent historical dispositifs. Both these modern and pre-modern pedagogical concepts, promising no less than a new kind of human being, remain central to our understanding of what education is today.

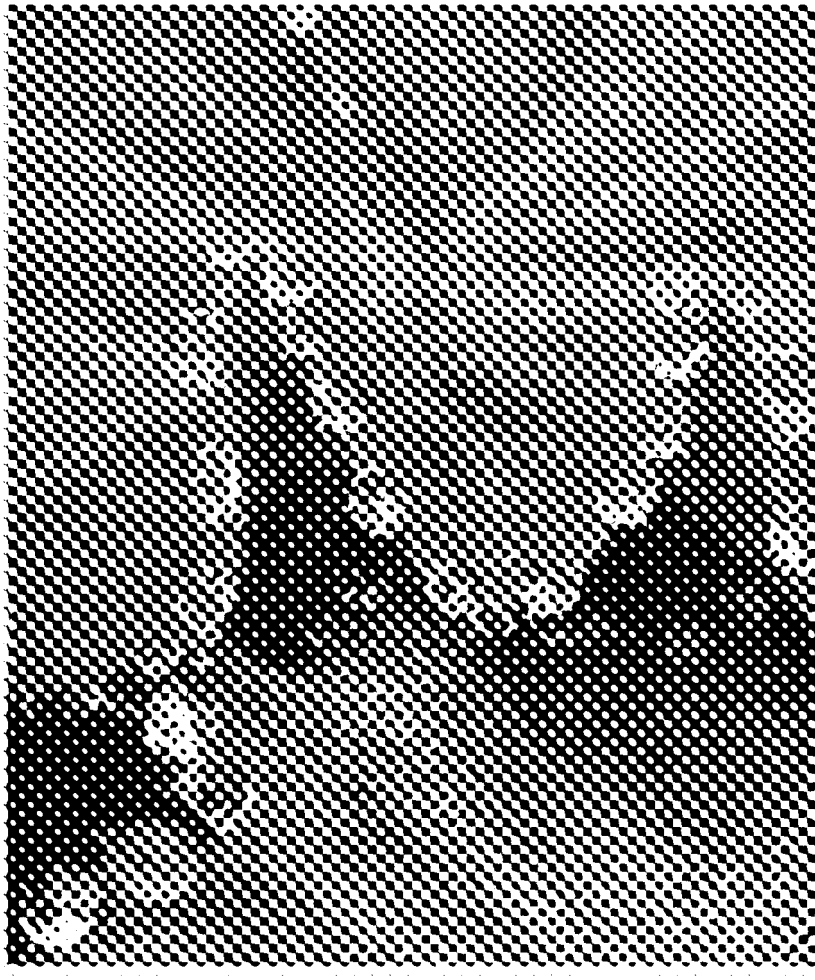
However, industrialization created a need for human beings who can adapt to new forms of production. Pestalozzi and his student Friedrich Fröbel responded to these demands by developing teaching methods that oscillated between observing nature and measuring it. They came up with specific exercises based on math, geometry and arithmetic, thereby creating the formal language of abstraction. This language continues to hold a hegemonic position going far beyond the aesthetic field. Grids, difference and repetition, tessellation, diminution and accumulation are figures that form the basis of abstract composition. These figures also laid the groundwork for aesthetical operations set in the third, digital industrialization.

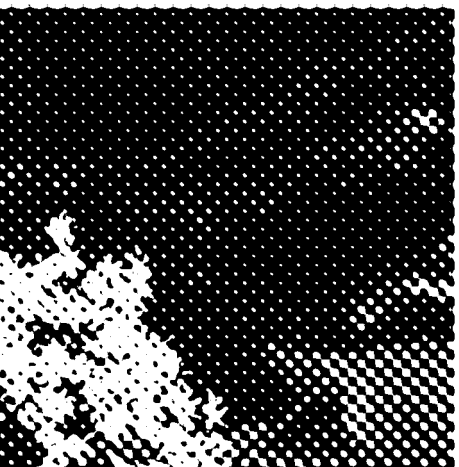
As a key term in modernity, creativity has substantially influenced art education. The idea of acting creatively, of being able to shape a golem out of clay, create something out of nothing, seems to promise knowing how to shape life itself. The idea of the creative act has become programmatic in aesthetic education. Creation ex nihilo has also found its way into the neo-liberal strategies of autonomy – spontaneity, flexibility, mobility that Luc Boltanski and Eve Chiapello described in ‘The New Spirit of Capitalism’ (Le nouvel Ésprit du Capitalisme). As touted by current management strategists, creativity is understood as an infinite resource and thus, a guarantee for infinite growth.

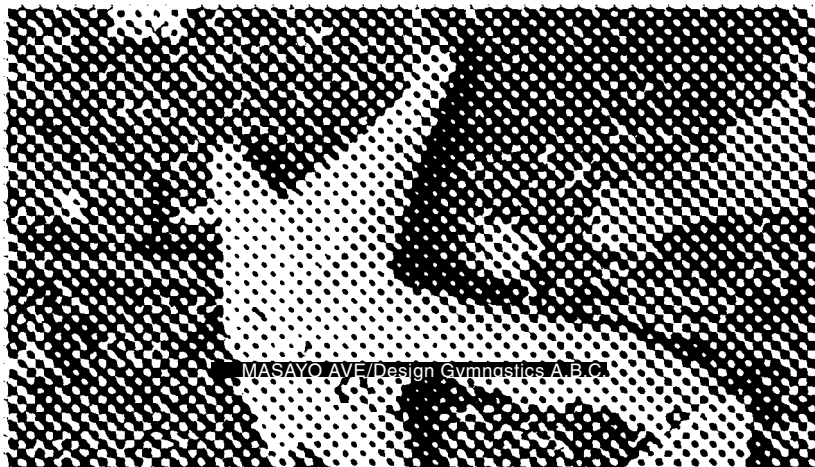
The American artist John Baldessari titled a video from 1972 ‘Teaching a Plant the Alphabet’. As this name suggests, Baldessari literally attempted to teach the alphabet to an ordinary potted plant. As is the case with Osman Hamdi Bey’s ‘Tortoise Trainer’, it portrays education as a wholly futile endeavor. Art education involves much more than skills training or production of artworks; more importantly it is about fostering acts of thinking and perceiving and aesthetic sensibility. These are the qualities that enable us to develop political awareness.

MASAYO AVE/The garden in the air



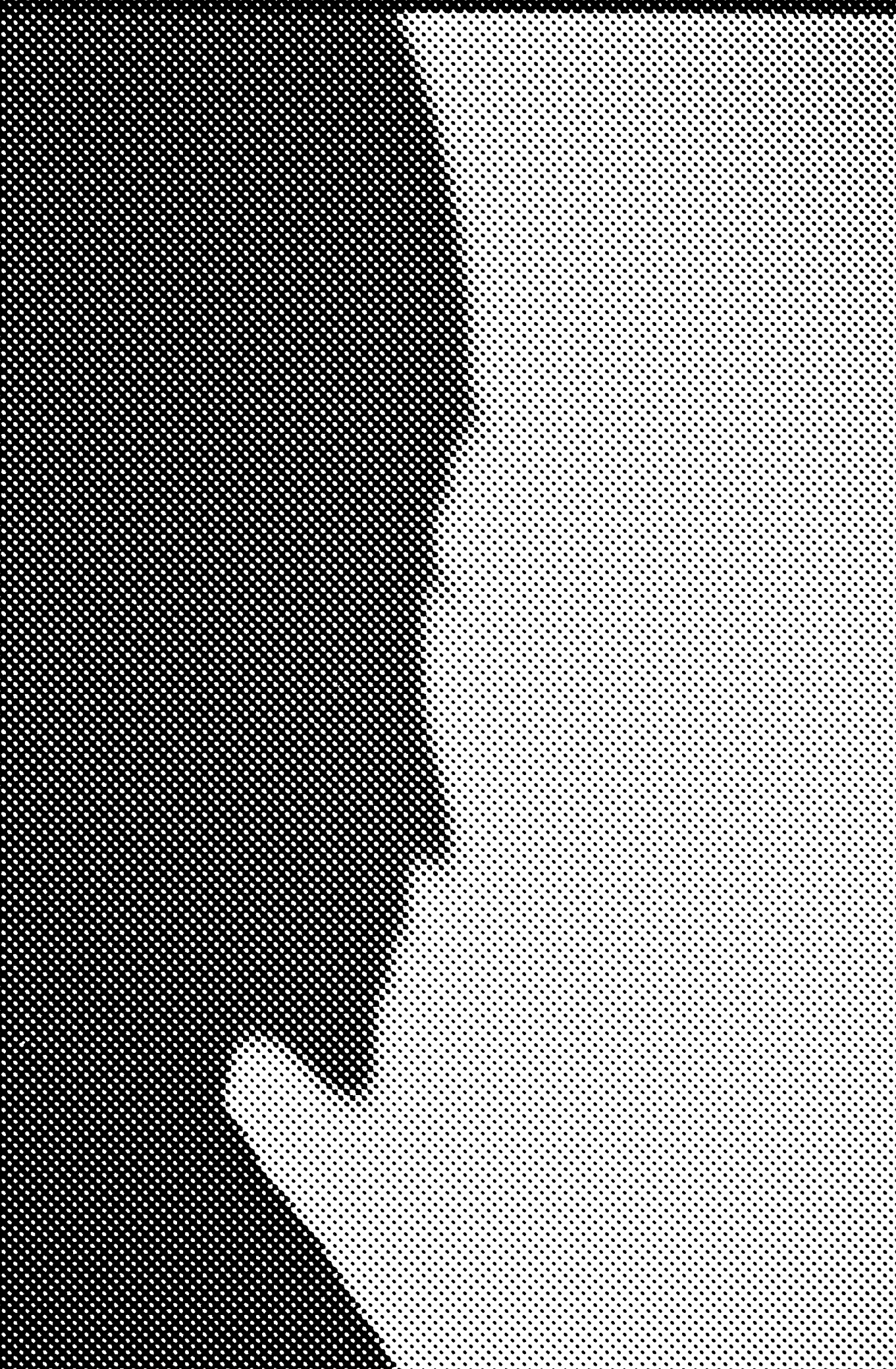


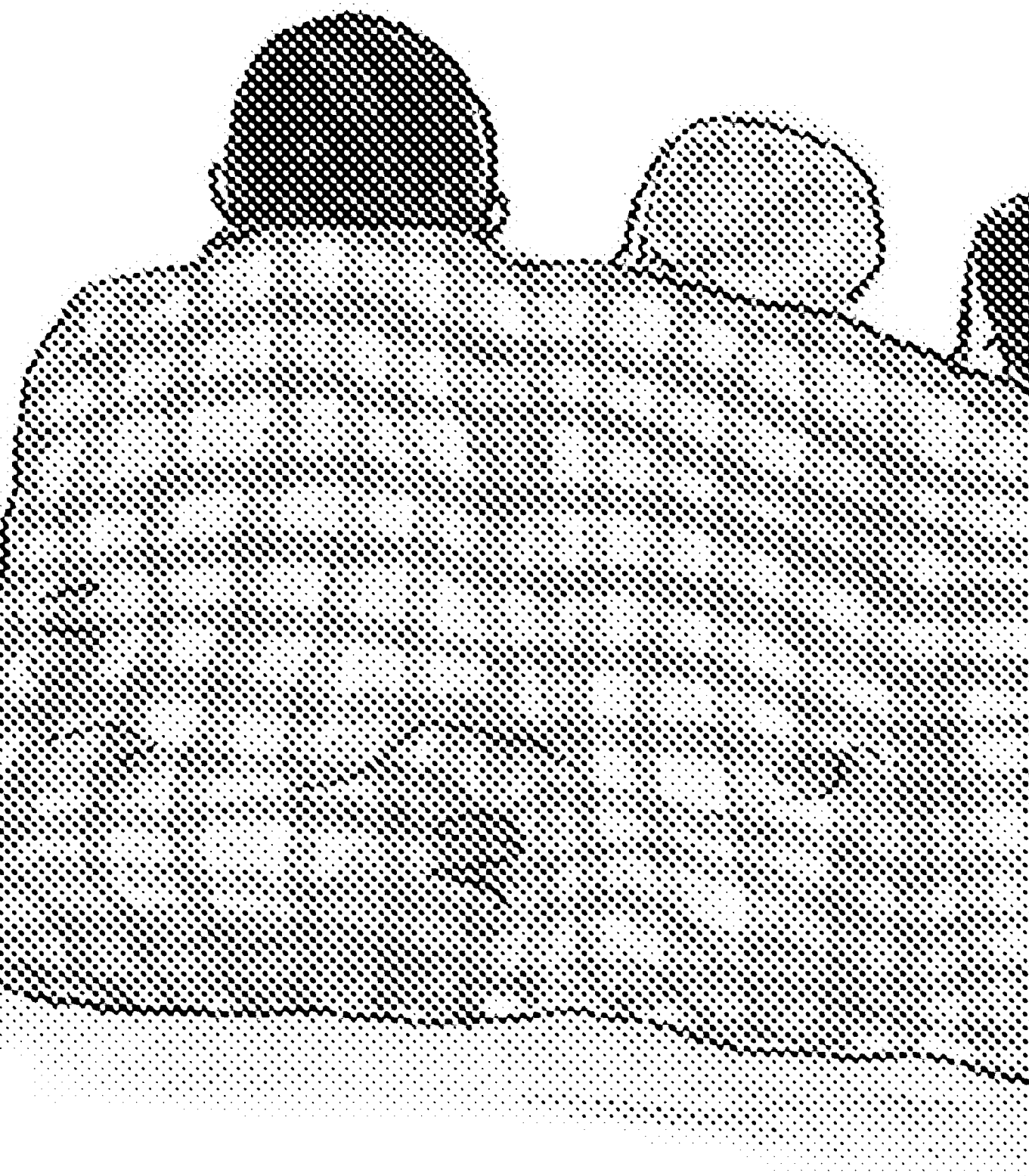


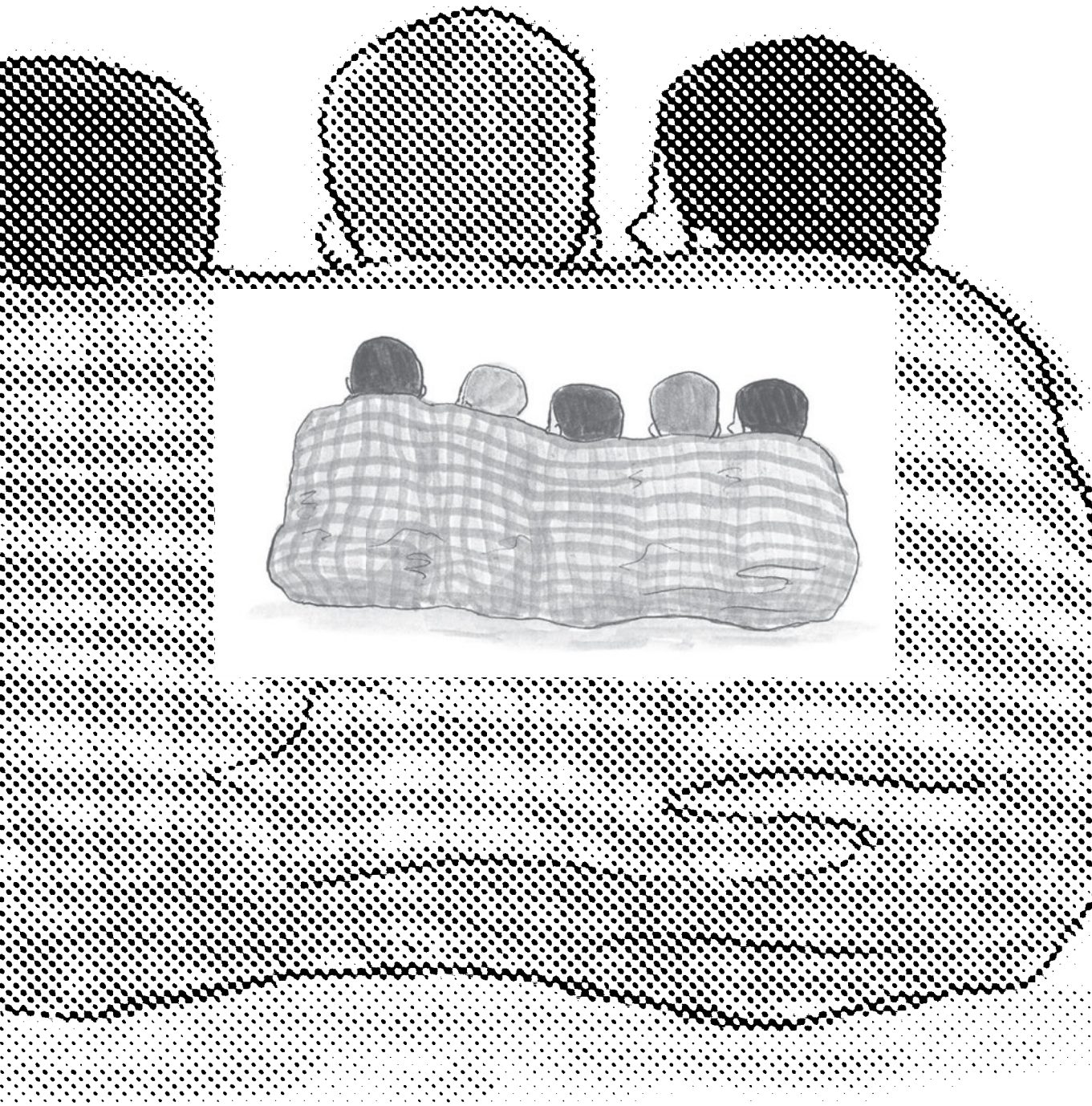


CATERINA TIAZZOLDI & EDUARDO BENAMOR DUARTE / Onion Pinch

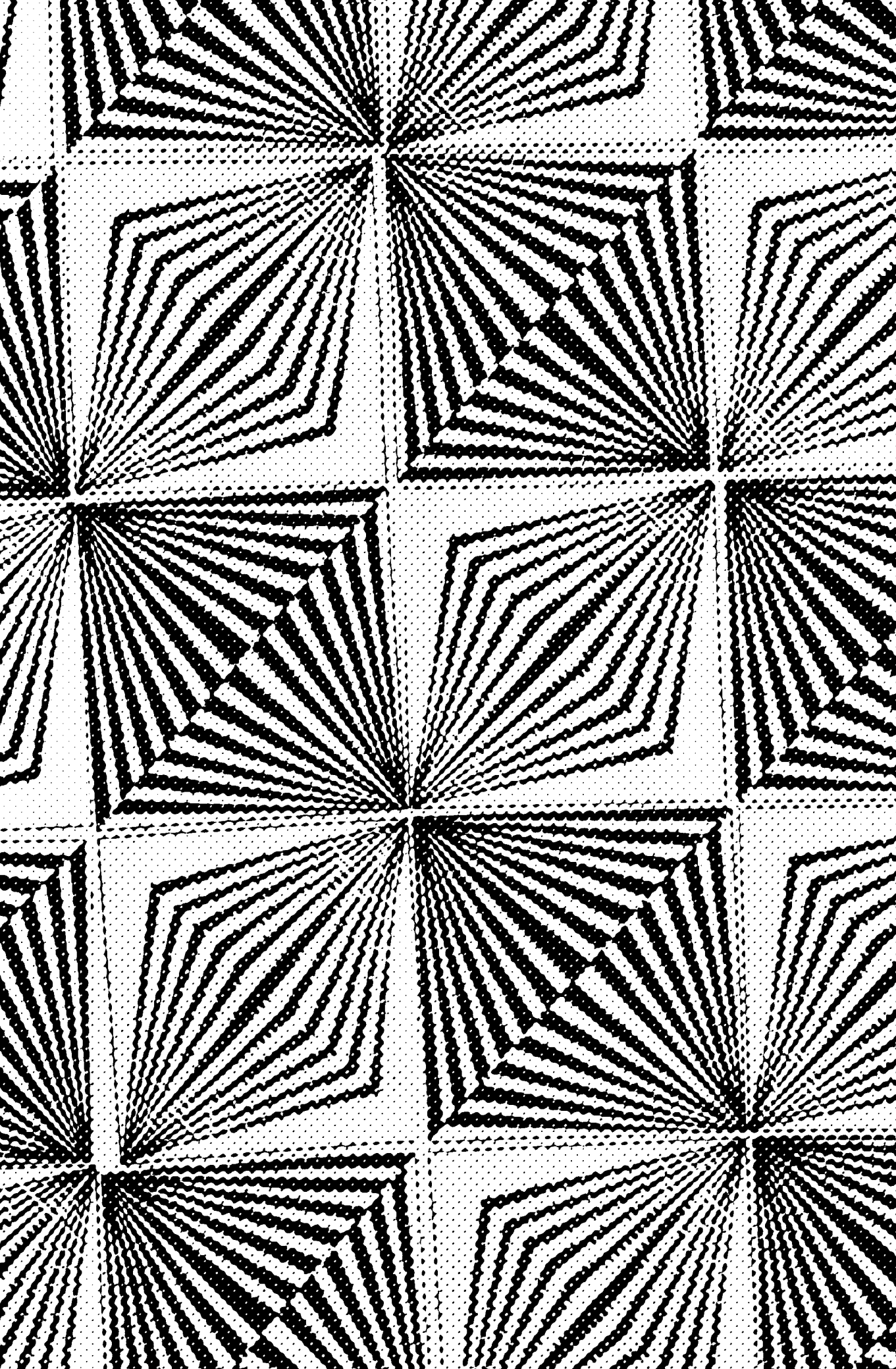
MONIKA FARUKUOYE/Minutes, Minutes OFF

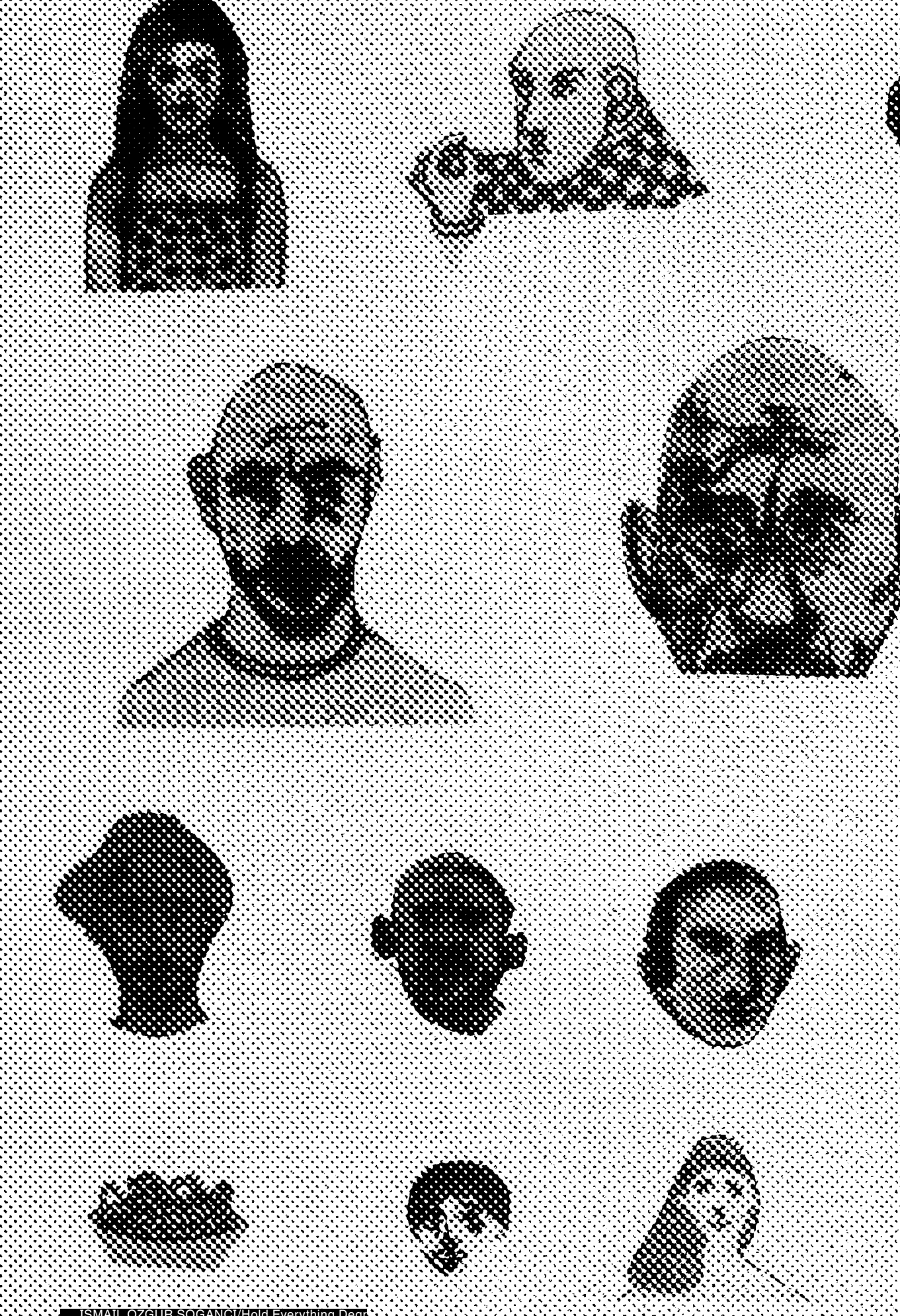




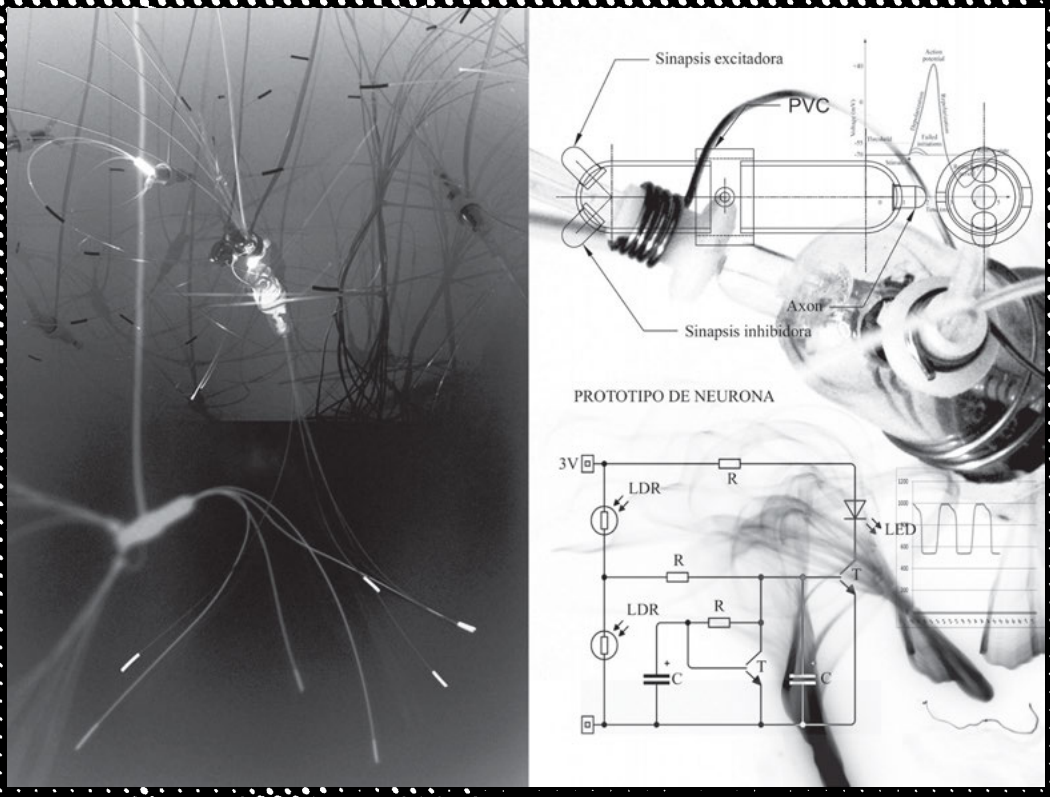


RUTH MATEUS-BERR / Op-Tiles by
ANNA SCHWARZENBERGER, SABRINA
SZUKITS AND INES BELHAI: CLASS 4A
BERTHA VON SUTTNERSCHOOL VIENNA

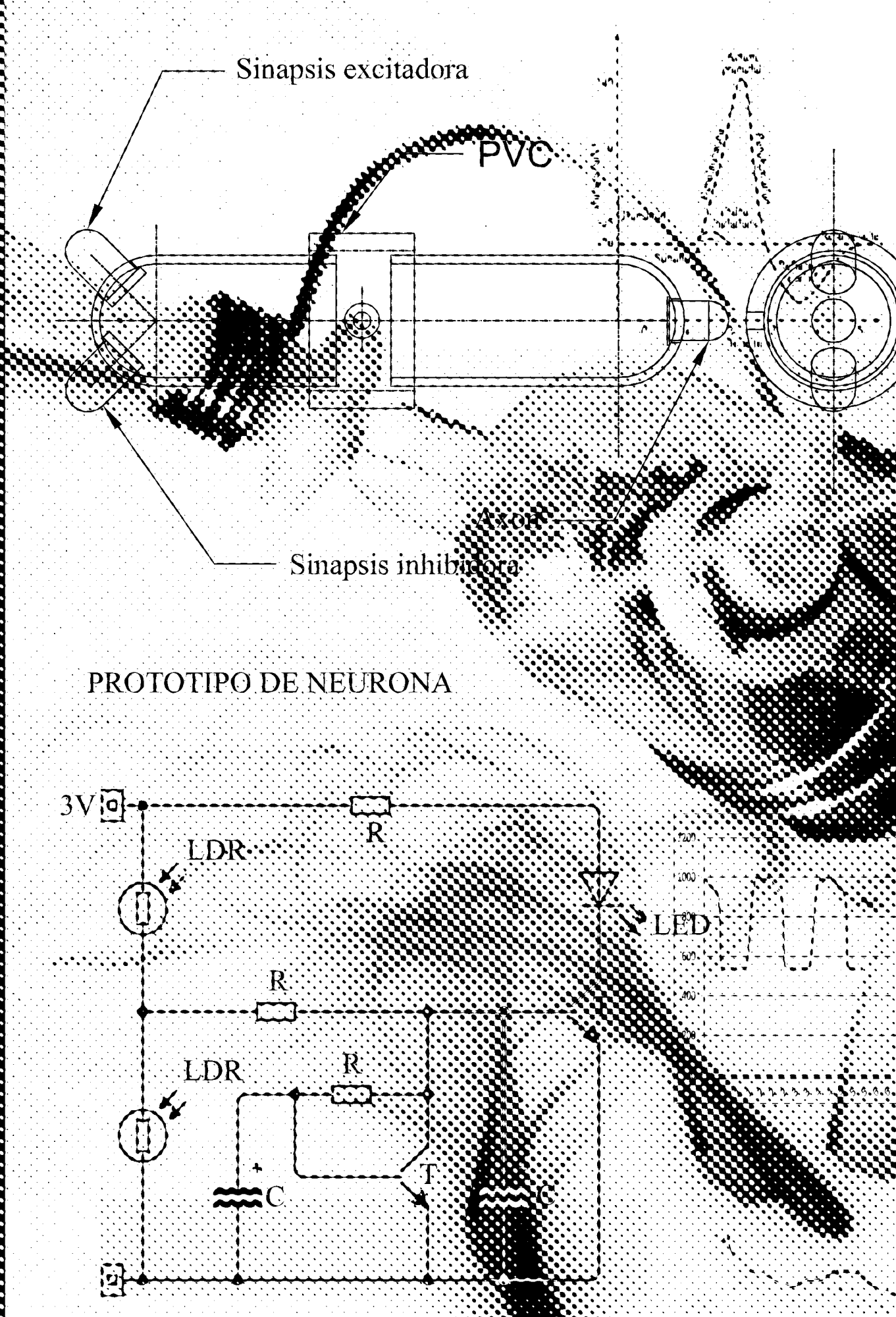




İSMAİL ÖZGÜR SOĞANCI/Hold Everything Dear



AUGUSTO ZUBIAGA/ Critical Care



PROTOTIPO DE NEURONA

CURRICULUM VITAE

Eduardo Benamor Duarte
was born in Lisbon in 1975. He is Assistant Professor Rhode Island School of Design and Principal of Benamor Duarte Architecture. He earned his Masters of Science in Advanced Architecture Design from GSAPP Columbia University after earning his Bachelors degree in Architecture and Urban Design from Faculdade de Arquitectura Universidade de Lisboa where he is a PhD candidate in the field of design process in architecture education. In 2009 he founded his studio, Benamor Duarte Architecture, focused on design of objects, and spatial environments at large. Eduardo Benamor Duarte's current research and practice identify reflexive systems that foster the transformation of our living environments based on the adaptation of a geometrical abstract apparatus in dialogue with a preexisting material condition; or a pre figuration of a thought as a spatial typology. Recent architecture, design and installation commissions include group exhibitions at the Cite' de l'Architecture et du Patrimoine, Institut Francais d'Architecture in Paris, University of Memphis Art Museum, First Street Garden I Open Art Space, Salone Satellite – Milan Furniture Fair, Temporary Museum for New Design, and Made Expo in Milan; Doing and Undergoing, 125th Anniversary of TC Columbia University, Wanted Design NY and Soho Digital Art Gallery in NY; Bienniale Design in Saint Etienne and Experimenta Design in Lisbon. Over the past years Eduardo Benamor Duarte's work has been published widely in a number of international magazines, books and newspapers such as Abitare, AD France, Domus Magazine, Elle Décor, Interni, Ecologik, Frame, La Repubblica, Expresso, Vogue Italia, or the publishing houses Gestalten and Links Books. His work has received awards from several institutions in Portugal and US such as the Ministério da Cultura – Direcção Geral das Artes, Calouste Gulbenkian Foundation and Rhode Island School of Design.

Judit Bényei
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Judith Burton
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Karen Carroll
is the dean of the Center for Art Education at the Maryland Institute College of Art where she oversees masters programs for preparation and professional development of art educators and community artists. She also developed a course in the college teaching of art, now entitled: Philosophy and Pedagogy in Post-Secondary Art Education. She has written extensively in School Arts with additional articles in Art Education, Studies, and journals in gifted education. As one of seven co-authors of the text, 'Creating Meaning through Art: Teacher as Choice Maker', she makes the case for cultivating artistic behaviours. A commissioned work for the Maryland State Department of Education, entitled Better Visual Arts Education, offers a comprehensive overview of theory, research and practice. She has authored noteworthy policy papers including "What If They Believed Us? How Well Prepared are Art Teachers to Deliver on the Promises of Art Education?" published by Arts Education Policy Review. Dr. Carroll is a NAEA Distinguished Fellow and recipient of several national awards including National Art Educator of the Year, awarded by the NAEA in 2009. In 2004 she was named to MICA's first endowed chair, the Florence Gaskins Harper Chair in Art Education. Her doctorate in art education was earned at Teachers College, Columbia University. Carroll serves as a Visiting Fellow with the Singapore Teacher Academy for the Arts and Chair of the Education Committee for the newly established Baltimore Design School.

Lourdes Cilleruelo
PhD in Fine Arts. Assistant professor in Art Education and Director of the Department of Didactics in Music, Visual Arts and Body Expression at University of Basque Country (UPV/EHU). She participates in international meetings and events in the fields of both Art and Education. Head of the research project "Transforming Education through Art and Media" which focuses on researching art education as the main element for developing transdisciplinary curricula. Currently Lourdes Cilleruelo, Itsaso Madriaga, Augusto Zubiaga, Miriam Peña Zabala are researching relationships between Art Education and New Technologies, using recycling, low cost and sustainable materials as relevant factors when applying the 'learning by doing' approach. They participate in international meetings and events in the fields of both Art and Education.

Alexander Damianisch
works at the University of Applied Arts Vienna, heading the Department for Support Art and Research; he is involved in strategic, conceptual and administrative tasks. He is also an executive board member for the International Society for Artistic Research and the Angewandte Innovation Laboratory. He lectured at the University of Durham (GB) and the Lomonossov University Moscow (Russia), and worked the New Synagogue Berlin and the Akademie Schloss Solitude Stuttgart, where he was responsible for the program Art, Science & Business. Until 2011, he was in charge of PEEK at the Austrian funding scheme for arts-based research at the FWF.

Anton Falkeis

studied architecture at the University of Applied Arts in Vienna, where he graduated in 1986. He is a licensed architect in Austria and Liechtenstein. Together with Cornelia Falkeis-Senn he is co-founder of falkeis I architects . vienna (1988) and falkeis I architect . vaduz (2011). Their architectural work has been widely published. Among these are: Mauthausen Memorial, Museum and Documentation Center of Austrian Resistance, Roof Top Enlargement University of Applied Arts Vienna, Curhaus St. Stephan's Square Vienna, 'Austria Abroad'–Exhibition Austrian Parliament Vienna, Active Energy Building, Vaduz. The work was exhibited at Venice Biennale, Kuala Lumpur, New York, Vienna. Anton Falkeis started his academic career as a guest researcher at the University of Tokyo, Japan in 1992 and has been teaching and lecturing at several universities such as Royal College of Art, London; ELISAVA, Barcelona; ESAG, Paris; Denmark's Design School, Copenhagen, and at the University of Applied Arts in Vienna, where he was Vice-Dean of the School of Architecture from 1999 to 2003. He has since taken on a number of responsibilities at the University of Applied Arts Vienna: In 2000, he became head of the Department, as well as a professor of Special Topics in Architecture. Since 2012, he has also been head of the Department of Social Design, plus heading their master programme 'Arts as Urban Innovation'. Since 2013, he has also been head of the Institute of Arts and Society.
In 2012 he was guest professor at Nanjing University of Art China, conducting the experimental studio. He is visiting critic at University of Liechtenstein and ETH Zürich. Anton Falkeis is JSPS fellow of the Japan Society for the Promotion of Science. He published theoretical papers such as 'Featureless City', 'Western Style and Eastern Mind', 'Film as Preview', 'Urbanizing the world' and 'Thinking out of the urban design toolbox'.

Monika Farukuoye

was born in Vienna. She completed an MSc in Computer Science at the Technical University Vienna and a two-year training in filmmaking at WerkstattFilm in Vienna before she went to Hamburg to conduct MFA Studies in Film Directing at the Hamburg Media School. A year later, she changed to the Master Programme in Fine Arts at Hamburg University of Fine Arts. She completed her MFA as a student of Professor Wim Wenders in the Film Department at Hamburg University of Fine Arts. She lives in Vienna where she works as an artist, filmmaker and as lecturer in the Department of Social Design – Arts as Urban Innovation, University of Applied Arts Vienna. Her filmic work has been shown at festivals like the Pärnu International Documentary and Anthropology Film Festival in Estonia and the OZU Film Festival in Sassuolo, Italy, as well as at exhibitions, as part of installation centred artworks in Hamburg, Germany. Her article on Ken Wardrop's short film "Undressing my Mother" was published in the Short Film Studies issue 1.1 in 2010. Her artistic interests are centred on structures of poetic expression in film and the artistic process per se, which she investigates through drawing and writing poetry and prose. In her films she addresses questions of integrity and transgression of cultural barriers as well as delimitations of the personal self.

Michaela Götsch

works as a research assistant at the Institute of Art Sciences and Art Education at the University of Applied Arts Vienna. She is a teacher of Arts, Textile Design, Design and Technology at secondary level. She worked as a museum educator as well as in the museum planning. Her scientific interests refer to exchange processes between scholastic and extracurricular fields of practise regarding art education and knowledge transfer.

Dirk Huylebrouck

spent eight years working at universities in the Congo until a diplomatic incident between Belgium and President Mobutu of Congo interrupted his stay. Then he worked at the University of Aveiro Portugal and the European Division of Maryland University, until the majority of his American (military) students were sent to Iraq. He returned to Burundi Africa but for only three years, because of the genocide in neighbouring Rwanda. In 1996, he finally consented to teach at the Faculty of Architecture of the KULeuven (Belgium). Fortunately, he can still escape abroad, as he has edits a column called 'The Mathematical Tourist' in the journal 'The Mathematical Intelligencer' since 1997. However, he may soon have to flee abroad again because has become (in) famous in Belgium for his work discovering or popularizing errors in the Belgian Atomium landmark, in the work of Leonardo da Vinci, in a runway of Brussels Airport, in the interpretation of The Forbidden Fruit on the Mystic Lamb by Jan and Hubert Van Eyck, and, most recently, in Norbert Francis Attard's Fibonacci artwork.

Richard Jochum

is a post-conceptual media artist with a strong focus on interactive video, installation, and project-based art. He received his PhD in philosophy from the University of Vienna (1997) and an MFA in sculpture and media art from the University of Applied Arts in Vienna (2001). Currently, he is a studio member at the Elizabeth Foundation of the Arts and an associate professor of art and art education at Teachers College, Columbia University specializing in new media, cultural theory, and higher art education. He is represented by Gallery Bundo, South Korea.
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Christoph Kaltenbrunner

Educated in mechanical engineering, architecture and industrial design, Christoph Kaltenbrunner has been head of the Department dae (Design, Architecture and Environment) at the University of Applied Arts Vienna since March 2014. He owes his extensive training and education to the free-of-charge Austrian school system, which enabled him to pursue all the possibilities of further education.
He learned the basics of engineering at a technical college (HTL), continued for two years with technical physics, before, because of a happy accident, he started his studies in architecture (Vienna University of Technology) and industrial design (University of Applied Arts Vienna). International exchange programs enabled him to spend several years of studying in Japan, England and the USA. During this period he established, together with university friends, the internationally successful architecture office "propeller z", from which he withdrew in 2013. National and international teaching activities and lectures support his interest in foreign countries and his inquisitive nature regarding life abroad. The work of «propeller z» won several awards and nominations and has found its way into most of the relevant architecture books of recent years.

Albrecht Karlusch

is a researcher in the Entrepreneurship Center Network (ECN) of the University of Economics and Business Vienna. He is interested in new technologies, business modelling, finance and learning theory. After he completed his studies in economics and computer science at the Vienna University of Technology he lectured at the University of Vienna and was a consultant for various industries for several years. In 2013, he completed an MBA in Entrepreneurship and Innovation at Danube University Krems and at Hong Kong University of Science & Technology. He has shared his knowledge in guest lectures at a number of universities. In 2008 he began a career as a founder and CEO of a start-up for which he attracted several million Euro in public, private and venture capital funding. After more than six years as an entrepreneur he has decided to return to the academic sector to share his practical experience and continue research.

Fares Kayali
is a game designer and researcher living and working in Vienna, Austria and holds a PhD in computer science. Fares has headed the design of several digital games that were finalists at IndieCade and the Independent Games Festival and has presented his work at international conferences including Games for Change, Game Developers Conference, Games and Learning Society, Games for Health, and the Digital Games Research Association. He works as a postdoctoral researcher at the Vienna University of Technology and University of Applied Arts Vienna. Fares lectures in game design at several Austrian universities and is principal investigator of the game-based learning project 'Sparkling Games' and the art-based research project 'Breaking the Wall – Playful interfaces for Music Audience Participation'. His research interests include game design, music and interactivity, serious and positive impact games, media, and game art, as well as topics around human-computer-interaction (HCI) at the intersection of health care and technology.
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Lise Kjaer
received her PhD in Art History from the Graduate Center, City University of New York in 2008. She teaches undergraduate and graduate courses in twentieth century and contemporary art, art history survey and MFA seminars at The City College, City University of New York. Her area of research includes issues of identity in modern and contemporary art, and global art history. Kjaer's dissertation 'Awakening the Spiritual: James Turrell and Quakerism' considered the artist's light installations in view of his renewed interest in Quakerism, Quaker tenets, history and tradition. Her current research involves an anthology (co-edited with Dr. Will Wroth) on the scholar Ananda K. Coomaraswamy's influence on twentieth century art, tracing the impact of the writer and curator's publications, exhibitions and scholarly involvement with Southeast Asian art on twentieth century American, Asian and European art and art history. Kjaer has previously received an MFA with Distinction from the Academy of Fine Arts in Warsaw, Poland in 1992. She has exhibited internationally in Denmark, Finland, Germany, Poland and the United States, and been awarded a Fulbright Scholarship, Bamse Kragh-Jacobsen's Award, and been a fellow of NIFCA, a Nordic artist in residency program in Helsinki, Finland. Along with her scholarly work in art history, Kjaer continues her art practice exhibiting sculptures and installation pieces that are often time-based, ephemeral and participatory inviting the viewer to become a part of the work.

Gila Kolb
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Rolf Laven
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Barbara Mahlknecht
is a cultural researcher, curator, art educator and teacher. She currently holds a position at the Institute for Education in the Arts at the Academy of Fine Arts Vienna. Her work in research, curating, art education and teaching strongly relates to postcolonial and feminist curatorial practices, socially engaged art, the exhibition as performative space and critical art education. She has (co-) conceptualised and (co-)realised a variety of projects – e.g. 'A Proposal to Call' (exhibition, Kunsthalle Exnergasse Vienna, 2015); 'Projecting out into the Community' (interview/online project, 2013); 'The Subjective Object. (Re)Appropriating Anthropological Images' (exhibition, Grassi Museum Leipzig, 2012); 'Producing Publics — Presence as a Strategic Tool?' (conference/publication, Galerie für zeitgenössische Kunst Leipzig, 2012) et al.

Ruth Mateus-Berr
is professor at the University of Applied Arts Vienna and an artist and design-researcher. She studied Art Education at the University of Applied Arts, and English and History at the University of Vienna. Her PhD completed in 2002 investigated the design of Carnival parades in Vienna 1939 and she gained a postdoctoral qualification in Design Education in 2011. Her research focuses on the interface between art/design & science and she has published articles and books about inter/transdisciplinary art & design, social design, art & design & textile education, multi-sensual art & design transfer, mathematics & design & fashion & textiles & games, and intercultural and social projects. Presently she is professor at the Institute of Art Sciences and Art Education, Institute of Art & Society, at the Department of Social Design and head of Department for Didactics in Art, Textile, Design. She is an active member of the Design Research Society, The International Society of Education through Art (INSEA) and the research committee of Sensory Studies, and is currently an external evaluator of EU Program P7, Marie Curie Multi-ITN project 'TRADERS'. Professor Mateus-Berr teaches Design Research, Applied Design Thinking, Art, Design and Textile Education and Team & Presentation Skills. She founded the Applied Design Thinking LAB Vienna in 2007 and recently initiated interdisciplinary and intercultural projects. Her personal artwork focuses on interfaces between research and arts, artistic research, performance, staged photography and topics such as smart cities, society, medicine, national socialism, racism, mal practice, smell scape, education, silver generation, collaborative artwork. It has featured in numerous exhibitions, workshops and publications in Austria and abroad.
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Torsten Meyer

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Patricia Olynyk

Patricia Olynyk is director of the Graduate School of Art and Florence and Frank Bush Professor of Art at the Sam Fox School of Design and Visual Arts, Washington University in St. Louis. She has also taught at the University of Michigan in the School of Art & Design in Ann Arbor, where she became one of the first artists in the US to be appointed as a research professor to a scientific unit. She completed her undergraduate work in Canada at the Alberta College of Art and Design and received her MFA degree with Distinction from the California College of the Arts. Olynyk later spent four years as a Monbusho Scholar and also a Tokyu Foundation Research Scholar in Kyoto, Japan. As former Chair of the Leonardo Education and Art Forum (LEAF), the International Society for the Arts, Science and technology (Leonardo/ISAST), Olynyk co-organizes NY LASERs in New York, a program that convenes monthly in New York, which includes artists, scientists, theorists, and curators to foster cross-disciplinary dialogues. Patricia has exhibited her work in solo and group exhibitions at venues that include Galleria Grafica Tokio, the Toby Moss Gallery (L.A. International Biennial Invitational), the Brooklyn Museum of Art, Museo del Corso in Rome, Saitama Modern Art Museum in Japan (Sublime Present), and the National Academy of Sciences in Washington, DC. (Sensing Terrains). Her work examines the ways in which culture and institutional structures shape our knowledge and understanding of history, science and the natural world. With a focus on the image and by appropriating medical imaging technologies and methods of collecting, documenting, and exhibiting scientific artifacts, her work addresses how interpretation fluctuates between fact and speculation. Her installations, sculpture, photography and performances operate in the spaces between sensing and knowing, and order and affect.

Miriam Peña Zabala

Graduate in Fine Arts and lecturer in the Department of Didactics in Music, Visual Arts and Body Expression in the School of Teacher Training at University of Basque Country (UPV/EHU). She is currently writing a thesis on reactivate Art subjects in the School of Teacher Training. Currently Lourdes Cilleruelo, Itsaso Madariaga, Augusto Zubiaga, Miriam Peña Zabala are researching relationships between Art Education and New Technologies, using recycling, low cost and sustainable materials as relevant factors when applying the 'learning by doing' approach. They participate in international meetings and events in the fields of both Art and Education.

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Ljiljana Radovic

was born in Nis, Serbia on 28th October 1969. She graduated in Mathematics from the University of Nis (1993), where she gained an M.Sc. in Mathematics (2000) and a Ph.D. in Mathematics (2004). She is currently associate professor at the University of Nis. Professor Radovic has published more than 30 papers on symmetry and ornament, colour symmetry and antisymmetry, ethnomathematics and knot theory and has participated in many international conferences. She collaborated with professor Slavik Jablan on creating a visual-mathematics course at BMU Belgrad and co-authored with Jablan 'The Vasarely Playhouse' published by the Association for South-Pannon Museums in Hungary in 2011. In 2012 she co-edited and authored 'Experience-centered Approach and Visuality In Education in Mathematics and Physics', published by Kaposhvar University, and 'ADVENTURES ON PAPER: Math–Art Activities for Experience-centred Education of Mathematics', published by Eszterházy Károly College (within Tempus project). She is the editor of the electronic journal 'VisMath' and has participated in research projects focusing on geometry, education and visualization.

Zsófia Ruttkay

is founder and head of the Creative Technology Lab at Moholy-Nagy University of Art and Design Budapest. She holds a PhD in computer science. Her work in academia, and research in computer graphics and artificial intelligence have gained her international recognition. She is fascinated by novel applications at the intersection of art, science and technology. She designed and developed interactive applications that, for instance, help to understand the mechanisms of old, wooden drawing machines, allow to explore 3d space in a painting by Jan van Eyck or the patterns in works by Victor Vasarely. Currently, she is researching ways of using computing and sensory technology to enhance museum visits and new approaches to learning.

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Wolfgang Sachsenhofer

is a PhD student at the University of Economics and Business Vienna (WU Vienna). He is studying business model innovation and corporate and start-up venturing, especially in the area of energy and clean-tech. Since 2014 he is has worked for the Energy & Strategy Think Tank of OMV AG and WU Vienna. He has been active at the interface of strategy, entrepreneurship and Design Thinking since completing graduate studies at St. Gallen University, Switzerland. His interest in design thinking was stimulated by participating in a successful interdisciplinary case study involving the Rotman School of Management and Ontario School of Design. After a stint in strategy consulting, his decision to return to academia to study for a PhD was fuelled by a desire to better understand the transformation of business models and to do interdisciplinary studies on energy scenarios and future business models. In 2014 he co-initiated cooperation between WU Vienna and the University of Applied Arts Vienna and followed this up by co-organizing a seminar entitled 'Building Start-ups in the Energy Industry'. Thanks to a Marshall Fund grant, he is currently researching business model innovation in the automotive industry (E-Mobility) with a team at UC Berkeley. He is interested in developments in artificial intelligence, and design & strategy in politics and business.

Stacey Salazar
is director of the Master of Arts in Art Education program, a low-residency and online program integrating artmaking, teaching, and research at the Maryland Institute College of Art (MICA). Prior to joining the full-time faculty at MICA, she was the Visual Arts Department chair in a large, suburban public high school, the accomplishments for which earned her, her teachers and students, national and regional recognition. In addition, for over 15 years she taught college studio art – primarily foundation painting, drawing, and design – at a community college, a large university, a small liberal arts college, and at MICA. Stacey's research has been published in 'Studies in Art Education', 'Visual Arts Research', and 'Art Education Journal'. In addition to MFA and MAT degrees, Stacey holds a Doctorate of Education in Art and Art Education from Columbia University Teachers College. Stacey is the recipient of the 2015 Manuel Barkan Memorial Award for research in art education and the 2013 MICA Trustee Fellowship for Excellence in Teaching.

Konstanze Schütze
1981; producer, curator and assistant researcher at University of Cologne, her academic work and PhD thesis focuses on non-visual imagery in Contemporary Art with a strong interest in Cultural Studies, Art Theory, Art Education and the post-digital condition. Her latest curatorial projects involve: video violence (Kunsthaus Dresden, 2012), how the fuck did I end up here (studionihilbaxter, 2014), It's All Chinese To Me (DIAF, 2015), official office (w/RECESS, NY), Pizza Pavilion (Venice, 2015)
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Eva Maria Stadler
lives in Munich (D) and Vienna (A). Eva Maria Stadler is professor for Art and Knowledge Transfer at the University for Applied Arts in Vienna and curator for contemporary art. She was teaching at the University of Fine Arts in Vienna (A) and Munich (D) and at the State Academy of Fine Arts in Stuttgart (D). From 2012-2013 she was director of Galerie der Stadt Schwaz (A). From 1994-2005 she was director of the Grazer Kunstverein and from 2006-2007 she was working as curator in residence at the Academy of Fine Arts in Vienna (A). From 2007-2011 she was curator for contemporary art at the Museum Belvedere (A).

Ernst Wagner
studied visual arts at the Academy of Fine Arts Munich. He has exhibited artwork and taught visual arts in Germany and the United States. He studied art history and philosophy at the University of Munich and graduated with a PhD in art history. In the 1990s, he worked as an expert in media, in visual arts education at schools and, since 2005, as an expert in heritage/museum education for the German Association for Visual Art Teachers (BDK) at national level. He was employed by the Bavarian Ministry of Education (where he was responsible for art education) from 2000 until 2006; and by the Institute for School Quality and Research in Education in Munich from 2006 until 2014 (where he was responsible for art, film and drama education.) He has been a member of the Board of Culture at the German Commission for UNESCO since 2007. He initiated an International Network for Research in Arts Education (INRAE) linked to UNESCO (UNESCO–Chairs, UNESCO–Observatories) *(www.arts-edu.net)* and coedited the first 3 volumes of the International Yearbook for Research in Arts Education (2013–2015). The European network of "UNESCO-Observatories" he initiated will be established in Genshagen, Germany in November 2015. He has been appointed as adjunct professor at the Hong Kong Institute of Education/UNESCO Observatory and is responsible for initiating the international network "European Framework for Visual Literacy" in cooperation with InSEA Europe *(www.envil.eu.)*.
Professor Wagner is currently employed at the Academy of Fine Arts in Munich (where he is responsible for teacher training) and at the UNESCO-Chair in Arts and Culture in Education at the University of Erlangen-Nuremberg where he is a lecturer and executive coordinator (since 2008). He has written more than 200 articles/books.

Augusto Zubiaga
PhD in Fine Arts. A multimedia artist and Assistant Professor in the Sculpture Department at the University of Basque Country (UPV/EHU). In 2000 his work won an award at the Audiovisual Creation Festival of Navarra and was selected for the international European Media Art Festival. Currently Lourdes Cilleruelo, Itsaso Madariaga, Augusto Zubiaga, Miriam Peña Zabala are researching relationships between Art Education and New Technologies, using recycling, low cost and sustainable materials as relevant factors when applying the 'learning by doing' approach. They participate in international meetings and events in the fields of both Art and Education.

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D'Art

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Teaching and learning art in tertiary education has experienced significant and challenging cultural, technological, societal and economic change. How will art education change in view of the shifting trends in youth culture and expectations in society? How should we educate artists, designers and architects so they can actualize imaginative, socially responsible and respect-guided meaningful art practice? What is the best way to engage in interdisciplinary collaboration and intellectual exchange?

This publication offers a range of perspectives on art education that address these changes. We invited artists, designers, architects, artist-teachers, educators and scientists to submit written papers that will enhance discussion about this topic.

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CONVERSATIONS ACROSS CULTURES

PERSPECTIVES ON ART EDUCATION

Edited by
Ruth Mateus-Berr
Michaela Götsch

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