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ORAL HISTORY WORKSHOP

HOW EDUCATION MADE COMPUTERS PERSONAL

Organized by Liza Loop, LO*OP Center & Jeremias Herberg, Leuphana

Contributors
Clemens Apprich, Paula Bialski, Lee Felsenstein, Jérémy Grosman, Jeremias Herberg, Howard Rheingold, Liza Loop, Christina Vagt

Since the 1960s California's Counterculturalists considered both computers and education as tools for change. They lamented how computers are "used to control people instead of to free them" and created educational and techno-logical visions "to change all that" (Peoples Computer Company 1972). They came up with *community memories*, *personal computers* and *virtual communities*. Computer technologies, by being modeled after educational aspirations, became *personal* and *social*.
At the workshop, some of the most involved contemporary witnesses meet young scholars to revise a techno-determinist genealogy of computers and education. Together they reflect the limits and benefits of reviving alternative computer pedagogies within our digital cultures.



Courtesy of Lee Felsenstein

LEE FELSENSTEIN
Lee is an engineer involved in the creation of several countercultural move-ments and computer technologies. In 1963/1964 he was one of the few technologists in the Free Speech Movement at University of California, Berkeley, where he later created the famous "Community Memory". In 1975 Lee co-founded the Homebrew Computer Club, an open community of hobby engineers that co-created the first marketable personal computers. Among Lee's creations is the Sol, and subsequently the Sol-20 released in 1974, and the Osborne 1 in the early 1980's, one of the first portable computers.
Lee will reflect on the educational underpinnings of computer engineering.

LIZA LOOP
Liza is one of the first educators involved in California's mid 1970s computer hobby scenes. In 1975 she founded the second public access point to personal computers outside of museums, a storefront meeting place aptly called Learning Options*Open Portal. LO*OP Center offered programming classes for children and adults, and rented unstructured time for learning about or with computers. In 1978, she was contracted by Atari to write the user's manuals for the Atari 400 and 800 computers, major competitors in the emerging PC market. Liza will investigate the pedagogic implications of manuals.

HOWARD RHEINGOLD
Howard is one of the first to ever point out the educational values of digital networks. Since the early 1980s he experimented with how minds meet technology through computers. On that basis he wrote "Tools for Thought: The History and Future of Mind-Amplifiers". In 1985 he became involved in the WELL, a "computer conferencing" system and, drawing from that experience, he coined the term "virtual community".
Howard will discuss the connection of Do-It-Yourself teaching and technology.

» hclemuseum.wordpress.com/workshop
» complexitycontrol.org

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HOW EDUCATION MADE COMPUTERS PERSONAL. ***Concept Paper to an Oral History Workshop, June 7, 2016, 15 – 20 pm, central european time.***

By Jeremias Herberg, *Leuphana University Lüneburg, Postdoc Researcher at Complexity or Control? Paradigms for Sustainable Development (complexitycontrol.org)*

In this document, I present a workshop Liza Loop, founder of the Learning Options*Open Portal (LO*OP Center) and me have organized at Leuphana. My goal is to persuade you to join the discussion and support this event. This text outlines a broad historical and political framework with which I am currently working in my team at Leuphana (for more see complexityorcontrol.org). Addressing both my teammates and the workshop audience, I argue here that education is important in the context of the cultural history of computing and the rise of 'the information age'. I then write about how the idea came about and who has been invited to the workshop.

Education and the complexity-or-control conundrum

Living in, or imagining the "information age", our technological and political cultures are full of dilemmas. In sharing our lives with strangers, we use "technologies of hospitality", but in turn strive to regulate our most intimate encounters (Bialski 2012). And our dwellings, be they virtual or physical, appear as informational representations and thereby leverage both new kinds of communalism and regulatory oversight (Apprich 2015). Even our political culture at large, as a recent project at Leuphana (complexityorcontrol.org) phrases it, is characterized by puzzling dilemmata: the cultural cognitive framework of many of the most important regulatory strategies are caught up in a dialectical relationship between acknowledging complexity, on the one hand, and seeking control, on the other. As the project team argues (Vilsmaier et al. 2015), that situation is best exemplified by the most urgent political field, namely in the co-occurrence of economic, social and ecological crises, usually addressed in terms of *sustainability problems*.

The conundrum of complexity or control, however, was not invented and did not come about only after problems of ecological sustainability emerged. Rather those problems seem to be scientifically conceivable and politically legitimate based on the epistemological condition of computer models. The famous report "Limits to Growth" (Meadows et al. 1972), for instance, succeeded to manifest the predicament of complex, ecological decision making on basis of "world3", a computer model succeeding Jay Forrester's world2". In similar models, long before "Limits to Growth", circular causal connections between biosphere and economies were already deemed a design challenge in Buckminster Fuller's and John McHale's "World Ressource Inventory" (cf. Vagt 2013). What is more, as Christina Vagt points out, the six editions published between 1963 and 1967 were not only an early Big Data model of ecology. The authors also meant the Inventory to be an educational tool, that is, a "guide analysis of the basic world trends data to the various school projects of the world" (McHale 1967, cited in Vagt 2013: 62).

The history of the complexity-or-control conundrum thus is both computational and educational, not only ecological. Therefore I plea for a marginalized arena in the cultural history of computers: education (cf. Oelkers 2008, Pias 2013, Snyder & Vesna 1998). An education lens can help to create an alternative approach both on the historical and the contemporary front of our

techno-political culture. As a contemporary problem, popular variations of the complexity-or-control conundrum continue the mantra of decentralised control as the better kind of control (Apprich 2015). Kevin Kelly (1995), for instance, in *"Out of Control"* seeks to reintegrate technology with nature on the basis of information technology, post-Fordist production and entrepreneurship. And also the historical scrutiny of the "information age" is rather one-sided, usually turning to the history of computers and cybernetics. On both ends, academia and politics, we too often fall back on a techno-determinist history of the "information age".

I argue that looking at education shows how the "information age" was, and continues to be, in part, co-produced by humanist visions of learning and collaboration. Politically, as result of not seeing education and computers together, we witness forms of education that do not do justice to computers in their Janus-faced capacity as both a regulatory and emancipatory tool. And as citizens and academics, we see the situation escalate into yet another dilemma: If indeed humanist ideas of learning and research were part of establishing a technological control apparatus, are there any transformative ideologies that we can turn to in the face of the complexity-or-control conundrum?

First findings

To be sure, the close reader of the cultural history of computers may not be surprised by the selection of education as a field of historical study. In the 1960s and 1970s, the attempt to *make computers personal* had a profound educational underpinning. In the context of complexity-or-control, it seems safe to say that education appears both as a second tool for change, next to computers, and as a second control mechanism, next to state institutions and corporate technologies. From an activist point of view, for instance, the disconcerting conundrum was stated in the motto of the People's Computer Company (PCC), a 1970s computer hobbyist collective in Menlo Park, California.

> "Computers are mostly used against people instead of for people, used to control people instead of to free them. Time to change all that – we need a people's computer company."

The founders of PCC, Bob Albrecht, Dennis Allison and George Firedrake, linked their apparently emancipatory efforts back to Buckminster Fuller by installing the group in the so-called "Dymax" division of the Portola Institute – "Dymax" being coined after Bucky Fuller's "Dymaxion maps". And, using Portola as their organizational envelop even before it gave birth to the Whole Earth Catalogue as a bible of countercultural lifestyle (cf. Turner 2006), they shaped Portola as an educational project. That particularly applies on the works of Bob Albrecht (whom I interviewed in Summer 2015), and is true in the figurative sense of emancipating individuals and society as a whole, in the institutional sense of reaching out to schools, and even in the didactic sense of using computers to enhance technical abilities; in mathematics especially. I argue that similar educational appeals cut right across the most critical technologies and collectives in the history of "the information age". The resulting personal computers, most interestingly, "were not just smaller than previous machines, they represented a whole new way of looking at and using computers. They could be deployed in new environments for a host of new applications, and they made computing accessible to masses of ordinary people for the first time" (Abbate 1999: 1695).

To me personally, the central role of education did come as a surprise. I was particularly struck when I realized that the institutional interplay of the tech industries and education, which I came to study in the contemporary San Francisco Bay Area (Herberg forthcoming), goes back a long way and may even be generative for the recent desintegration of tech booms on the one hand and educational crises, on the other. That historical (dis-)entanglement is particularly striking in Fred Turner's (2006) work, who regularly touches upon education as a major theme when tracing the history of computers "From Counterculture to Cyberculture".

The book starts with the Free Speech movement in 1963/64 on the Campus of University of California, Berkeley, and it ends in the educational and economic crises since the late 1990s. On the first pages, he points out how students at Cal (the common acronym for UC Berkeley) saw both corporations such as IBM and public universities as control apparatuses. He quotes the student leader Mario Savio: *"At Cal you're little more than an IBM card"* (2006: 12). The dual imagery of computers on the one hand and education on the other, constitutes the dual "Countercultural Embrace of Technology and Consciousness" (Turner 2006: 28). In my reading, that dual embrace opens an entire second thesis within Turner's book. Turner's "From Counterculture to Cyberculture" mirrors both tools for change and their interplay, computer *and* education: Be it Stewart Brand's discursive entrepreneurship in joining counterculturalists and hackers in a mutual learning effort; be it the Whole Earth Catalog as a educational journal and a handbook for a do-it-yourself lifestyle; or the hackers' ethic of public access and self-guided teaching and learning (cf. Levy 2010); or be it the WELL as a digital network that decentralizes and combines collective learning and work-related collaboration (Rheingold 1993). In line with the complexity-or-control conundrum Turner's book ends with "The Triumph of the Network Mode" (Turner 2006: 237). The new heterarchic and IT-based economy, the "Network Mode", grew out of a *"deep distrust of the institutions that governed cold war politics"*. Its outcome, however, creates new forms of alienation, material costs and socio-economic inequalities. Turner (2006:7) even recounts its historical result in educational terms.

> In the new economic era, "individuals could now no longer count on the support of their employers; they would instead have to become entrepreneurs, moving flexibly from place to place, sliding in and out of collaborative teams, building their knowledge bases and skill sets in a process of constant self-education."

The latter-mentioned educational culture appears as one historical outcome of the cultural history of decentralized technologies and control regimes. The "Network mode" thus puts a burden on the prevailing educational institutions, while devaluing learning through an ever-accelerating supply-demand cycle for employable skills (see Herberg 2016 for a contemporary addition to that narrative). So how did we get here?

In order to circumscribe the educational underpinning of personal computers, I started a re-reading process of more pertinent literature (Rheingold 2000, Turner 2006, Kline 2015, Levy 2006), visited archives (Berkeley, Stanford and Liza Loop's private collection) and started to interview historical witnesses (so far, Bob Albrecht, Liza Loop, Howard Rheingold). What I found is something like a mirroring function of the complexity-control conundrum within the educational implications of computer technology. Education and computers are both mutally

dependendent, on the one hand, in making "the information age" a problematique, highly-unsustainable, economic system and an unjust educational culture. On the other hand, they together represent the two major beacons of emancipatory hopes. In addition, I argue that education can be found in the underlying, historical process itself. I claim, more pointedly, that the economic system and technological condition of "the information age", seemingly relying on non-hierarchical structures, was in fact co-created by emancipatory ideals and collaborative practices of learning and (self-)education on the other. That thesis is meant as a proposal for discussion— a discussion that I hope to start at the *"Oral History Workshop – How Education Made Computers Personal"*.

The Oral History Workshop

At the workshop, a number of young scholars (Clemens Apprich, Paula Bialski, Jérémy Grosman, Christina Vagt, and myself) will meet with three key witnesses of the California counterculture on its technological and educational underpinnings. Lee Felsenstein (via skype), Liza Loop (on site), and Howard Rheingold (via skype) will report on their views and their historical experiences with regards to the bidirectional interplay of computers and learning.

Felsenstein, Loop and Rheingold are three extremely influential characters and outstanding sources to trace the role of education in shaping today's digital cultures. In order to elucidate the historical context of the three mentioned speakers, Christina Vagt will speak about Buckminster Fuller's (1962) "Education Automation" and Fuller and McHale's "World Ressource Inventory". I will then trace the educational aspirations from the Stanford Research Institute to the work of Liza Loop. As respondents to Felsenstein, Loop and Rheingold I invited Paula Bialski, Jérémy Grosman and Clemens Apprich to join the discussion.

The remainder of this text introduces some of Felsenstein's, Loop's and Rheingold's most significant contributions to the history of computers to which I will add some insights into their educational aspirations (obviously that is an interpretation they may disagree with during the workshop).

Lee Felsenstein

In 1963/1964 Lee Felsenstein was part of the Free Speech Movement, which famously took place at the University of California, Berkeley. Among his later technological creations, Felsenstein, together with Bob Marsh, created the Sol, a computer terminal that they subsequently used as the basis for the Sol-20, a second product based on Intel's 8-bit, 8080 microprocessor and released in 1974. In 1975 Lee Felsenstein was a founding member, and later the speaker of the Homebrew Computer Club, an open community of hobbyists and engineers who dreamed of personal computers before the big corporations did. In the early 1980's he created the Osbourne 1, one of the first portable computers.

Already at the Free Speech Movement, as one of the few technologically gifted members, Lee Felsenstein wanted to foster social change from an engineering point of view. That ambition sparked his first computers as well as a public computer interface he helped to install at Berkeley. He wrote a pamphlet I found in the Berkeley archives loosely stapled as part of a more

encompassing flyer which bears witness to an intricate fusion of technological and pedagogic vision. In the pamphlet, Lee mapped out a free university teaching curriculum, that contains a passionate call for liberation:

> "We want LERNFREIHEIT, the Freedom to Learn, not the administering of anti-education by non-teachers." (sic) (Felsenstein 1965)

Felsenstein advocates a humbler vision of science and technology, too:

> "Vast and extensive laboratories should not be required, since this program limits itself to creative students and it is a recognized phenomenon that small minds need huge machines for research to cover up the fact." (ebd.)

In the early 1970s, inspired by the idea of helping individuals to teach themselves computing, just as it has been formerly practiced with radio, Felsenstein put a note in the magazine of the Peoples Computer Company magazine. He wanted to discuss an idea derived from his earlier experience with the Community Memory at Berkeley, a information and resource sharing network that Felsenstein helped to establish in 1973 to connect Countercultural initiative across the region.
Bob Marsh, another Berkeley alumni and prominent hacker, among others responded (Freiberger & Swaine 1999: 102). Felsenstein says, *"I had turned out a specification for what I called "The Tom Swift Terminal, or, A Convivial Cybernetic Device.* For readers not familiar with the name, Tom Swift was a central character of a series of boys' books who was in effect a young Edison – inventing his way through various adventures. I named the design after him [...] in honor of the character most likely to be found tampering with the equipment" (Felsenstein 1977).
Further inspired by Ivan Illich's book on conviviality (a gift from his father) and Don Lancaster's *"how to build a TV Typewriter"*, Felsenstein and others "opened the first of four terminals available for walk-up use in Berkeley and San Francisco" (Felsenstein 2005).

> In 1974 I was helping to run a public-access "computerized bulletin board" system (called Community Memory), which was essentially a labor of love for me and several other people. It had two terminals in public where people could come in off the street and enter information items as well as search for them. Since the terminals were unattended, hardware reliability was an obvious problem, especially when we postulated much larger systems.
> My way out of this future problem was to design an all-purpose "convivial cybernetic device" as a terminal/concentrator/processor - in such a way that amateurs would be encouraged to get their hands on it. In theory, each place where one of these "Tom Swift Terminals" was installed would develop a computer club. Then, when a terminal broke down, relief would be a local matter, and people would not have to place their trust in a remote maintenance structure." (Felsenstein 1977)

At the workshop, Lee will speak about his perspective on the link between education and computers in the years before the PC and at the Homebrew Computer Club. We have posed this question to him: "In your creations, how much did educational and technological aspirations influence each other, or did they merge into one combined driving force?"

Liza Loop

Liza Loop is the founder of the second public access point to personal computers outside of museums, a store-front meeting place aptly called Learning Options*Open Portal. From its

opening in 1975, LO*OP Center offered programming classes for children and adults, hosted school field trips, "playshops", and rented unstructured time for learning about or with computers. She started the Sonoma County Computer Club and also joined the Homebrew Computer Club where Steven Wozniak learned of her in-school computer teaching. Wozniak later handed her the first *Apple I* to take to schools and low income neighborhoods. After closing the storefront 1978 she was contracted by Atari to write the user's manuals for the Atari 400 and 800 computers, major competitors in the emerging PC market. She continued to introduce thousands of students, teacher and everyday people to their first computer at libraries, fairs and conferences and went on to write for Apple, Visicorp, Broderbund and other software companies as well as contributing articles for hobbyist magazines. She has always considered this writing and teaching in non-formal settings to be essential to empowering self-directed, lifelong learning and as a disruptive alternative to formal schooling.

Liza Loop's work is inspired by, among others, Dean Brown, a collaborator of Doug Engelbart at Stanford Research Institute. A pivotal early encounter with computer education occurred when Brown taught a Montessori education course in 1972 at Sonoma State College, affectionately known at the time as "touchy-feely U.". Liza joined the course as a student and was impressed with the combined potential of computers and Montessori pedagogy.

> "Making sure that youngsters knew exactly how programs got into computers was the best possible vaccination against public intimidation by the elite"

Building on their mutual sympathy, Dean Brown introduced Liza to Bob Albrecht, co-founder of People's Computer Company (the publication) and People's Computer Center (the storefront). Liza then brought another of her professors, Stuart Cooney, on board as the third co-founder of the LO*OP Center. As Director of the Instructional Television Consortium of the California State College System, Stu was delighted to add computers to his arsenal of distance education tools. With these three founders and Liza as a manager, Learning Options Open Portal (LO*OP Center, Inc.) became a California nonprofit corporation broadly chartered to engage in any form of education, research or publication. It opened for business in January of 1975 with a rented ASR 33 Teletype machine serving as a "dumb terminal" to the timesharing computer at UC Berkeley's Lawrence Hall of Science (5) and one of the first MITs Altair kit computers. Announcing the Center in the Amateur Computer Users Group, an outlet of the Homebrew Computer Club, Liza writes:

> Liza Loop ((East Cotati Ave): "have coffee pot, telephone. Working on an Educational Computer Center. Use: programs for 3 to 6 yrs old in Pilot 73. I am not primarily a computer person. So my greatest contribution is to help professionals communicate with total laymen and kids. Have access to apples, fresh eggs, beautiful countryside. Need : TTY, acoustical coupler. Are there any club members who would like to contribute to LO*OP center. We need hardware, teachers for Altair kit classes, programming classes, games classes."
> (Newsletter, Homebrew Computer Club, April 12, 1975, Issue 2)

After these postings the Sonoma County Computer Club in 1976 sent her to join the Homebrew Computer Club which led to a further happy coincidence, namely the acquisition of the very first Apple I. She recalls that Club meeting as follows:

> "I met Steve Wozniak...I was the first person that he had ever met who was taking computers into schools so he gave me the first Apple... So we have Apple I number 1 and Apple II number 10."
> " TO: Why did you choose the Apple I over other computers?
> Loop: Because Woz gave it to us. Actually, I found it very difficult to use. Our Apple I wouldn't stay running for a 45-minute class period and caused no end of frustration. I took it back to Woz and asked him to fix it. He made it a little better but still not very serviceable. Eventually, he provided us with an Apple II to replace it with. (Antic 2015)

Still not identifying as a 'geek' but as a teaching pioneer, her work with computing has been driven by pedagogic considerations. Reminiscing about her 10 months of manual writing at Atari she said her task was to write the manual for the Atari 800 even before it was built.

> For her, the Atari manual "was another chance to exercise ... what were Montessori principles. Because having had that Montessori training, in Montessori there is nothing extra. There is nothing decorative. The materials are beautiful and carefully crafted. They are sparse. ... it helps [indicate to] the learner what to focus on." (Interview with author)

The development of the Atari machine is a good example for how her user knowledge was first appreciated and partly translated into the technology, but at the same time marginalized in favor of more commercial schemes of design and marketization. At the workshop, Liza will report about the decisive years between 1975 and the early 1980s. She will report how the Atari manual is in itself an educational tool and comment on why she believes, after 40 years, educators scarcely begun to exploit the potential for computing to enhance both formal and non-formal learning environments.

Howard Rheingold

Since the early 1980s, Howard Rheingold has explored the impact of technology on the powers of the human mind. He documents with how minds meet technology through computers as mind-amplifiers. Based on that experience, he famously wrote *Tools for Thought: The History and Future of Mind-Amplifiers* (1984), a vivid history of computer technology. Rheingold identifies a set of scientists and engineers, who "insisted on thinking about how computers might be used to assist the operation of human minds in nonmathematical ways" (Rheingold 2000:15).
In 1985, he became involved in the WELL, a "computer conferencing" system and, drawing on that experience, he wrote about life in virtual communities. As yet another seminal book resulting from his explorations, Rheingold wrote "The Virtual Community. Homesteading at the Electronic Frontier", thus inventing the term "virtual community." Then he served as an editor of The Whole Earth review and editor in chief of The Millennium Whole Earth Catalog (1994).
Also Rheingold cares deeply about the collaborative learning implications of computers, and the computer implications of collaborative learning. In the introduction to the *The Millennium Whole Earth Catalog* Rheingold presents the reader with a new world with new possibilities and new responsibilities:

> „Here are the tools for producing knowledge, reporting and broadcasting the news as you see it, and creating communities according to your own values and ideals."
> (Introduction to the Millennium Whole Earth Catalog).

And inside the Catalog, Rheingold calls for a new public discourse on *"Taming Technologies"* in the name of a *"sustainable civilization"*. Yet, he says, *"Before we can hope to achieve answers, we must elevate the level of discourse from an argument between tree-huggers and nuke-lovers.*" (http://www.rheingold.com/texts/taming.html)

Howard Rheingold can be said to be one of the first writers to ever take note of the educational values of digital networks. *"online social networks can be powerful amplifiers of collective action precisely because they augment and extend the power of ever-complexifying human sociality."* (Rheingold 2014). Ever since his paradigmatic book on "Virtual Communities", documenting his experiences on an early collaborative network, The WELL, Rheingold also urgently warns that emancipatory potentials may go hand in hand with the possibility of constant supervision and commercialization. In the introduction to the book, he writes:

> "The technology that makes virtual communities possible has the potential to bring enormous leverage to ordinary citizens at relatively little cost--intellectual leverage, social leverage, commercial leverage, and most important, political leverage. But the technology will not in itself fulfill that potential; this latent technical power must be used intelligently and deliberately by an informed population. More people must learn about that leverage and learn to use it, while we still have the freedom to do so, if it is to live up to its potential. The odds are always good that big power and big money will find a way to control access to virtual communities; big power and big money always found ways to control new communications media when they emerged in the past. The Net is still out of control in fundamental ways, but it might not stay that way for long. What we know and do now is important because it is still possible for people around the world to make sure this new sphere of vital human discourse remains open to the citizens of the planet before the political and economic big boys seize it, censor it, meter it, and sell it back to us." (Rheingold 1993:5–6)

Yet, in the 1980s, he reports, "computers were so often seen as just another channel for transferring knowledge from the teachers to the students" (ebd. 248). "And those teachers who did learn how to use the machines had trouble sifting out the few examples of genuinely useful educational software from the large amount of crap. Many schools abandoned the attempt, but few threw away the old Apple IIs or Ataris or Commodore-64s."

More recently, Rheingold advocated the term "literacy". By means of new modes of participating in and learning from digital cultures, Rheingolds educational vision seems geared towards transforming control regimes by interweaving technology and learning.

> "By literacy, I mean, following on Neil Postman and others, the set of skills that enable individuals to encode and decode knowledge and power via speech, writing, printing and collective action, and which, when learned, introduce the individual to a community. Literacy links technology and sociality."
> (Rheingold 2014)

At the workshop, Rheingold will draw on the notion and movement of "edupunks" in which the do-it-yourself approach to technology is transferred to education, thus re-assembling alternative pedagogies on the one hand and technologies on the other as a potentially transformative interplay.

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