Technobiographies: Perspectives from Education and the Arts

Cynthia Carter Ching & Linda Vigdor

University of Illinois at Urbana-Champaign

Contact:

Cynthia Carter Ching

Department of Educational Psychology, MC-708

University of Illinois at Urbana-Champaign

1310 S. Sixth Street

Champaign, IL. 61820

ccching@uiuc.edu

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Recent research on technology use has begun to move away from deficit models of knowledge and skill (see Ching, Basham, & Pianfetti, in press for discussion of deficit model technology research) and toward narrative lifespan perspectives on situated technology practices across multiple contexts. Research on teachers' cognition and teachers' use of technology is also looking beyond the classroom walls and beginning to understand the teachers' practices as situated within complex contexts (Cuban, 2001; Putnam & Borko, 2000; Windschitl & Sahl, 2002). Relatively little work has been done so far, however, to connect these two lines of research. Thus one of our research objectives was to examine the life narratives of pre-service teachers and investigate the role of technology in their personal and professional lives. Furthermore, we sensed it might be fruitful to compare pre-service teachers to students of some other discipline. So, drawing largely on our own personal histories, we chose the arts, a discipline which has also received little attention regarding technology learning.

The research presented here analyzes the technology-related life narrative interviews, or "technobiographies," of 30 pre-service teachers and 10 students of the arts at a Midwestern university. Our objective was to examine the conditions, motivations, attitudes, and tools characteristic of these individuals' technology experiences. The overall goal was not to strictly compare these two groups to one another, or to establish some quantifiable conclusion about their differences, but rather to open up new questions about the conditions and contexts of technology in different professions, and to approach research on teacher education and technology from a new perspective.

Perspectives and Theoretical Frameworks

Our research directions as described above stem from existing narrative inquiries into how technology is experienced and interpreted, from childhood through adulthood (Hawisher & Selfe, 2004; Stepulvage, 1999). We also draw on research examining narratives of formative technology experiences in professions such as computer science and media design (Kennedy, 2001; Margolis & Fisher, 2002). These two related lines of research argue that technology experiences are situated within life ecologies and imbued with meaning by the motivations, social interactions, and contexts surrounding technology tools and practices.

In determining how we wanted to conduct this investigation and what interview questions to ask, we were guided by research and theory on narrative inquiry, which argues that storytelling not only recounts sequences of events in a person's life but also, and primarily, is a means of organizing and making meaning of experience (Bruner, 2003; Linde, 1987; Ochs & Capps, 1996). As Rosenwald and Ochberg argue:

> How individuals recount their histories—what they emphasize and omit, their stance as protagonists or victims, the relationship the story establishes between teller and audience—all shape what individuals can claim of their own lives. Personal stories are not merely a way of telling someone (or oneself) about one's life; they are the means by which identities may be fashioned. (Rosenwald & Ochberg, 1992).

Furthermore, storytelling also serves to construct and represent identity in collaboration with an interlocutor or interviewer (Clandinin & Connelly, 1994). We were aware of this co-construction at all times, and thus carried this awareness over into our analysis as well. We chose to not only position our analysis as a reflexive conversation among art students and education students, but we also placed ourselves in that conversation. Our hermeneutic phenomenology approach to analyzing the interview transcripts is described in the following section.

Methods, Data Sources, and Modes of Inquiry

Instruments

Pre-service teachers. In designing the pre-service teachers' technobiography interviews, we drew on existing interview protocols developed for use with women computer scientists (Margolis & Fisher, 2002) and working adults (Hawisher & Selfe, 2004). This method is somewhat ethnographic in nature and involves beginning the interview with an open-ended question such as, "tell me the story of you and technology," and then following up with probes about topics like specific tools, practices, and contexts. We were also interested to hear about how pre-service teachers encountered technology at various times and in various locations throughout their histories, for example in homes, libraries, or in their own k-12 experiences. Interviewees who did not address multiple contexts in their response to the initial "tell me the story" question were asked specifically about other contexts as a follow-up question. Phases of the interviews focused on past life experiences with technology, current uses of technology, and anticipated future uses in the interviewee's career and personal life.

Art students. Interviews with the art and design students were semi-structured (Berg, 2004) and although we generally focused on a pre-set series of questions we were also open to following tangential stories as they unfolded. This set of interviews was intended to investigate how artists self-understand their practices in the contexts of technology use and as well, their perceptions about technologies and their relationship to these practices. Our interest in having the artists construct meanings about their experience and perceptions informed the kinds of questions we asked. Samples of the kinds of questions we asked are: How did you evolve as an artist; as a digital artist? How did you come to use technology in your art? Can you describe your artistic processes of working with the technologies? Our intention in talking with these artists was to engage them in a reflective conversation about their understanding of their use and beliefs about technology as specifically situated in the context of their arts practices experiences.

All forty interviews with pre-service teachers and artists were conducted by one of the authors or a member of the research team, and all were videotaped or audiotaped. Interviews were then transcribed, and transcripts became the primary data source for analysis.

Analysis Methods

Our analytic methodology is meant to facilitate coming to an understanding and interpretation of our interview data by creating a conversation between the reflective observations contained in the interviews—the traditions that are revealed individually and within pedagogical groups—and our own researcher perspectives that are situated in

traditions of educational experiences with technology. Because we have two different interview sets we have set up this conversation by locating meaningful segments in the interviews and then questioning what was said and the meanings we make of what was said in order to come to an understanding beyond the immediate representation.

> Understanding is always more than merely re-creating someone else's meaning. Questioning opens up possibilities of meaning, and thus what is meaningful passes into one's own thinking on the subject… (Gadamer, 1960/98, cited in Laverty, 2003, p. 10)

Acknowledging our constructivist perspectives as our window on the optimal pedagogical uses of technologies, we have devised our interpretive methodology as grounded in hermeneutic phenomenology. Inspired by Gadamer, our interviews become sites of conversations, as "a dialectical interaction between the expectation of the interpreter and the meaning of the text." (Polkinghorne, 1983, cited in Laverty, 2003, p.10). Our method treats each interview segment as part of a dialogue, wherein we, as interpreters, formulate an understanding of what is being said rather than as a recreation of what was originally said. This understanding evolves in conversation with our own questions and perspectives as researchers. As we engage the interviews in this dialectical conversation, both are transformed as initial assumptions are challenged and elaborated. Important to this process is a continual questioning – of both the interview text and of ourselves in the conversation.

> The interpreter must recover and make his own, then, not the personality or the worldview of the author, but the fundamental concern that motivates the text – the question that it seeks to answer and that it poses again and again to its interpreters. This process of grasping the question posed by the text does not lead to the openness of a genuine conversation, however, when it is conceived simply as a scientific isolation of the "original" question, but only when the interpreter is provoked by the subject matter to question further in the in direction it indicates. Genuine questioning always involves a laying open and holding open of possibilities that suspend the presumed finality of both the text's and the reader's current opinions. (Gadamer, ed. intro p. xxi)

Our understandings, which become interpretations, are fully grounded in the text and mediated through our reflexive questioning of our own perspectives as we seek to locate the fundamental meanings relevant to the particular questions. Our concern though, is not with maintaining individualized worldviews and relative positions in relation to a situation. Our interpretations are grounded in lived contexts, and though these are individual, they are also situated in social and historical time. In a sense, in putting these two narratives into a conversation, understanding evolves out of the dialogic relationship between these situated stories. While our interpretations are bounded by the questions we ask, and by the perspective from which we ask, our concern is with revealing meaningful insights that serve to enhance our understanding of the issues surrounding the contexts and conditions of technology in education and art students' lives.

Results

Pre-Service Teacher Findings

A unique focus with the pre-service interviews was on early encounters with technology, something we did not include in the art student interviews. Particularly striking for pre-service teachers were profound differences between the stories told about early encounters with technology in home and school contexts. One of the obvious differences was tone: while home vignettes varied in their positive, neutral, or negative tone, stories about school encounters with technology were almost invariably negative. Sometimes this negativity took the form of disdain (e.g., the computers at school were "old," or the software was "dumb"), and sometimes interviewees' language conveyed irrelevance or confusion; but only in rare cases did an interviewee actually express liking, interest, or enthusiasm for the technology he or she encountered at school.

Another difference was in the type of applications interviewees described using. Again, a wide variety of home experiences were conveyed, ranging from functional utilities (most often reported being used by parents) to creative drawing programs and games. When games were mentioned, they were generally for entertainment purposes and described positively (e.g., "we loved that game! Me and my little brother, we'd play that for hours!"). School uses, on the other hand, were far narrower. When discussing elementary school encounters with technology, discussions were often non-specific, or the interviewee couldn't remember particular activities. Among those who mentioned specific applications, however, the most common use was some kind of game. Math games were mentioned frequently, as was the ever-popular Oregon Trail™, which was

one of the few titles to be explicitly named. These games were usually described in negative or neutral terms, however. Encounters in middle school and high school were more varied in application and generally neutral in tone, but infrequent use was a common theme. The following pre-service teacher's description of her school encounters is characteristic of what we found: disdain for outdated technology ("it was just like an old dinosaur"), math games, and infrequent use beyond elementary school ("once in a while we'd use it for that").

> Like, late elementary school we'd have a computer in the classroom, but it was just like an old dinosaur, and we'd use it for math games and stuff like that. Um, then, high school, we had computers in the library, but not really in any of the classrooms. But we'd go down to the library to do research, once in a while we'd use it for that.

One of the most striking differences between home and school encounters was the degree to which these experiences took place in an explicitly social context. We noticed that many home stories included the presence of what we came to call a "catalyst person," someone who introduced the interviewee to computers and showed him or her how to use the machine. Parents were often catalysts, because they initiated the purchase of the home computer and trained their children how to use it, but older brothers, friends, and uncles or other family members were also mentioned. Descriptions of the catalyst person's actions were not always positive, as in the example below ("my parents made

me sit there…"); however, in all the stories that contained catalysts, the agency and influence of these people was clear.

> Well, when I was seven, we got our first computer, a Packard-Bell. And I remember my parents made me sit there and go through the introduction program that they had, where you're told what to do around the computer, not to put magnets on the computer, and stuff like that, and then I could use it.

Given our reflective and hermeneutic approach, we went back and approached the school segments again, after we had seen the importance of the "catalyst person" for home encounters. Remarkably, we found only one interview out of thirty in which any kind of catalyst figure was mentioned. In that case, the interviewee described how his elementary teacher was excited that the class would be getting new computers, but the interviewee did not say what the teacher did with the computers when they arrived. In all other cases, there was no mention of a teacher, librarian, or other student who facilitated the interviewee's use of computers at school. The school example on the previous page is typical of this lack of agency by some influential other; the only actions described are those of the interviewee and her generic fellow students ("we'd use it for math games…"). Information could be gleaned from these stories told about the ways teachers, librarians, or others had set up computer activities in the interviewees' school experiences, but these other actors were never mentioned directly. Below is another such example, wherein we can interpret that the interviewee's teacher used computer time as a reward for good behavior, but there is no teacher explicitly mentioned in the description.

> I always ended up, I got to use it [the new, better computer] more often than anyone else I think just because I was one of the top students in the class and it was sort of a reward for good behavior, good performance. You could get your pick of the software.

In the absence of the striking differences between home and school stories, these school responses might not seem so remarkable. One could argue that perhaps pre-service teachers were just focusing on themselves in their responses. Certainly the request, "tell me the story of you and technology," does not explicitly ask for information about other people who might have been involved in that relationship. Given the prominence of catalyst people in the home stories, however, the almost complete lack thereof in the school stories deserves some attention. We will return to this issue in the Discussion, following an examination of art students' narratives.

Art Student Findings

Without exception, the art students locate their motivation intrinsically. This tends be manifested in two interrelated ways, both centered in their self-understandings as artists. As artists they all have a drive to create and to do innovative work. This extends beyond wanting to compete with others and drives their continual process of exploring and pushing personal and aesthetic boundaries. One artist describes both his frustration and his drive to get beyond it in order to get his work done:

> A lot of that has to do with being familiar with software and being familiar with technology because there's a lot to - you really need to be savvy with what you're up against, in order to really, to really get prod - you know - get ideas through it. So, yeah, there's an element of frustration when you get to a point where you know what you want, but you don't know how to get the technology to do what you want. And uh, but I think through experience and through uh, you know, it's those experiences that get you past that. (MU-009-M)

Another artist explains how motivation to take on the learning challenges of technology is in no small way connected to her investment in the challenge itself:

> I mean, that technology is a really big challenge for me. And so that's interesting to me. Um, to use it in my work. Yeah. And, but I guess paint could be a challenge too, just not a challenge I'm interested in at the moment. (A&D-006-F)

While the challenge is part of the allure of technology, the artists are also fully grounded in practice – which we have conceptualized here as task specificity. When they undertake learning a new software package or technique it is in search of ways to accomplish or produce a particular (or vaguely imagined) idea. They as well reflect a confidence that they will be able to figure out what it is they need to know.

> In my case, if I learn Flash first, at the time, ah at the first work is about the, um, making animation about the movie. I made it very simple – a very simple animation, and then after I make it, it was so interesting. So yeah, the result was great and then I was thinking oh yeah, I can do anything more than this. So from that point I think I – I push myself to study more. And then, the results was great so with the result I made, that's my motivation I think. (A&D-004-F)

An independent and self-directed spirit grounds their motivations to learn, sometimes in spite of the difficulties.

> And then I figured out that you could sit, like if I just sat by myself and got a book – and I did the book enough, that I, like eventually like it just sort of clicked in and other things got easier. I mean I finally figured out no one was going to tell me …" (A&D-006-F)

Identity/temporality is strongly reflected in these artists' narratives. This identity is solidly situated in their self-perceptions of themselves as artists even as they recognize that their skills with technology are sometimes inadequate. Even as students their self-perception is as artists engaged in a real practice – they have no reservations, even if they sometimes express their fears and uncertainties. One artist, as she expresses her belief that artists must reflect seriously on their use of technology, exhibits this clarity about who she is and what she is about:

> I think it's important for artists to think why they are using technology, and what it is for, you know. And pay attention to your original concept first. And then, if you start losing the track too much I think it's time to reestablish, you know. (MU-011-F)

Another artist expresses this somewhat differently, focusing on what innovation means to an artist's growth and identity:

> You're always striving to come up with something new for yourself. Or else you would never evolve or progress as an artist. Yeah, I think that's part of, part of the goal of an artist is to come up with - yeah, innovation, I guess. I don't know if I'd call it innovation. ... Evolving as an artist and coming up with stuff that isn't the same every time. But you can always, you can always go at - push ahead, but also be sort of using stuff from your past, so I think that's a possibility too. (MU-009-M)

Often these artists do express their self-perceived inadequacies: "And I was like well, at this rate I must, there must've just been some stuff I should have been born with and um, and maybe I'm – I'll just never be qualified to learn about computers…" (A&D-007-F) Sometime later her perspective completely shifts: "it's a really dumb object to communicate with … that really helped get through learning HTML and Visual Basic [a programming language]. This internal resilience is characteristic of all the artists, and is

a significantly different relationship to technology than was exhibited by the education students.

Comparative Findings

In discussing our comparative results, we want to address themes and questions that were opened up through this analysis and to provide meaningful examples of each. We focus here on three related issues that stood out most prominently: task specificity, motivation, and identity/temporality. Interestingly enough, these were not the themes that might have been suggested by previous research. Much existing work on technobiographies with other populations focuses on the importance of critical entry points to technology (Hawisher & Selfe, 2004) and supportive social structures (Margolis & Fisher, 2002). While our interviewees had a wide range of early experiences with technology in their pasts—from the rich to the mundane to the non-existent—and a wide spectrum of support or lack thereof from influential others, these factors were not characteristic of particular groups, but rather spread across the entire body of interviews. As we had hoped, however, we did notice some contrasting characteristics of pre-service teachers' narratives when we read them in the context of the arts students' stories.

One area of contrast was that of task specificity. In describing both their current and past uses of technology, art students tended to focus much more on creative technologies they would use to create art, whereas education students were more likely to recall using "the computer" in previous experiences, with either a non-specific application or educational games. The two examples below from a graphic art student

recalling her first encounter with print technologies for making art (A1) and a pre-service teacher describing her k-12 encounters with computers (E1) demonstrate this difference.

> (A1) My mind just totally started going off on uh, wow - what can we, wow - what can I do with this machine process uh, of the printing - uh, what are the limitations that it imposes. What, how can I push it, you know, can I remove the printing plates and just have ink on blanket on the paper and ya know, and so, that was an interesting part of the production.

> (E1) I always ended up, I got to use it [the new, better computer] more often than anyone else I think just because I was one of the top students in the class and it was sort of a reward for good behavior, good performance. You could get your pick of the software.

Another emergent theme that seemed to distinguish the two groups was intrinsic versus extrinsic motivations. In the two examples below, the art student (A2) articulates positive emotions and a self-rewarding, "serendipity" process of discovering how to manifest and even enhance one's artistic vision through the use of technology. The education student (E2) attributes her "every day" use and reliance on technology to the requirements for her classes at the university. Note also that in the previous examples, the pre-service teacher (E1) also says that her previous K-12 experiences with technology had extrinsic rewards "for good behavior."

> (A2) If I'm sitting there with a piece of technology software or hardware that I don't understand uh, there's so much discovery in the serendipity of going oh, I didn't know it would do that, or I didn't know I could make that...so very often if I don't understand what I'm you know, totally how to use this thing, the process of trying to get to - to manifest this artistic vision very often leads to other things that I didn't even anticipate or didn't even see ahead of time.

> (E2) I think I use it – well I know I use it every day I guess… I probably rely on it more now that I ever had before just in terms of, you know, you look here at the university and how much technology is being used within the classrooms, and for group projects, and to complete assignments.

Finally, the third theme that emerged was that of identity/temporality. The art students' stories conveyed the idea that they thought of themselves as artists already, even though they were still students. The technologies they were learning to use were immediately employed in the service of their art, as one student articulated (A3). This theme was present in the previous example as well (A2). The pre-service teachers, on the other hand, seemed highly future-oriented in their discussions of learning to use technology for their careers. The quote from one student (E3), "I'm going to be a teacher so…" was very frequent within the education group. The vast majority of discussion of technology for teaching was oriented toward some future date when they would become teachers. Note also this student's extrinsic language, talking about "the big push now in

education," and "I'm gonna have to…" This example is also a rare instance of an education student specifying a particular use of technology for teaching, PowerPoint; the art student articulates a specific tool such as Photoshop or Flash.

> (A3) I tend to use the technology more as a tool as opposed to a canvas, I guess would be the right analogy. So, uh, I will use technology to facilitate what I'm trying to do. In other words…I'll have a mental image of what it is I want to portray, what it is I want to create, and chances are I'll use the technology Photoshop or Flash or whatever to kind of embody or express what it is I'm trying to communicate.

> (E3) I'm going to be a teacher so I need to stay on top of things like that – cause the big push now in Education is to bring technology in the classroom, so uh, I'm gonna have to learn how to do PowerPoint and all that other stuff.

Discussion

Our findings about each of the groups we interviewed, pre-service teachers and art students, enable us to better understand their experiences with technology and shed some light on critical issues in technology research. A focus on past experiences with pre-service teachers is particularly enlightening, since research reveals that among the strongest influences on novice teachers are often their own k-12 student experiences: the old adage that teachers teach the way they were taught (e.g., Zhao, 2004; Carpenter &

Fennema, 1991). We know of no other research study in which teachers' past histories with educational and other technologies are being systematically examined. Given that the current generation of incoming teachers has extensive k-12 experience with technology in the classroom, and given the troublesome findings from our exploratory study about pre-service teachers' negative tone, non-specific activities, and lack of teacher agency in their school technology narratives, this issue definitely deserves further research.

The artists' stories are remarkable in their own right. Here we see a group of individuals whose use of technology is highly self-motivated, highly grounded in practice, and characterized by seeking and overcoming challenges. Many of the artists interviewed were women; we feel that the experience of these individuals speaks to existing research on gender and technology, particularly since much existing research tends to focus on computer scientists and games (Margolis & Fisher, 2002; Cassell & Jenkins, 1998). In fact, our ongoing research further examines these artists' narratives from the perspective of gender and technology research, offering an alternative to research primarily focused on either instrumental uses of technology or a view of play focused on video games (Vigdor, in preparation).

Turning to our comparative findings, we do not want to argue that we have uncovered some fundamental differences between art students and pre-service teachers. Yet the process of entering into this research conversation has brought out some compelling questions. Issues of motivation, task specificity, and identity/temporality clearly deserve to be explored further in research, narrative or otherwise, on teachers and technology. The question of identity/temporality is particularly perplexing in our data,

given that many of our pre-service teachers had already completed field placements and student teaching, yet they still viewed their technology-related learning as being largely preparatory. Art students, on the other hand, were *doing art* and seemed to configure their narratives as such. Disturbing as well is the high degree of extrinsic motivation that emerged from the pre-service interviews. Given the current climate of high-stakes accountability and standards-based education, this finding is perhaps not surprising. Ideally, pre-service teachers might be thinking about how to harness the power of specific technologies to best support student learning goals (Cuban, 2001; Windshitl & Sahl, 2002), but it is possible that a high-stakes environment reinforces "the big push" instead. Further investigation will address these issues beyond the scope of this exploratory study.

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