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Tool or Sign? Negotiated Learning and Socialization Process in the Students' Perceptions of Technology in the Digital Library Classroom

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Abstract

This study explores the learning process in a group, focusing on novice users of technology, by observing how they build frameworks for deep and strategic learning, the role of the communities of practice and the role of existing learning style as a context for learning. A group of Library and Information Science (LIS) students in a digital library classroom was selected for the study. A pre- and post-test questionnaire and a recorded interview (where students described their experiences of achieving technological proficiency in the course) provided the data for the study. The study showed that students provided narratives in which they negotiated the role of technology as tool for digital librarianship. The learning process involved interpretation and repositioning of the learning subjects. The loci of control provided the perceived membership in librarianship as a community of practice and their personal experience. The discourses created by the students emerged in relation to regulative contexts that they perceived from their position, notably the expectations of the marketplace and the profession. The personal experience involved the language of the learning contexts (music, art) that students were familiar with.

Introduction

This paper examines the process of learning in a group as novice users of technology learn to use technology to build a digital library. This process is a fusion of different viewpoints into one experience; its actual resolution goes from feeling of uncertainty to certainty about their technological competence. For these users, technology is a sign with diverse points of reference defined by the communities of practice they

associate themselves with. The process of understanding technology involves negotiation familiar from the studies in psychological Gestalt theory (Boon, 1982, p. 117). Therefore, the ambiguity of rabbit/duck with two optional readings of an identical form (in which the duck's open beak becomes the rabbit's ears) may be used to speak of technology as tool or sign—material reality or symbolic value. This paper explores a similar ambiguity in which the students construct technological proficiency in a symbolic field of an ambiguous relationship of tool/sign.

Research Objectives

Technological proficiency as learning activity provided a focus for examining how LIS students, novice users of technology, approach learning. In order to explore the learning in a group as an extension of existing learning styles and the process of socialization in a community of practice, the research objectives were to: (1) examine how novice users of technology build frameworks for deep and strategic learning; (2) understand the role of the communities of practice as the context for learning technological proficiency and (3) understand the role of personal experience as the context for learning technological proficiency.

Literature Review

The research objectives were based on existing research. They included studies on the experiential approach to learning and the role of negotiation in which learners become active participants in interpreting that activity, studies focusing on how existing learning styles aid in constructing meaning from new information, and studies of strategic approaches to learning in adult learners.

Lave and Wenger (1991) proposed a theory of situated learning based upon the relational character of knowledge and learning, negotiation of meaning and the engaged, dilemma driven nature of learning activity for participants. Proponents of this approach advocate experiential learning approaches that couple "know what" with "know how." In system building courses, such as computer programming and design, instructors incorporate discourses and norms of work practice, so that by building a system, students apply what they know to learn how to build systems in general (Roschelle, 1995). Because learning cannot be separated from the community of practice, the construction of experiences or discourses by the participants are at least as important as performance outcomes or products of work. Benner's (1984) work with nurses' stories in which they relate practice and expertise,

and Schön's (1983) work on connecting practice to how professionals think demonstrate that the process of learning is related to membership in social worlds in professional communities of practice. Suchman (1987) has also shown how plans and situated improvisations may be used as resources for action.

Learning styles are cognitive and behavioral patterns people use to construct meaning from new information. In this paper, learning in a group is considered as an extension of existing learning styles. Although there are a variety of complementary models of learning styles, there is still debate on whether effective instruction matches a learning style or alters it (Tendy & Geiser, 1998-1999). For example, to match a learning style, an instructor would vary the external conditions to accommodate a biologically determined learning style. To alter a learning style, the instructor motivates, takes account of perceptions and guides students through strategies. Tait and Entwistle (1996) articulated four learning style "approaches" that have been tested and implemented to inventory performance and study skills. *Deep* and *surface* refer to levels of understanding the student seeks and attains. *Strategic* and *apathetic* refer to motivational approaches that students express towards their learning. For instance, a successful scholar would exhibit a deep strategic approach whereas a student seeking only a credential with minimum effort would exhibit a surface apathetic approach. This study observed how students created discourses that reveal deep and strategic approach to learning.

In a study of the relationships between learning styles, self-reported proficiency and academic achievement in higher education, Cassidy and Eachus used questionnaires to collect data on 130 undergraduate students in Health Care and Social Work services. They found that students' attributions of causality (locus of control) to *internal factors* (i.e., their perception of their own proficiency, task difficulty and effort required) is associated with high academic performance. It is also a predictor of student adoption of deep or strategic learning approaches. *External locus of control* (powerlessness over uncontrollable factors causing success in learning) was a negative predictor of academic achievement and the surface or apathetic learning styles. Learning in a community of practice engages perceptions about locus of control in two ways for the self-reflected learner: how will my group influence my individual performance and how will my own proficiency match against task and effort requirements.

The work of Lave and Wenger suggest that educators examine the experiences our students bring both individually and as a learning community to the class. Malcolm Knowles (1970) coined the term

“andragogy” to refer to particular features of adult learning that differ from pedagogy, a term traditionally applied to the educating of young children and young adults. For example, self-directed learning, relating new knowledge to existing experiences and performance-centered outcomes were put forward by Knowles’ approach. Although situated learning incorporates many of the principles of andragogy into its perspective, the maturity and experience of adult learners drive many professional educators to examine self-perceptions of learners as they move through an MLS program. Knowles’ work calls for an examination of their self-perceptions as they construct their own experience through class participation. In a study of the factors influencing academic achievement, Cassidy and Eachus (2000) found that self-perceived proficiency was positively correlated with a strategic approach to learning and should be considered a useful evaluation measure for teaching and learning.

The literature review suggests that learning is a process of negotiation that cannot be separated from the community of practice, that the construction of experiences or discourses by the participants are at least as important as performance, and that improvisational learning may be used as resource for action. The role of self-perception further clarifies the process of learning as negotiation. It shows that successful learning needs to focus on internal locus of control in which the learner takes a deep and strategic approach to learning. Adult learning is self-directed and self-perceived proficiency is positively correlated with a strategic approach to learning. This study explores the nature of that negotiation process, using adult learners who are novice users of technology in the field of library and information science (LIS).

Research Design

Setting

The study was conducted with master’s student population from a top-ranked North American library school program, at a public state university in the Mid-West. The students were enrolled in a course titled *Special Collections in the Digital Environment*. This course had a strong technological component because it called for the students to build an archival digital library. The students thought about it as ‘digital history,’ and an archival digital library course that emphasized using digital tools to build cultural texts. In the words of one of the students “I’m glad that this is a technology from a humanities perspective—if I can remember that when I get frustrated, I’m sure to do fine! I also believe that art takes on all form—spoken word, video,

time-lapse images, images. A special art collection should be able to archive all these moments / means of expression” (JP, pre-test questionnaire). The course was selected because many students were self-professed novices in the use of technology. The course focused on the content and collection development aspects of an archival digital library and it provided a hands-on, experiential learning, combining “know what” with “know how” aspect of building a digital library. The key assignment called for building a virtual archive of historical letters and a web-based regional history resource.

Subjects

The subjects for the study self-selected from the students enrolled in the digital history class. The subject volunteers were interviewed at the end of the class. Of the 9 volunteers, which represented well over a third of the class of 25, 7 were women and 2 were men, corresponding to a national Master of Library and Information Science graduates’ ratio of 78.2 / 21.8 percent (based on 1996 *Library Journal* survey). Although the ratio of women and men corresponds to a broader graduate population of library and information science graduates, the study does not include minorities. (None of the 3 minority students in the class volunteered for the study.) Students with science or engineering background were not represented either. (This is consistent with the national averages in library and information science programs.) The call for volunteers was issued at the end of class and the questions presented to the subjects prior to the interview. The interviews were scheduled within two weeks after the end of classes.

The students enrolled in the digital library class were primarily from the arts and humanities as shown in Table 1.

Table 1. Primary and Secondary Area of Study for Students Enrolled in Digital Library Class (N=25)

Level of Study Already Achieved	Subject Area	No. of Students
Undergraduate	English	4
	+ Cinema	1
	Language Teaching	1
	History	4
	+ Anthropology	1
	+ Sociology / Education	1
	+ Russian	1
	Religion & Philosophy + German	1
	International Relations	2
	South Asian Languages & Culture	1
	Education / Psychology	1
	Music (Viola Performance)	1
	Music Composition	1
	Theatre & Drama + Pre-med	1
	Art History	1
Journalism & Mass Communication	1	
East Asian Literature	1	
Anthropology + Cinema	1	
Graduate	M.A. / M.Sc.	4
	M.L.S. already obtained	1
	Ph.D. in progress	2

The students who volunteered for the study were typical for the course population in terms of gender, but not in terms of minority status and disciplinary representation. As shown in Table 2, the students who volunteered for the study included all but one who had a second graduate degree or were pursuing a doctorate.

Table 2. Subjects' Primary and Secondary Area of Study (N=9)

Level of Study Already Achieved	Subject Area	No. of Students
Undergraduate	English	2
	History	2
	International Relations	1
	Music (Viola Performance)	1
	Music Composition	1
	Art History	1
	Education / Psychology	1
Graduate	M.A. / M.Sc.	2
	M.L.S. already obtained	1
	Ph.D. in progress	1

All but two of the students (N=25) were self-declared technological novices. The data were collected by means of a pre-test questionnaire distributed at the beginning of the class in which one of the questions called to identify their level of technological proficiency. According to that self-rating, the technological proficiency and attitudes among them varied from 'technophobic' to 'luddite' as some of them admitted, to modestly proficient and very proficient. The population, given this characteristic, was ideal to study situated cognition of technological novices.

Data Collection

Data collection included a pre- and post-class questionnaire and recorded interviews. The interviews were based on a semi-structured interview outline and were transcribed. We based behavioral data analysis upon a grounded theory approach (Strauss 1987) including open coding, theoretic sampling and integrative team meetings. Theoretical analysis draws upon Benner's (1984) work with nurses' stories in which they relate practice and expertise, and Schön's (1983) work on connecting practice to how professionals think. The interpretive style followed critical theory approach, giving primacy to subjects' experience, and the expression of emotionality. Data reduction aimed to generalize the stories told about the case.

Data collection was conducted at two points. A form was distributed in the beginning of the class, with questions gathering information on: demographics, expectations from the course, and technological proficiency of the students at the beginning of the class (level of experience with web authoring, knowledge of SGML, scanning, software they are familiar with, systems, experience with WebCT).

At the end of the course, the students were asked to volunteer for interviews. The interviews were organized around 10 open-ended questions, and lasted from 30 to 45 minutes. (The interview guide is reproduced in the Appendix.) Four of these questions form the basis for data analysis and findings. The students were asked to identify the rationale for taking a course in digital libraries (question 1). They were asked to list the core requirements for creating digital libraries, and to assess course material in terms of those requirements, with technology being one among these requirements (question 2). The subjects were then prompted to assess their technological proficiency at the beginning and at the end of the class, prompting them to reflect in retrospect on their experience of the learning process (question 3). Question 7 tapped into how learners perceive their social context and the external controls, and how they developed the discourse of negoti-

ation with the external loci of control. The subjects were also prompted to outline a set of professional competencies, as distinct from technology, needed for digital librarianship, thus prompting them to elaborate on how the external loci of control and internal ones converge (question 9). We expected them to build narratives that reveal how they built deep and strategic approach to learning, how they used social worlds and personal experience in incorporating their new knowledge and how they related their learning to the social worlds and communities of practice. The narratives captured their experience and negotiation strategies.

Findings

The findings demonstrate students' self-perception of the process of learning about technology, and how these attitudes shape their opinion about the information professionals' roles, and their own membership in a community of practice. They are organized around two perspectives as students assessed the role of technology in the library and information science curriculum and as they defined what being technologically proficient means.

Technology in the Curriculum

The novelty of the course was recognized as a value in itself. Students explained their initial motivation to take the class because it covered a 'current topic,' because it reflected a 'current trend,' it is 'a modern class that is kind of pushing the envelope when it comes to library technology and services.' They acknowledged a high value of anything digital, and its marketability. But, this was certainly recognized as external pressure by the students: 'it's sort of a buzzword that's going around about you should know about digital libraries.' Even when initially recognized that the class will not focus only on building the digital libraries, but that it will integrate traditional with non-traditional aspects of library work, that combination was perceived as attractive:

'it had a nice combination of very cutting edge sounding digital environments but also the more traditional special collections so it seemed like a nice way to get into both the historical point of special collections and also very cutting edge of digital libraries'
(KA)

At first when asked why they took a course in digital libraries, the students confidently asserted 'the only technology course offered in the program,' 'that there has not been a course precisely like this before.' One noted that 'the whole technological aspect is kind of hidden in this program in and of itself' and 'that it is not often that a

modern class is taught in this school,' that this was 'the only computer-related course available this semester.' Yet, in that same semester, there were other classes that involved learning technology skills, including online searching, database building which was integrated in an organization of information class. The students' perceptions reveal that they are used to think about technology as being compartmentalized, making it difficult for the administrators and educators to deal with such perceptions in building a meaningful curriculum that will satisfy these perceptions. LIS administrators are only too familiar with the pressures that students exert for courses on current topics, for marketability, and the requirements of their job, but these perceptions are introduced externally through the marketplace. Perceived membership in the professional communities of practice thus becomes entangled with the process of learning.

Technological Proficiency

As already stated, the proficiency level among the students varied but most of them were technological novices, according to their self-rating at the beginning of the course. In the exit interview, however, when asked to define their level of proficiency and compare it with their proficiency at the beginning of the course, they understood ambiguity to be the necessary element of the process. They shifted from external locus of control and surface learning to internal and strategic learning. The nature of that process can be captured in how they strategize about the authority by which they measured their own relative position in an imagined hierarchy of proficiencies, and perception of the process of learning itself.

... technological proficiency measured against imaginary authority

Technology is something one has, and uses as a means of comparison to others, a means of differentiation and a moral stand. In positioning themselves in relation to current trends, students debated with an imaginary market (this was explicit in their comments on the marketability of technology skills). Their goal was evidently to be integrated into the market and a fear of failure colored their emotional responses. Because most of them have not grown up with technological advances now most influential in changing the nature of information work (because of their age), they measured themselves against an imagined authority, 'I knew that technology is a deficiency of mine coming into the program.' And, although they were able to identify their level of proficiency, they failed to identify the needed skills that constitute such proficiency.

Two of those interviewed were very confident in terms of proficiency and both identified their own proficiency in relation to other students, the library world at large, and the market. But it is all about imaginary authority. One of those students had a very realistic judgment of her own, and other people's skills:

'I wouldn't think I was very proficient in comparison to the library world ... fairly proficient in a lot of stuff. If I don't know it I can pick it up fairly easily.' (EB)

'And compared to other library students ... I see them as being in three separate categories. One category would be the category I am in, the people who are familiar with and use the technology all the time and not just word processing or even just PowerPoint .. use it as much as they can. Then there are the people who are willing to learn about it and willing to use it but aren't necessarily going to take the initiative to learn it themselves. And then the third category would be the people who don't necessarily want to learn at all even but are almost I don't want to say forced to but in a way a lot of professional librarians are forced to use technology because its growing all the time .. but they are resistant to learning I guess.' (EB)

Another student resorted to critiquing the concept of technology 'because technology for me is something that is ephemeral'; 'it's a concept within which you place things.'

'I see technology as a tool, as a medium more than I see it as something real. ... And it's like art in that a painter uses a canvas or board and paint to convey an idea. We're using bits and bytes and pixels and formats to package information. And I think it also the analogy to art is extremely I think deserved because it's a visual thing, entirely visual and in the future hopefully video and audio archiving will be included in the presentation of digital libraries. Like I said, it pushes the envelope in what we normally consider a traditional library setting.' (JP)

All of the students were very emotional in describing their process of learning, and resorted to expressive devices as they described that process as a major shift in their understanding. In terms of their influence of their experience on self-perceptions, the digital library class enabled a 'conversion experience' that the students expressed, signaling a change in their self-perceptions from an external locus of control to an internal locus of control. Often this was related to a specific task that they learned, like 'burning a CD' or uploading files to a server. The imaginary authority by which they judged their proficiency in the beginning dissipated as they constructed the digital library through experiential learning. Students appeared to shift from a surface to a deep strategic approach:

'My feeling, if I have to describe my current state is that I do not feel proficient. However, I feel an excitement. I feel an excitement. I feel less fear.' (JD)

'I am going to start backwards, I am going to start with my proficiency at the beginning of the class. Let me preface this by saying, when we were in Information Use and Users [class], we learned about a particular I forget whose theory it is, but there is certain stages of learning certain stages of awareness. The first is that you don't know that you don't know and then the second is that you know that you don't know and that is where learning begins. And then you know but don't know that you know when you are gathering proficiency but you are not sure that you are of that proficiency and then one day: you know that you know. I'd say I'm still in the second one: I know what I don't know and that's ... currently, I know what I don't know and when I started this whole thing I didn't know what I don't know. So I was just very unaware, I had no idea what was involved.' (JP)

Several of the students used the vocabulary they already had to relate their experience of the unknown, relying on the imagery of art, composition, and music. Drawing upon the discourses of their personal experiences and educational training, the students also constructed a new language with which to draw meaning from their work with technology. As they drew upon the affective aspects of their experience they constructed their own technological discourse that reflected the community of learners in this class.

... technological proficiency as learning experience

Even students who initially admitted very low level of proficiency, mentioned that learning consisted of a willingness to reposition themselves and start learning adaptively. The process of learning was described as a dialectic of the student's initial self-defined status with technology and passing through the gate of proficiency. Learning is described as entering an unknown territory and then when you get there, it is like entering the gate. From that time on, they achieved a position that made them comfortable to meet unknown tasks:

'I don't think it is all that difficult. A lot of it is opportunities to learn it, and use it. And so there's always someone who knows more than you. And, I think that when you get to that point of a high proficiency level and able to do a lot of the stuff that we did, because it is, once you learn it, it makes sense. It's a simple process. Then, when others have trouble with it and trying to make sense of it from the higher proficiency level, you say, 'alright just learn this and you'll get up to speed.' And so there is that guilt [when other tell you] 'don't make such a big deal out of this.' And I am not talking about anyone in particular, I think it's just more

of our society that's, you can do it, there's always this paranoia, there is always someone who has more knowledge and experience.' (LD)

The students who started out with a very fearful attitude to technology describe their process as a conversion experience, realizing that their initial fears and anxieties came out of self-imposed view of technology. That creates self-imposed discomforts of what shouldn't be a mysterious process. A genre of a conversion narrative in which the transformation of technology proceeds from the unfathomable to the manageable implies the rewarding nature of the process:

'and my biggest joy was the fact that this class kind of lit a fire under me — I found something that I found really fascinating. Originally I walked into it thinking it was something that was really frightening but I found it really fascinating.' (JD)

It seems that once the first (and the steepest in the learning curve) step is passed, students express relief at being able to learn. The learning itself is not learning a set of skills but a process of socialization into situational thinking. There were several true converts among the interviewees, who expressed their newfound freedom in highly charged emotional language, focusing on critical incidents that they identified as crucial moment of that conversion process:

'There is no absolute knowledge ... Okay, you know all there is to know about the technology but it is going to change... So I think to be successful, you need to be able to be flexible and to be able to read the context into the situation and then go into the real technological aspects of, 'so what does that mean, practically, if I do this.' And there is just much more trial and error in this than people would think.' (KA)

Once accepting that learning is a manageable process, they re-formulated their self-perception. Being able to recognize that they have an ability to learn was crucial in a feeling of empowerment that they gained:

'I think that the perception is that you have to be a hard core techie, and that you have to know all those numbers, and all the stuff within the *Practical Digital Libraries* [title of textbook used in the course]. But I think that, you just have to know how to learn that or how to think about it. So I think that the technological proficiency for digital librarianship can be demystified to say, 'well it's not it's not so far out of reach that it can't be done.' Because I think it is so cutting edge that you'll never be able to figure it out. But if you can read and sort of sit down with it, and have other people to ask those extremely technological questions.' (KA)

Discussion

These findings support the relationship between self-perceived proficiency and strategic approach to learning. In fact, this data suggest that a key mechanism is the relevance of the strategy approach to construction. Because the learning experience requires construction of an artefact embedded in the context of the humanities and liberal arts, students create a discourse about their experience and proficiency in their own language, often drawn from that community of practice. A strategic approach is essential for sense-making in a context-rich learning experience. The discourse surrounding the acquisition of technological skills in the Masters' program reveals that students perceive their community of practice to value novelty and currency on the job market. However, they also perceive technology as being compartmentalized in LIS, of being something external. This shows that at the moment a paradigm is developing, you need the old and the new to make it accessible, to integrate technology in courses across the curricula rather than compartmentalize it.

Faced with ambiguity and discontinuity in the community of practice for which their Masters degree stands, students may find it difficult to define the position that will allow them to build frameworks for deep and strategic learning in the context of a community of practice. Perceived as external locus of control in the process of learning, the marketplace (which is tied to an undefined community of practice) is likely to result in the self-perception of powerlessness, and result in negative academic achievement.

The internal factors determining students' self-perception of technology are reflected in them being fearful of the unknown and seeing technology as the other. They also positioned themselves in an imaginary market in which they came out as less competitive, and feared being left behind (i.e. by computer scientists). Yet they are not technological determinists because they have the awareness that they can be agents of change. Through the ability to learn, they felt they would be able to resist the external threats of the market and its pressure for technological determinism. Although modern and cutting edge is appealing, it does not determine their perceptions of technology, which they see as a tool subordinate to the traditional roles of information agencies.

In their responses, students show that they are tradition-oriented. This is a radical position in relation to seeing technological skills in the information work market as commodity. Although acknowledging the draws of the market, and their own interest as largely motivated by the 'modernity,' the 'current' nature of technology-oriented course,

they are also very critical of the 'consumer' aspects of technology and political in asserting the traditional roles of librarians. Students were generally giving a critical view of a view of technology as they saw it being shaped by the market. The need to find traditional purposes for technology, 'the reason why we do it' (JG) was prominent.

'You have to have a purpose why are you creating the digital library to begin with because there is this feeling that oh, aren't they great, we should all be doing them because there is sort of the pressure to do them, oh, don't you have a digital library but shouldn't be doing them just for digital library's sake but to have a particular purpose to them and to have a goal whether that be for research or for highlighting your own collection.' (KA)

There was also recognition that there are several cultures of technology that result in a different appropriation of the purposes for technology in the computer science and the information science / librarianship field, and among the students, the purposes that sometimes conflict.

'Let's say were I was working for a consulting firm if they were doing a digital history it would not have been done even close to this way and even level of detail and description, and cataloging and access points and everything that went into it ... it would never have been done ... I think in those digital history collections you wouldn't find that in if the regular computer company did that: that is what I think librarians have to add and market themselves.' (TK)

The students were able to reverse the power in which they come out weaker as defined by the market, in that they all saw the contribution of LIS graduates they thought crucial in shaping the current discourses of technology.

The acculturation of the students to a common discourse about constructing technology engages another aspect of the locus of control issue. The shift from external to internal locus of control affects not only their self-perceptions of proficiency, but also influences the way they participate in constructing digital libraries. As the learner moves from uncertainty towards proficiency, the confidence expressed by the learner enables her to participate more fully with other digital library endeavors. This finding provides support to Kuhlthau's (1998) evidence and responds to her call for understanding both how and why information professionals respond to uncertainty and complexity with construction strategies.

Implications

Through the process of interpretation in the words of novices, the study shows how barriers were broken down in a group of mature

learners who were not socialized in the same way as the upcoming generation. Because the process itself lends itself to creating an anxiety, the educators often ask whether it is a personality or exposure issue that they have to deal with. It is important for educators to recognize the internal and external pressures that their graduates are facing, knowing that most of those who are changing career have not grown up with information technology. This study shows that educators may help learners assume learning styles that develop interpretive learning (deep and strategic learning) that relies on their own life-worlds, and takes advantage of the learning communities as the students reposition themselves in the community of practice. The challenge for the educators and scholars is to integrate the discourses of the life-world within the larger space of professional development and teaching technological competencies.

The students need to gain confidence and the ability to accept that there are limitations to what they can know because technology is ephemeral. The educational goals should be to achieve a level of comfort that will make students willing to grow into various sets of changing skills and environments. This calls for educators to acknowledge the problems that arise from a discontinuity and change. In a service profession that survives upon showing the added value, the ability of students to participate in cognitive apprenticeship is critical to their success. Yet the sharp differences among the compartmentalized communities of disciplines and sub-disciplines and the hybrid environments in which employers operate provide a challenge for educators to develop integrated curricula.

Conclusion

In light of this study, it is appropriate to ask is technology a competency, or is it a political arena to frame new discourses in the education of professionals such as librarians and information workers?

The students overwhelmingly embrace, or at least acknowledge, the importance of being current in their technological proficiency. They recognize the contradictory nature of the discursive field around 'technology' created by the marketplace and the traditional values of the library and information science field. These students see technology as part of material reality, a currency for an economic exchange in a changing job market. It is a tool, but it is also a sign of the scientific-objectivist worldview that they contrast with the humanist values of the library and information science profession. They also recognize that the traditional paradigm of librarianship primarily focused on service and the user is at the core of the practices in the use of technology as they start defining their own roles.

Faced with technology, students reveal fear and anxiety. The learning process is depicted as a qualitative shift, as learners' fear of failure and a goal of social integration is achieved when students acquire confidence in their ability to learn. In the process of learning, the students questioned the scientific objectivism in which technology is defined, and also attempted to connect the process of learning to a "life-world" (*Lebenswelt* in Husserl's phenomenology) based on their immediate experience. The scientific-objectivist discourses of the communities of practice and the "life-world" discourses are used by these subjects in the process of repositioning. The students interviewed for this study were not likely to naïvely accept the technological determinism, but rather are aware of the politics of technology and the ideas of progress that is shaping the views of technology in the marketplace. In that sense, they retained the locus of control that aided deep and strategic learning. The oral evidence of this interpretation, in the words of technological novices, reveals the emotional challenges presented by technology, and strong ethical and political convictions that these individuals bring to the profession.

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Appendix: Interview Guide

1. Why did you decide to take a course in digital libraries?
2. List several items that you think to be the core requirements in creating digital libraries.
3. Describe yourself in terms of your proficiency with technology:
What do you believe is your technological proficiency at this point?
How would you describe it in relation to your proficiency at the beginning of this class.
4. What do you believe is at the core of your experience with technology as you used it in developing the projects in this class?
5. What were the major barriers for you in completing the digital archive project for this class. How do these differ from your initial expectations at what would be the major obstacles in completing the project.
6. What were the major revelations for you in the process. Reflect on two major fears, and two major joys in the process of completing the requirements for this course.
7. Explain how your perceptions differ from what you consider to be generally accepted notions of what constitutes technological proficiency for digital librarianship.
8. In light of your recent experiences with technology underlying the creation of digital libraries, how would you describe a digital library?

9. What are the professional competencies that you identify to be central for the practitioners in the area of digital librarianship?
10. Please briefly introduce yourself in terms of your educational background, work experience, and your career goals in librarianship, the stage in the M.L.S. program, expected date of graduation.

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