Teaching and learning in technical theater: activity, composition and embodiment

Alex Hoobie Schott

University of Iowa

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TEACHING AND LEARNING IN TECHNICAL THEATER: ACTIVITY, COMPOSITION AND EMBODIMENT

by

Alex Hoobie Schott

An Abstract

Of a thesis submitted in partial fulfillment of the requirements for the Doctor of Philosophy degree in Teaching and Learning (Language, Literacy, and Culture) in the Graduate College of The University of Iowa

May 2013

Thesis Supervisor: Associate Professor Carolyn Colvin
ABSTRACT

If not ignored completely, the body has been under theorized in literacy research. However, recent research in cultural studies, linguistics, philosophy, psychology, neuroscience, education, and the arts suggests that the body is implicated in thinking and knowing as well as doing. In this dissertation I examine high school technical theater. In this robustly embodied activity students build sets, rig lights, and paint backdrops in preparation for a theatrical production, as well as run sound and lighting and perform scene changes during the production. I use data from high school technical theater to explore the body in literacy, embodied learning, collaboration, composition processes, and experiential learning.

I gathered data primarily during out of school work sessions over the multi-week production cycles of six plays produced at one high school over two school years. As an experienced theater technician, I used participant observation as the primary method of data collection, supplemented with semi-structured interviews with the technical director, artistic director, and four students. I collected data and analyzed data through iterative processes in which analysis began during data collection, emerging analyses influenced data collection, and constant comparisons to new data influenced emerging analyses.

Observations of student work revealed that student theater technicians employed literacy skills including speaking, reading, writing, drawing, calculating, and interpreting the written text of plays as necessary elements of the normal course of technical theater work. Observations of teaching and learning showed that little explicit instruction was used but that mini-lessons, individual and collective problem solving, and multiple configurations of collaboration among more and less experienced technicians led to the development of critical thinking and physical skills, as well as proficiency in the creation of props through the evaluation and application of building techniques and materials.
I used theories from art making and multimodal literacy to examine technical theater building projects as examples of composition. My findings show that the design of technical theater texts – e.g. props, scenery, lighting – emerges through a recursive process of creation and interpretation and is mediated by the technicians’ knowledge of building techniques and materials. Situated learning and activity theory were used to analyze learning in the technical theater community. Results demonstrate that the structure of the community allows for learning through experience, apprenticeship, and collaboration as well as through the creation of texts that balance personal expression with collaborative enterprise.

Abstract Approved:

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CERTIFICATE OF APPROVAL

PH.D. THESIS

This is to certify that the Ph.D. thesis of

Alex Hoobie Schott

has been approved by the Examining Committee for the thesis requirement for the Doctor of Philosophy degree in Teaching and Learning (Language, Literacy, and Culture) at the May 2013 graduation.

Thesis Committee:

Carolyn Colvin, Thesis Supervisor

Gail M. Boldt

Steve McGuire

Kristine L. Munoz

Amanda H. Thein
To Boof.
Labour is blossoming or dancing where
The body is not bruised to pleasure soul,
Nor beauty born out of its own despair,
Nor blear-eyed wisdom out of midnight oil.
O chestnut tree, great rooted blossomer,
Are you the leaf, the blossom or the bole?
O body swayed to music, O brightening glance,
How can we know the dancer from the dance?

W. B. Yeats
“Among School Children”

There’s really no such thing as unskilled work.

Joe Meraglio
quoted in
Mike Rose
_The Mind at Work_
ACKNOWLEDGMENTS

This work could not have been completed were I not graced with numerous blessings. I hope to be forgiven if I mention only a few of them here.

Throughout my life I’ve been blessed with outstanding educators. All of them have given me something unique that is reflected in this work, but none of them more so than Carolyn Colvin. Carolyn asks the right questions herself, and she made me keep asking questions until I asked the right ones, too. I could not have learned what I learned, nor even known what I wanted to learn, without her. If I taxed her good will and patience more than was reasonable, again I hope to forgiven.

I have had classes with a number of outstanding professors, some of whom were on my committee and whose influences are easily seen in this work. It’s been a pleasure to study with Gail Boldt, who is still helping me grasp embodiment; Steve McGuire, who patiently explained why art is important to me; and Kristine Munoz, who showed me how to care about data.

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No part of this research could have taken place without the initial and continued support of Bill Lammers and Pat Lammers. Their generosities of time and wisdom, and dinner and conversation, are ongoing blessings to me. In addition, Len Struttmann has been a wonderful resource and source of encouragement.

Other educators helped me as well, some recently, others long before this work began. From LLC, Cynthia Lewis was the initial source of inspiration for me to enter the LLC program, and Anne DiPardo was inspirational while I was there. Elsewhere at the University of Iowa Jeff Porter, Rob Latham, Rob Ketterer, Rob Chametzky, and Laird
Addis all introduced me to the challenges and rewards of diverse scholarship and composition. The same is true of Craige Roberts, whose support and encouragement during my time at the Ohio State University are appreciated still. Not least, from Lewis Central high school, I thank Wilson Forbes and Larry Mateyow, my shop teachers.

I appreciate the support of Revere high school colleagues Michael Ayers and Debbie Aldrich, who were also writing dissertations, and Gary Lindsay and Kara Asmussen who encouraged us. I thank Mary Wilcynski and Ralph Plagman, who allowed me time and space for research.

My first work in technical theater came from Heartland Scenic Studios, in Omaha Nebraska. In particular I fondly remember Howard Beals and Amy Matthews, who introduced me to the possibilities of imagination, composition, and expression integral to tech work.

I write in my conclusion that the theater technicians at Lincoln high school do spectacular things. I’m privileged to have worked with them. Techies rule.

I am also blessed with family, both new and old. Foremost is Elizabeth Schott. I may have finished this dissertation without her, but I certainly would not have been happy doing so. I’m thankful to my parents, Marjorie Schott and Charles Schott, teachers themselves who raised kids who value and practice both scholarship and carpentry. On numerous occasions my brother Joe told me not to quit. My sister Mary was a wonderful editor. And my brother Eric is the subtext of much that is written below.
ABSTRACT

If not ignored completely, the body has been under theorized in literacy research. However, recent research in cultural studies, linguistics, philosophy, psychology, neuroscience, education, and the arts suggests that the body is implicated in thinking and knowing as well as doing. In this dissertation I examine high school technical theater. In this robustly embodied activity students build sets, rig lights, and paint backdrops in preparation for a theatrical production, as well as run sound and lighting and perform scene changes during the production. I use data from high school technical theater to explore the body in literacy, embodied learning, collaboration, composition processes, and experiential learning.

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I used theories from art making and multimodal literacy to examine technical theater building projects as examples of composition. My findings show that the design of technical theater texts – e.g. props, scenery, lighting – emerges through a recursive process of creation and interpretation and is mediated by the technicians’ knowledge of building techniques and materials. Situated learning and activity theory were used to analyze learning in the technical theater community. Results demonstrate that the structure of the community allows for learning through experience, apprenticeship, and collaboration as well as through the creation of texts that balance personal expression with collaborative enterprise.
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CHAPTER I
INTRODUCTION TO THE STUDY

For all of my life that I can remember, I have watched my brother Eric using tools, building things, taking things apart, fixing things. Eric is a skilled abstract thinker – he majored in mathematics in college – but since the time I began devoting time to understanding how thinking worked it has been clear to me that Eric’s thought processes were significantly impacted by the tools he had in his hands. I used to say that he thought with wrenches. I had been getting settled in my first job as a language arts teacher at Lincoln High School\(^1\), and worked for a while building sets for the school plays with my friend Linus, the technical director for Lincoln’s drama department, when I noticed that the students who helped build the sets used wrenches, too. In fact, they used all sorts of tools and built magnificent sets for the plays. I saw them work their way through building problems with tools in their hands, and I saw them teach each other to use those tools. It occurred to me that they were working collectively on an enormous literacy project, creating a physical space out of construction materials that both interpreted a play and helped to complete it during performances. They had tools in their hands and were engaged in learning that stood largely outside the traditional school curriculum. I thought of my brother and how he thought, and wondered if these student technicians also thought with wrenches. And if they were thinking with wrenches, they were learning with wrenches, and I wanted to be able to understand how.

Strike: A Politico-Personal Anecdote

“How was it you got roped into this, too?”

“Well, you know: weak mind but strong back….”

\(^1\) “Lincoln,” as well as every other name in this work is a pseudonym. To the extent possible I have asked participants in the study to choose the name I use for them.
The second man trailed off, either unable to complete the thought or satisfied that he had said enough for it to complete itself. The first man finished his stroll towards the second and the two stood, rocking on their heels and looking around. I was on my knees twelve or fifteen feet away, removing screws that attached a sheet of plywood to the floor. I had been more attuned recently to exchanges like the one between these two men, one of whom was later described to me as a “financial advisor” and the other of whom was said to “work at Acme,” the international aerospace engineering company that employs hundreds of people in our town, including many parents of students at Revere High School, where I transferred after three years at Lincoln. I had been keeping an informal record of these comments, the context in which they happened, and my best guesses as to the intentions of the speakers.

The second man was entirely correct from the perspective of pragmatics and the conversational etiquette of self-deprecating humor; he had no reason to finish the thought. To do so would only have served to draw out a conversation the point of which had already been made so pervasively that the complementarity of intelligence and bodily work has become idiomatic. ‘Strong back~weak mind’ idioms assert more than the assumed dichotomy between physical and intellectual labor; they endorse an underlying ontological separation between mind and body. I do not know if these gentlemen were contemplating metaphysics as I was; further comment on their part would have detracted from their enjoyment of rocking back and forth on their heels while they watched the rest of us work.

The men and I were not alone at the time. Another dozen or so adults and twice that many students were busy all around us in the theater, striking – that is, taking down – the set from the play that just ended its production run an hour or so earlier. In another hour, strike would be over and the entire set would be disassembled, its parts put away or thrown away as the case may be. At the moment I was pulling up the light brown stained wooden floor we had installed over top of the black theater floor to create the illusion of a
building interior for the play. A few students were also doing what I was. Others were
taking down set walls, taking apart large props, storing smaller props, pulling nails out of
dozens of wooden pieces, unwiring scenery porch lights, climbing around in the scene
shop fifteen feet off the ground on two extensive sets of shelving used to store parts, and
everywhere I looked someone was carrying something somewhere. The theater was
bustling with good natured activity, adults eager to go for drinks as arranged earlier, kids
excited but exhausted from the show and eager to get away from school and head off to
the all-night pancake shop.

I decided to intrude on this collective good will. “Actually,” I said looking up at
the two men, “my dissertation is on the thinking and learning that goes on when we work
with our body.” After a pause, I added mildly, “Like in technical theater.” I was being a
jerk, and I knew it. They were less sure, but look like they could be convinced. And
actually, they were pretty good guys, parents pitching in and helping out with their kid’s
school project, late on a Saturday night. It was also social time for them and perhaps I
should not begrudge them their good humor at labor’s expense. They had seen me only a
few times and I was still a bit of an enigma to them, a long haired, scruffy man in heavy
boots and stained, patched denim work clothes amid their polite conversation, casual
work, and loafers. They were used to having good relations with the theater department,
the performing arts department in general, and indeed the school as a whole. They knew
I am associated somehow with the drama department, but were not sure in what capacity.
They looked down at me, then across to each other and awkwardly smiled, commented to
one another that they should get back to work, wandered off without bothering to ask me
what a high school student could possibly learn crawling around on the theater floor.

I am noticing more and more lately as I think about learning, literacy, technical
theater, thinking, and embodiment that I do begrudge them their little joke. For me, it is
not just political. It is personal as well. Growing up, my family was in the middle class,
if not entirely comfortably so. My folks stretched themselves thin for the house in the
suburbs and the commitment to send four kids to college. We had a strong do-it-yourself ethic that derived at least in part from the need to economize. My father, grandfather, brothers and I built, remodeled, and repaired things ourselves, and I daresay we felt a certain understated pride in not having to hire experts. Family lore had it that Grandpa, a generally cheerful man, spared no ridicule or contempt for the “master carpenter” he had hired (well before my birth) to make the precision cuts for his garage rafters; the hired man measured them wrong.

Master carpenter was my title at Revere as this strike unfolded. It is a traditional theater title, close to technical director and even closer to gaffer. Like many young adults, I paid for my part of my college expenses working with my hands. For me, it was at cabinet shops, farms, and construction companies, but unlike many people I enjoyed the work and found it intriguing. Later, I worked at Heartland Scenic Studios, a small theatrical production company where I first learned, entirely by accident, that there was such a thing as technical theater. Later still, I found myself on the theater floor at Revere high school.

As there were several of us pulling up the floor, sheets of loose plywood were cluttering up the theater. Two students were carrying the sheets to the shop for storage. This was half-inch thick plywood, a size that I generally prefer to carry by myself as it is not particularly heavy, at less than 50 pounds per sheet (APA, 1997) and the job goes twice as fast if everybody carries a sheet alone instead of with a partner. The two young men carrying the plywood had been actors in the play. I knew them only slightly. They were both in Revere’s top level, award winning show choir, were high school seniors, able bodied, fit. I suggested to them that they could each carry a sheet by themself, and they balked, continuing to carry one sheet between them. Turning my thoughts from metaphysics, I tried to interpret this as I worked. The explanation I settled on was that although they were both clearly capable of carrying, and I dare say easily carrying, a whole sheet on their own, they did not entirely understand this, mentally or physically.
Although they put their bodies through rigorous workouts as part of their dance and show choir practices, I do not think they understood their bodies well enough in this plywood carrying situation to know that they were easily capable of carrying the shape and weight of a sheet of plywood. One thing a person could learn through technical theater was new uses, new deployments, of his or her body.

Other explanations – that they assumed that it was easier the way they were doing it, that they were better able to talk to a friend if working in partners, that they had never given any thought to how to carry something and were not about to start now, that they thought they had an easy job and so were going to drag it out as long as possible – occurred to me as well. None of these exclude my preferred explanation, however.

In further support of my preferred interpretation I offer this: I originally suggested they carry the sheets themselves because of the difficulties they were having in carrying a sheet in tandem. Every time they lifted the 4x8 foot rectangle of plywood, they had Laurel & Hardy sorts of difficulties. They lifted the sheets up flat (like a tabletop) and would then try to rotate them so that the four foot span was vertical. They ended up crossing their arms one over the other, or standing on opposite sides of the sheet making it difficult to walk smoothly, or they had their hands ill positioned when the sheet was turned and they dropped it. They ran into things when one person had to walk backwards, and failed every attempt at the lead person turning around to walk forward while still lifting the piece. Watching them was wearing me out. I called up some concise instructions – get on the same side, hold it from the bottom with just one hand, lean it over onto your shoulder – which they considered briefly before ignoring. Ultimately they decided to carry the sheets in the tabletop position that was easiest for them and most difficult for the others in the crowded theater who had to move around them.

I thought back on the conversation I had heard earlier and the strong body~weak mind association. These young men were academically talented. From watching them
work on homework on previous days I knew they were both in Advanced Placement (AP) Literature and Composition, and AP Physics. At least one, and I believe both, was in AP Calculus. In short, these were guys who had decent reasoning skills and knew basic geometry. In these two students I observed strong bodies and strong minds, yet ones that seemed almost entirely disassociated from each other. These bodies could put on 30 minute dance routines in show choir and these minds could solve differential equations and analyze the themes in *Hamlet*, but these young men displayed remarkably little aptitude for figuring out how to make a simple mechanical task easier on themselves, let alone on others. While the strong body–weak mind comment had gotten to me on a personal level, it was also, of course, political. Such comments reflect values that are so widespread as not to be questioned, at least in casual conversations, at least among adults with lucrative white collar jobs. And these values affect and are reflected in both what gets taught and how teaching happens.

With so much implicated in those simple comments, it is worthwhile to examine the assumptions that underlie them. One is that there is a strict dichotomy, an either/or divergence between mental work and bodily work. A further assumption is that physical work is equated with intellectual simplicity, the ‘weak mind.’ Whether one accepts that dichotomy, it further corresponds to a division between good work and bad work. Physical work is bad work; one gets ‘roped into it’ – an interesting physical metaphor. Intellectual work therefore is the preferred work and comes along with more pay, more respect, and more subsequent opportunities (Crawford, 2009).

While not all the history of thought fits the same mold, the predominant western philosophies have supported distinctions similar to these, and these thoughts have been incorporated into education and educational psychology. Since at least Descartes’s original “*je pense, donc je suis*” (Descartes, 1637 / 1994) and more famous, “*cogito, ergo sum*” (Descartes 1644 / 1975), and even as far back as Plato (Lewis, 1993), the status of the body in education has been relegated to a place a distant second to that of the mind.
The appeal of the rationalist and empiricist progeny of Descartes to the fledgling sciences of psychology and education in the late 19th century helps to explain the limited role of the body in education throughout the 20th and now 21st century. With Descartes as its philosophical touchstone, the tradition of mind-body dualism is as prevalent in education as in culture. I maintain that this is an illusory distinction, but one that these well-educated white-collared men are happy to reinforce. It runs hand in hand with the assumptions they make about good work and indeed good minds, a set of assumptions that given their occupations seems to have worked out well for them. It is an as yet open question how those assumptions work in the life of laborers, tradespeople, and those of my technical theater students who do not excel in traditional classrooms.

Fortunately, these assumptions have recently been called into question, even for students who do excel in traditional academic classrooms. Crawford (2009) describes his work experience, as a construction laborer and electrical contractor as he worked his way through college, and as a think tank director and motorcycle mechanic following the completion of his doctoral work in political philosophy at the University of Chicago. In between these, he worked writing abstracts for journal articles, toiling at what he called “intellectual factory work.” Work at the intellectual factory is driven in part by advances in computer and electronic communication capabilities, and as such is a fairly recent development. In their extensive biographical surveys of occupations in the United States, neither Ginzberg and Berman (1963) nor Terkel (1974) include anything resembling the work described by Crawford. Certainly both Ginzberg and Berman, and Terkel describe occupations more and less physically involved and that are considered more and less intellectually challenging, with a preponderance of prestige and salary going to those jobs that are less physical and, the assumption follows, more intellectual.

Providing an update on this situation, Crawford (2009) argues that the prestige accorded to white-collar work has become out of balance with the utility, compensation, and satisfaction garnered from the work. Ultimately, Crawford preferred working as a
motorcycle mechanic. However, as he points out, the work is not mindless but requires a high level of esoteric literacies, analytical thought, evaluation of problems and possible fixes, and experiential knowledge along with skills with tools and one’s body. And the pay isn’t bad.

Crawford is not the first to analyze the assumptions about the skills and intelligence required of workers. Braverman (1975) confronts the idea of the de-skilling of American manufacturing workforce. Responding to ongoing implementation of Fordism and general offshoots stemming originally from Frederick Winslow Taylor’s theory of scientific management (Taylor, 1919), Braverman argues that in order to increase profits, industry has tended to foster repetitive, assembly line methods of structuring labor in which workers perform fewer tasks more often. Subsequently, because workers do fewer things, they need less training and they do not develop the large set of skills associated with performing a wider range of jobs. These less skilled workers earn less and because they are easier to replace, they are easier to fire.

The idea of an easily trained, easily replaced workforce closely parallels the assumption that physical work is mindless labor, the corollary being that a lot of thinking is required to make it that way. This assumption is not new; Taylor himself wrote in support of it. Speaking of workers handling material in the iron industry he writes, “This work is so crude and elementary in its nature that the writer firmly believes that it would be possible to train an intelligent gorilla so as to become a more efficient pig-iron handler than any man can be” (p. 39). Apparently, the small capacity for thought that elevates the workman above the great apes serves only to interfere with his capacity to work efficiently. Yet, while the factory workers are not only deskillied but also dehumanized by Taylor, it turns out that the scientific managers possess a deep and penetrating intellect:

…it will be shown that the science of handling pig iron is so great and amounts to so much that it is impossible for the man who is best suited to this type of work to understand the principles of this
science, or even to work in accordance with these principles without the aid of a man better educated than he is. (Taylor, 1919, pp. 40-1)

“The man best suited for this work” is clearly that same man, strong in back and weak in mind, that the adult volunteer was aping in the scene described above². Taylor takes a man named Schmidt, a stammering iron worker with a stereotypical Eastern European accent and difficulties following a simple conversation, as his prime example of the trainable human gorilla. Taylor recounts the following conversation as an example of how to fixate a “mentally sluggish” worker like Schmidt on earning 60 percent higher wages and not on the 400 percent workload required to earn them:

“Schmidt, are you a high-priced man?”

“Vell, I don't know vat you mean.”

“Oh yes, you do. What I want to know is whether you are a high-priced man or not.”

“Vell, I don't know vat you mean.”

“Oh, come now, you answer my questions. What I want to find out is whether you are a high-priced man or one of these cheap fellows here. What I want to find out is whether you want to earn $1.85 a day or whether you are satisfied with $1.15, just the same as all those cheap fellows are getting.”

“Did I vant $1.85 a day? Vaz dot a high-priced man? Vell, yes, I was a high-priced man.”

“Oh, you're aggravating me. Of course you want $1.85 a day every one wants it! You know perfectly well that that has very little to do with your being a high-priced man. For goodness’ sake answer my questions, and don't waste any more of my time….”

It is clear from Taylor’s description that Schmidt is barely capable of carrying pig iron and not judging how best to do it. It is also fortunate for Taylor and his scientific

² Ginzberg and Berman (1963) tell a similar, though much more sympathetic story, of Toné Kmet, a Slovakian steel worker at the turn of the twentieth century, whose job was also moving heavy materials. Somewhat resembling Steinbeck’s Lenny (Steinbeck, 1994), Toné was strong enough to do the work of two men, and fascinated but confused by his eventual pension check.
managers that such talk does distract Schmidt from considering his value as an employee, otherwise Schmidt might conclude that carrying an extra 35 tons of pig iron a day was not worth the 70 cents, and Schmidt’s increase in efficiency will be required to fund this new managerial class:

The development of a science, on the other hand, involves the establishment of many rules, laws, and formulae which replace the judgment of the individual workman and which can be effectively used only after having been systematically recorded, indexed, etc. (Taylor, 1919, p. 38)

Even if we were to believe his assessment of the much maligned Schmidt, Taylor goes further and universalizes the issue:

And the further illustrations to be given will make it clear that in almost all of the mechanic arts the science which underlies each workman’s act is so great and amounts to so much that the workman who is best suited actually to do the work is incapable (either through lack of education or through insufficient mental capacity) of understanding this science. (Taylor, 1919, p. 41)

I quote from Taylor at such length as the *locus classicus* of the industrialization of these beliefs and also to underscore the point that the advocacy of outside experts and the ascendancy of science over practical experience fosters the perception among the audience of *Scientific Management* of the deficiencies of their workers. It also advocates working environments where laborers are not encouraged to make discoveries from their experiences about their own work for themselves, nor are they allowed to act on any discovery they might make. Coupled with the more general presentation of the industrial workers from Taylor – a lazy, slovenly, dishonest bunch whose ignorance hurts themselves as much as it does their employers – the mindlessness of physical labor and the strong back–weak mind assumptions have become entrenched.

It is important to note a distinction. Taylor allows for the possibility of education to teach the fellows like Schmidt “the science which underlies each workman’s act,” but the meaning of science here is clearly the sort of training available to the intelligent gorilla, the ability to perform the job in the scientifically approved manner. Of course
Taylor admits people working at a job can be taught; his programme is telling management what to teach labor.

Examples of successful teaching abound in my own experience. The night of the strike, as I was taking up the floor we had built atop the stage, a handful of students were pulling nails out of various pieces of this flooring. Due to a lack of claw hammers, some of the students were using pliers – overall haphazardly, and frequently entirely ineffectively, by gripping the nail with the pliers and trying to pull it straight out. This was despite the fact that they all were acquainted with the principles governing the different types of levers as taught in science classes in middle school. I demonstrated a few techniques for them, ways to hold a nail in the jaws of the pliers, use the curved edge of the pliers as a fulcrum and pivot the tool in a manner to provide adequate leverage to fairly easily remove the nail. Some took to it, although I admit others did no better than the students carrying the plywood.

This is all the ground I can share in common with Taylor, however. Pliers come in a variety of shapes and sizes, and I did not demonstrate how to use all of them. Nevertheless, once savvy to the application of leverage with pliers, the students who took to using them applied their knowledge to different shaped pliers that required different ways or twisting or rocking or rotating to best remove nails in a variety of circumstances. In short, contra Taylor and the mindlessness of labor, they readily learned the science, understood it, and made it their own through individual application.

Others have also found fault with Taylor’s work. In one example, a recent article in The Atlantic (Fishman, 2012) tells a story of laborers that contrasts Taylor’s. In it, Fishman explores the return of previously outsourced manufacturing jobs to the United States, citing the example of General Electric’s American production of refrigerators, dishwashers. In particular Fishman discusses a high efficiency water heater, manufacturing of which has recently returned from China to its GE’s Appliance Park facility in Kentucky, reporting that having design staff work together with production
staff solved numerous production problems, reduced materials costs, reduced manufacturing time, and increased the energy efficiency of the appliance. In short, the hands-on workers helped correct problems created by the hands-off product engineers who had designed the appliance in the abstract but who had not themselves built it.

This leaves open the question of what to make of the young AP students struggling with carrying plywood. Lazy and slovenly? I confess a certain – temporary – disposition to agree with Taylor on this count, but would also point to the inadequacy of academic, even scientific, intelligence to help them solve their problem. I have known many workmen with less education who have carried heavier loads better. Other accounts, in addition to their unfamiliarity with using their bodies for this type of work, came to make more sense to me: They were actors, not theater technicians, and having finished the play they did not have much ownership of the cleaning up afterwards; their association with the technical theater community was at most marginal and with no esprit de corps they were lukewarm on helping the technicians; whereas the students using the pliers to pull nails had been failing completely, the plywood boys were in fact getting their job done, albeit slowly, and in their excited and self-congratulatory mood following their performances may not have been ready to learn something new – especially from someone like me who they did not know and who did not bother to explain it really all that well. In retrospect, I am open to the possibility that they did in fact discover the method of carrying the plywood that suited them best, only one of their objectives being to carry plywood.

This scene took place at Revere, where I worked as a teacher in the English / language arts department and as the assistant technical director in the drama department. Other than this scene and a few casual observations and comparisons, Revere is not the site of my research. My research took place at Lincoln High School, one of Revere’s cross-town rivals. I do not think a scenario as described above would happen at Lincoln. The technical theater community is too different. There are more students with active
long-term engagement in technical theater at Lincoln, a general breadth and depth of knowledge and skills, experience and enthusiasm that Revere lacks. Fewer parents participate at Lincoln, and parents that do participate are more likely to work as tradesmen and –women in their daily life. While I am confident that the attitudes discussed above exist in the larger community at Lincoln, those parents who do volunteer – two regular, long-term volunteers in particular – do so because they enjoy the work, both building and teaching. Frequently they function as informal assistants to the technical director and informal mentors to the students. The spaces of the theater department – the stages, the scene shop, the light booth, the lofts – are seen as learning environments, no more so by the actors and drama director than by the technicians and Linus, the technical director and his wife June, the artistic director.

**Defining Technical Theater**

“Technical theater” is a broad term covering a collection of activities necessary for the production of a play. Minimally, this includes building and painting sets and finding or making props (Campbell & Knekt, 2004). Although easily stated, these activities are potentially complex and may involve working with a seemingly endless variety of materials including wood, plastics, rigid foam sheets, spray foam, structural steel, wire mesh, cloth, paper mâché, or PVC pipe to list some common ones. In such a list, items like “wood” are themselves cover terms for a number of distinct materials such as dimensional lumber, plywood, engineered lumber, Masonite, etc. “Working with” is another easily used term that covers a range of complex activities that typically include manipulating materials using common tools such as hammers and nails, drills and screws, adhesives and clamps, saws of various kinds, or knives and chisels, as well as more specialized tools such as foam cutters and coffin locks, all of which tools can be used in a variety of ways to achieve a range of effects.
These effects can be structural or artistic and are guided by a number of concerns, on the one hand practical and on the other hand more literary or semiotic in nature. Practical concerns include evaluation of the suitability of particular building techniques and materials for creating a desired structural effect, i.e. if I build it this way out of this stuff will it fall down? Literary concerns include determining the appropriateness of particular effects to the text of the play, i.e. if I build it this way will it look like it is described in the written text of play. Semiotic concerns (Kress & Van Leeuwen, 2001) include aligning effects with interpretations of the play, i.e. if this castle is supposed to be old and spooky, will it seem old and spooky if I build it like this. While it is possible to think of them as analytically distinct, these concerns and effects are inseparable in practice where completed projects need to be both structurally sound and aesthetically pleasing. This interplay between the structural and artistic is evident in most building projects in the production of a play, and technicians evaluate and reevaluate as work progresses. These concerns also are relevant in technical theater activities other than building projects.

While building sets and props are the most obvious production activities prior to play performances, other pre-performance activities are equally important and sophisticated. These include costuming, rigging lights and microphones, and programming light and sound cues. Rigging lights itself involves hanging, focusing, repairing, and applying colored filters to multiple sizes and styles of lighting fixtures, and requires knowledge of safety procedures, electrical wiring, and the unique properties of the electrical system of the theater space, as well as proficiency with a range of tools some of which are specific to light rigging. Costuming and sound work are similarly involved (Gillette, 2005).

Production work in technical theater, as is apparent in this brief description, can be extensive and elaborate, requiring extensive skill sets in diverse areas. Technical theater also includes another entire set of activities that take place during the performance
of the play, beginning with lowering the house lights and raising the curtain at the beginning of the show (Kaluta, 2003). During the performance theater technicians will run spotlights, change lighting cues, play sound effects, manage small props to ensure actors have them when they need them, move scenery on and off stage, occasionally repair damaged props or equipment, and run special effects equipment such as smoke or snow machines. Technicians involved in the production work participate in the performance vicariously through their material creations, by having the props they made on stage, whereas technicians working during the show are themselves participating in the performance along with the actors.

High School Technical Theater

Compared to high school technical theater, in professional technical theater there is a greater degree of specialization, with technicians working primarily as carpenters or electricians, for instance (Lawler, 2007). At Lincoln High School, the site of my research, student technicians tend to work in multiple areas, some in which they have developed expertise and others in which they are novices. This is true in both production work and performance work. More technicians work in the preparation for a show than work during the show itself. Most of the technicians who work during the show have also worked during the production phase preparing for the show, although not necessarily in a similar area. For instance, an expert carpenter might end up running a spot light. Following this brief introduction, I continue to provide details of the roles of technicians at appropriate moments throughout this dissertation.

Before addressing the relevance of technical theater to literacy studies it is important to consider the ways in which technical theater is enacted as an activity in the school setting. While describing the multiple facets of technical theater itself begins to illuminate the complex physical and intellectual demands of the activity, it does little to explain how students and teachers engage with each other in the course of the production,
the roles the student take and the role the teacher plays in creating the space in which this happens.

Professional theater companies have a technical director who, among other things, is the supervisor of the theater technicians (Lawler, 2007). Not all high schools are fortunate enough to have a technical director\(^3\). In high schools that do, he or she is typically a teacher at the school, frequently a member of the language arts staff. As the technical director will determine the conduct of technical theater activities, his or her beliefs about both appropriate pedagogies and what it is possible to learn in technical theater will shape what students are asked or expected to do in their role as technicians. This surely varies, just as work in any two classrooms, offices, or factories varies. For my purposes the conduct of technical theater, what the students are doing and thinking, is important because it reflects the learning opportunities available to them.

Themes of this Research

In this section I introduce the concerns that most influenced me as I undertook this study. Many of my concerns are specifically educational, involving general theories of learning and pedagogy as well as more specific interests in composition and literary interpretation. Before addressing those, I briefly turn to the background of the body in education to help contextualize the relevance of the anecdote that began this chapter.

Mind and Body in Education

The fundamental problem motivating this research is that the body has been largely ignored or devalued in the intellectual traditions that have had the most impact on education and cultural values of work. Lewis (1993) provides an overview of the traditions and trends of thinking about the body, beginning with Plato and continuing

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\(^3\) See Williams (2003) for a discussion of which school personnel are likely to have technical director responsibilities for school musicals.
through Hirst (1975), noting that successive movements have devalued it in turn. I explore the theoretical background of the body along with related issues in more detail in the next chapter; my goal here is to provide an overview of the problem.

Lewis argues that “the meager existence of practical arts subjects in the curriculum comes about as a result of the persistence of the Platonic ideal of what constitutes valid knowledge” (Lewis, 1993, p. 175). The implications of devaluing the body in education have taken many forms. Pedagogy has been conceived without acknowledging the basic biological fact that we and our bodies are inseparable, that all learning is in fact embodied learning. This has meant that predominant recent pedagogies have not been based on experiential learning (Dewey, 1938) but instead have trended towards psychological theories such as cognitivism or constructivism (Wenger, 1996). This has coincided with a view of valid knowledge as abstract, symbolic, and propositional. Pairing pedagogical models that conceive learning as individual processes of internalization with conceptions of knowledge as possession of abstract information has an inescapable tendency to not recognize the work of the body or the fields in which that work is likely to take place. Lewis (1993, p. 180) quotes analytic philosopher and mathematician Alfred Whitehead (1929) on Plato’s legacy in education:

> An evil side of the Platonic culture has been its total neglect of technical education as an ingredient in the complete development of ideal human beings. This neglect has arisen from two disastrous antitheses, namely, that between mind and body, and that between thought and action. (p. 77)

In practical terms, this has been reflected most often in the separation of learning into two tracks, a highly regarded academic track and a less regarded vocational track (Rose, 2008). Lewis, a scholar whose research focuses on vocational education, explores
this in numerous articles mentioned throughout this dissertation\textsuperscript{4}. It is important to note that technical theater is not vocational education, although many similar concerns apply.

Rose (2004) takes a broader view of hands-on or physically involved labor. This is fortunate as his work provides an introduction to understanding the complexity of such work and the ways in which literacy is embedded in it. Experiential learning, physical skills, the integration of multiple sources of knowledge and information, and the development of thinking skills through on-going processes of problem solving are all evident in his work, although (Rose, 2004) does not endorse any specific learning theory.

**Learning Beyond the Mind**

Taking the treatment of the body in education at my initial theme in this work leads directly to learning theory as the second theme. In order to properly value the body a theory of learning that accommodates embodiment is clearly required. The availability of the work of Vygotsky (1978, 1986) has spurred an interest in what I loosely term social or sociocultural theories of cognition that hold social interaction to be a key element of learning and development, thereby dislocating knowledge from the minds of individuals (see Wertsch, del Rio, & Alverez, 1995 for an overview). A number of learning specific theories have derived from this. Of particular interest to me are situated learning (Lave & Wenger, 1991), activity theory (Engeström, 1987, 2001), and community of practice theory (Wenger, 1998) because they build on Vygotsky’s premise by focusing on activity, or embodied interactions among people, objects, and environments, as key components of learning and knowing. Although different in scope and formulation, these theories are united in holding to the tenet that knowledge is not

\textsuperscript{4} See Bowman and Powell (2007) for a parallel discussion of the body from the perspective of music and music education.
possession of abstract disembodied propositions about the world, but rather the ability to act meaningfully in the world.

These theories are useful to me because they directly address several of the themes of this research. My data makes apparent that learning in technical theater takes place through participation in the regular activities of the technical theater community. Very little overt instruction takes place and when it does it relates directly to the immediate goals of the community. This type of situated learning (Lave & Wenger, 1991) is pervasive in technical theater at Lincoln High School. At the same time, learning this learning takes many different forms and emerges from different ways of participating in the community.

Situated learning is not a unitary concept; Lave and Wenger (1991) explore multiple approaches to it. These include multiple forms of apprenticeship; legitimate peripheral participation, Lave and Wenger’s term for participants being able to contribute meaningfully to the goals of a community; collaboration in many different configurations; and experiential learning or learning by doing. These kinds of learning are similar, and the theories mentioned are related in that learning is not merely a disembodied cognitive process. Rather it happens as a function of acting with one’s body to participate in the world, engaging with others and the environment.

Learning Through Composition

As a literacy researcher, a language arts teacher, and theater technician, I am interested in composition. Composition in technical theater takes multiple forms. The texts are complex and physical, using multiple modes of representation such as the visual and spatial and incorporating these into the text of the written play. Creating props, or multimodal texts (New London Group, 1996), allows for technicians to interpret the play and design meaning. While some of the work of technical theater is useful to the community without being especially creative (e.g., sorting items in the hardware cabinet),
some of the work is similar to composition that might occur in art classes. Such composition provides additional learning and expressive opportunities.

Some examples will clarify these points. In Chapter Six I discuss two students – actors working as technicians – who make small, personal props that they will use in upcoming performances. These props had to be created within certain parameters, i.e. they had to fit with the characters and the show. At the same time, the students making the props had considerable latitude to make the props in ways that appealed to them. As these props were important to the characters in the play, and playing those roles was important to the students, the props took on special significance to the builders. This allowed them an opportunity to compose an authentic text that would be made public in their performances. The texts – a lollipop and a slotted spoon – reflected the idiosyncrasies the students caused to be represented in them, but also served as elements of the entire performed play, thus contributing to the meaning of the whole.

As means of interpretation, the lollipop and slotted spoon were relatively straightforward props. Other props, for instance the bookstand discussed in Chapter Five, required sophisticated interpretation by the technicians building it. In the play, the prop is brought out at a dramatic moment and used as a means of characterizing the character who in the plot of the play created it. Because the technicians had freedom to build it as they wanted, they were able to make personal interpretations that contributed to the overall text of the play. Moreover, their learning process does not end with the construction of the prop, but also to include interpreting the prop as it is used in the play, a complex interaction that involves their composition, the performance of the actors, the background of the character in the play and the audience reaction to the prop.

The term composition deserves consideration. In technical theater (and art) composition incorporates multiple ways of representing information with knowledge of materials, techniques using tools, and physical skills. Frequently composition projects require complex problem solving to integrate all of these elements into a usable product.
Rose (1999, 2004) discusses the challenges to combining these elements and following Rose I am interested in the learning that emerges.

Learning and Community

I have mentioned multiple ways that learning in technical theater can occur, for instance through composition, problem solving, experience, or direct instruction. I have also described learning in technical theater as an emerging from meaningful participation in the community. The relation between the activities that are likely to lead to student learning and the way the routines of the technical theater community are structured to provide opportunities for those activities is the primary concern of technical theater pedagogy. If certain activities are likely to provide powerful learning opportunities, the pedagogical goal of a technical theater teacher is to create an environment in which those opportunities arise. Having observed the learning at Lincoln, one of my goals as a researcher was to investigate how Linus structured participation to create that environment.

I use two approaches to explore this theme. The situated learning theories mentioned above are uniquely suitable to an analysis of learning in technical theater. By analyzing activities in terms of their constituent elements – participants, participant roles, goals, rules, artifacts, outcomes – activity theory (Engeström, 1987, 2001) is particularly useful for exploring isolated interactions that reflect on community behavior.

Gee (2004, 2005) approaches situated learning through the concept of affinity spaces, real or virtual locations that draw people together. Technical theater at Lincoln would be one such space. Gee posits affinity spaces as a corrective for earlier community based learning theories, and while I do not find his formulation entirely suitable for technical theater, Gee does provide an explicit list of affinity space concepts that are also shared by other similar theories. These principles include participation in a common endeavor, novice and veteran members working together, the value of tacit knowledge,
and multiple routes to participation. All of these are aspects of participation in technical theater at Lincoln that may not be valued in traditional classrooms. I choose to use Lave and Wenger (1991) instead of Gee’s work because I find it provides a better account of learning by doing and collaborations, two important aspects of technical theater. While there is little emphasis on direct instruction, collaboration both among students and between student technicians and adults is prevalent.

Technical Theater in High Schools

Technical theater, a venue of constant physical activity largely outside the traditional school curriculum and pedagogy, is an obvious site in which to explore these theories. Drama in education more generally would seem like a good substitute for the study of embodied learning should technical theater be unavailable. If at times I seem to shamelessly occupy the role of technical theater advocate, I do so because technical theater needs one. The paucity of research in this area deserves some comment.

Citing Dissertation Abstracts International (DAI), Wagner (1998) reports that between January 1994 and September 1997 there was a total of 37 doctoral dissertations in various educational drama areas, as compared to 7,776 in reading and 7,963 in writing over the same time period, or about two tenths of one percent as many. These numbers surprise me because as a teacher I have always considered drama to be a prominent part of the high school curriculum, but in fact DAI has no subject heading for drama education or theater education.

In March, 2013, a search of DAI spanning the previous ten years revealed that Williams (2003) is the only abstract on DAI that contains the term “technical theater.” Williams’s work poses a sort of chicken and egg quandary: is there no research on technical theater because there is not much technical theater in high school, or is the lack of technical theater in high school a reflection of the fact that nobody finds it important enough to study? The focus of Williams’ research is in fact not technical theater, but the
high school musical, or more specifically the preparation of teachers to produce high
school musicals. Williams reports that most music education majors have no preparation
in technical theater but that many are likely to need it when they produce the school
musical.

Williams (2003, p. 26) cites a survey by Nocks (1970) of Ohio schools of greater
than 1000 students. That survey addressed the likelihoods of which staff members would
perform various roles in the production of the school musical:

He [Nocks] made note of the fact that the position of technical
director who he defined as responsible for the scenic design,
construction and lighting design as well, and the position of
costuming design were performed by a member of the production
staff less than half the time. He suggested two explanations for
this; that these “are considered less important than they truly are”,
and therefore no one is asked to do these tasks, or that there is “a
shortage of persons who are both qualified and willing” to do these
tasks and therefore everyone pitched in to do them as well as they
could (Williams, 2003, p. 5).

Williams does not address the first of these possibilities, but does summarize a
later research project by Waack (1983) which surveyed schools associated with the
Educational Theater Association (the educational branch of the International Thespian
Association). Williams reports that, “14.8% had undergraduate course work in Technical
Theatre and Design” (2003, p. 32). It is difficult to draw firm conclusions from this
amount of data, but it points to a lack of technical theater training available in high school
drama departments5.

Taking these two pieces of information together shines particular light on the
backdrop of the present research. The body is devalued, so bodily skills and learning
through the body are devalued. This influences pedagogy and leads to the lower status of

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5 I have come to understand that technical theater is well funded in the school district of
which Lincoln and Revere are part. Lincoln, Revere, and Polk, the third high school in the
district, all have a technical director position in addition to the drama director position. Further,
each school has an assistant drama director and assistant technical director position. All of these
are supplemental positions in addition to regular duties, similar to coaching contracts.
vocational education. Technical theater, though not vocational education, shares the quality of bodily work with vocational education. Technical theater, as a site also of embodied teaching and learning, is devalued, its activities “considered less important than they truly are” and “a shortage of persons who are both qualified and willing” results in technical theater being taught to less than fifteen percent of future drama educators.

While this dissertation can hope to be only a mild corrective to this state of affairs, it is encouraging to note other trends that are emerging as well. There seems to be a renewed interest in the body and hands-on learning in both popular news media (Ashbrook, 2011) and education (Carlson, 2012). Any discussion acknowledging the importance of hands-on work, especially in educational contexts, supports the need to further theorize the body, embodiment, and learning by doing. I aim for my research to be part of that discussion.

Research Questions

Preparatory to beginning this research, the following questions were devised, and during the research provided a touchstone to the origins of the project that helped to guide me as research and analysis were conducted. Before listing the questions, I make an important distinction between my particular research interests in this dissertation and what I have said is the fundamental underlying problem, the disregard for the body in education. In the chapters that follow I analyze students as they learn with and about their bodies. Hands-on learning and learning by doing are central components of participation in technical theater, but embodiment is the context for research and not the central concern. My research questions focus on student learning opportunities in technical theater, how the pedagogy of technical theater shapes those learning opportunities, and the ways in which technical theater facilitates students’ meaning making.
1. In what ways are learning opportunities made available to students in the confluence of hands-on skills, critical problem solving, and artistic interpretation in the technical theatre curriculum?
   a. What learning opportunities are afforded?
   b. How are these learning opportunities constrained?
   c. How do these opportunities align with the learning opportunities available in traditional language arts classes?

2. How does the enacted pedagogy of technical theater shape the kind of learning that occurs during both in school and out of school activities?
   a. What constitutes teaching, learning, and assessment in technical theater? How do these resemble and differ from teaching, learning, and assessment in traditional classrooms?
   b. How do technical theater activities shape the interactions of the students and teachers who participate in them?

3. What processes and resources for meaning making are available to technical theater students? What is the nature of the meanings these students construct?
   a. How are the meanings related to the students themselves, to the written text (the play script), and to the enacted text (the performance) as a whole?
   b. What possibilities for making meaning arise in the acts of hands-on production, critical problem solving, and artistic interpretation?
   c. How do the meanings evolve through processes such as collaboration, iteration, and discovery?
   d. How and to what extent are meanings circulated among theater technicians, actors, and directors?

Chapters and Approaches

Data from this research are presented in Chapters Four, Five, Six, and Seven. Each chapter differs in the type of data examined, themes explored, and the theoretical frameworks used for the examination. In this section I provide a brief introduction to the
data in the following chapters and my approaches to understanding it. I hope this will illustrate my research questions and serve as a preface to the more detailed explanation of the theoretical background in the next chapter. A table at the end of this chapter summarizes the descriptions below.

The data in Chapter Four is drawn from written field notes and concerns primarily construction and learning to use construction tools typical of the scene shop at Lincoln. Among the elements that make this particular instance of building interesting is that it showed the three-way interaction of the text of the play, the possibilities of performance, and the emerging physical environment of the set. Two students and an adult volunteer, who played a mysterious old man in the play, were building a wooden walkway. As it happened, one of the students in this building project was also in the play and, like the adult volunteer, had lines in the play to be delivered on the walkway he was building. Yet more interestingly was the way in which design decisions were made.

Occasionally, in an almost offhanded way, the actors would practice their lines on the walkway as they built it. The physical configuration of the walkway space they were building suggested – or insisted upon – particular deliveries of their lines, e.g., to coincide with walking to a certain point on the path that was being built. Sometimes new possibilities in delivering their lines were embraced, and other times the walkway was reconfigured to allow for different readings. This suggests something about the design of meaning and the interaction of literacy with the physical space, i.e. that the design choices were as much unexpected reaction as they were choice and that the physical and literary contexts of the performances were inextricable in the construction of meaning.

My initial approach to this project is to analyze it as an example of multimodal text composition as initially proposed by the New London Group (1996) and which, employed by numerous researchers since, has become a sine qua non of research on non-print based literacies (Leander & Boldt, 2012). Complications arising from the multimodal literacy analysis lead to other considerations regarding the data. Numerous
skills with tools and design along with methods of collaborating were being used as part of the construction process. How design choices in the construction of the walkway were influenced by the technicians’ knowledge of tool use, and the ways in which lessons on tool use are embedded in both the conduct of the community, and the process of building the walkway are all considered.

As multimodal literacy theory is silent on the topics of lessons, teaching, and community organization, additional theoretical backgrounds are considered, including situated learning (Lave & Wenger, 1991) and activity theory (Engeström, 1987, 2001) to analyze the functions of teaching and learning in the community.

Chapter Five explores a wider range of data, beginning with three vignettes. The first is a lesson from Stagecraft class in which students are hanging and removing stage lights. This is a direct example of embodied learning and I use it to illuminate related concepts. Two vignettes of prop construction follow, in which the projects were physically smaller than the walkway in Chapter Four and the creation involved less heavy construction and more aesthetic designing. These vignettes are analyzed as examples of artistic composition (Beittel, 1972) as well as examples of collaboration.

In the first of these projects, two students with limited experience as technicians were asked to build a bookstand. In the plot of the play Nunsense (Goggin, 1986) the bookstand was made by Sister Amnesia, a comically demented nun. The two technicians were given limited instructions on both what to build and how to build it; the instructions were mostly to the effect that it should look zany and not fall down. In the second project, two other technicians were building a magical tree for the musical Into the Woods (Sondheim, 1987). Their project began with a lesson from Linus about the construction techniques to use and the purpose of the prop in the play, after which the technicians were left to build the prop on their own. In both projects the students collaborated in numerous ways, e.g., on the meanings they wanted the props to have, artistic and structural design decisions, choice of materials, and so on. The processes
through which collaboration took place naturally included talk, but at points surprisingly little, and at other points of a curious nature. Other collaboration happened through the hands-on construction of the piece and seemed to emerge from the experience of working in proximity to each other.

After providing context with these vignettes, the central piece of data in this Chapter Five is drawn from notes and audio recordings of technical rehearsal, the rehearsal prior to the dress rehearsal in which technical aspects of the play are worked out. Technical rehearsal is an intense affair lasting several hours on two consecutive nights, with all cast and crew members in attendance. I focused my observations on the technicians programming the lightboard, a hybrid computer and electronic hardware device that technicians use to run the stage lighting during performances. A number of factors drew me to this activity. They include the intensity of the students’ engagement, aspects of apprenticeship and collaboration among the teacher and students, the integration of multiple skills and literacies such as reading and annotating the play script, reading the technical manual for the software and hardware, using that software and hardware, and negotiating through talk and demonstration the meanings that were being constructed by the lighting. Ultimately, comparisons among these projects as examples of composition are made with reference to the concepts of embodiment discussed in the initial vignette of light hanging.

I draw most of the data from Chapter Six from audio recorded interviews with student technicians, and Linus, the technical director and his wife June, the artistic director. These interviews revisit some of the data reported in the previous two chapters as well as introduce perspectives on teaching, learning, and the value of technical theater from the practitioners themselves. Several new projects or incidents are introduced as well to help clarify concepts from earlier chapters.

Table 1-1 below helps to organize these data along with the themes I have associated with them. Most of the data could be asked to speak to many of the themes, so
there is considerable room for overlap and allowance for that is made in the chapters that follow.

Table 1-1  Major data and themes in Chapters Four, Five, and Six.

<table>
<thead>
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CHAPTER II
THEORY AND CONTEXT

In *Knowing Bodies, Moving Minds* Bresler writes:

The attention to the body has entered the world of scholarship from several directions, including Philosophy, the Social Sciences, and the Arts. The body is conceptualized through multiple lenses, including the Neuro–physiological, the cognitive unconscious, and the phenomenological (Johnson, 1999; Lakhoff & Johnson, 1999), the cultural (cf. Csordas, 1994), and the sociological (cf. Turner, 1996). (Bresler, 2004, p. 7)

In this chapter I provide an overview of some of these traditions – philosophical, scientific, educational – that are relevant to understanding the body and learning. This is an enormous literature. The philosophical research on the body has been developed for over 2500 years, and it is beyond the scope of this work to provide a complete understanding of the traditions involved. Nor is it necessary to do this; the concerns of philosophy are not always the concerns of education. What I hope to demonstrate is the plausibility of certain lines of reasoning or approaches to a topic on the assumption that if a general approach is applicable to my work, however the specific details are worked out will be consistent with the uses to which I put that approach.

In Chapters Four and Five I introduce specific theories of composition, literacy, art making, and learning. These are discussed in some detail in those chapters in reference to the data to which I am applying them, but not discussed in detail here. Instead, I focus here on providing the background and context in which those theories will be applied.

The Body in Education

In this section, I describe in greater detail issues involving how the body has been understood in relation to the mind. Since at least Descartes, possibly even as far back as Plato (Lewis, 1993), the status of the body in education has been relegated to a place a distant second to that of the mind. The appeal of the rationalist and empiricist progeny of
Descartes to fledgling sciences of psychology and education in the late 19th century helps to explain the role of the body in education throughout the 20th and now 21st century. However, while Descartes may be the epitome, or at least philosophical touchstone, of the tradition of mind-body dualism, his tradition of dualism has never been universally embraced in philosophy. A counter-point to traditional mind-body dualism, Husserl’s (1913 / 2002) first works in phenomenology appeared at the turn of the 20th century and influenced the French tradition of phenomenological philosophy, most especially Merleau-Ponty (1945 / 2009; see also Sepp & Embree, 2010). At the same time, and throughout the first half of the 20th century in America, the pragmatist school of philosophy (Thayer, 1982) and most notably John Dewey (e.g. Dewey 1938a, 1954, 1958) was at odds with mind-body dualism. Dewey ultimately argued explicitly in *Experience and Nature* for a naturalistic theory of knowledge stressing the interaction of subjects with their environment (Dewey, 1958). Dewey’s wide-ranging influence in education and elsewhere is clear and fully addressed elsewhere (e.g. Fairfield, 2009; Hickman, 2011). However these parts of his pragmatist philosophy on the nature of mind and body, although evident in Dewey’s thinking on education, did not themselves find widespread acceptance in other branches of philosophy, psychology, or much of mainstream education.

Following the progressive movement of the 1920s and 1930s, and a period of general directionlessness following the Second World War, principles of the “new criticism” found favor in the English curriculum as a way of returning to rigorous academic standards (Santora, 1979). New criticism textual analysis progresses on the assumption that the text itself contains the answer to any relevant questions concerning the text and that those answers could be found through the process of close reading and examination of literary form. As such, it is decidedly linguistic, abstract, symbolic, and disembodied. As Santora described the pedagogy,
The basic method was the question-discussion unit. Class talk would center on ‘Socratic’ dialogues based on the theoretical principles of discovery learning as advocated by Bruner. The teacher would ask questions that would presumably lead to a consideration of the basic form and meaning of a text. The questions were derived from the rhetoric of the new criticism. (p. 40)

In my experience as a high school student in the 1980s, a college student in the early and then late 1990s and as a high school teacher since 2000, the influence of the new critics has remained strong. This is corroborated by Lishan and Hermsen (2007), who also suggest that the influence of the new critics has lasted longer in secondary schools than in post-secondary institutions. However, there have been moments of resistance and theoretical developments that question the disembodied rationalist stance of the new critical approach. In particular, the Dartmouth Conference of 1966 advocated several different approaches, including the use of imaginative response to literature in both oral, written, and – importantly – dramatic forms. Drama or dramatization was seen both as a way of both individual exploration and textual interpretation for dramatic and non-dramatic literature alike (Barnes, 1968). While not adopted widely in the United States, it had a prominent role in the ensuing development of process drama (discussed below) and I see this as at least a symbolic recognition of the value of the body in education.

Outside of education, the emergence in the 1980s of theories of body criticism and of the body in general created the potential for reexamining the relation of the body to education and literacy. Preeminent among theorists in this tradition was Michel Foucault who theorized the body as both explicitly material but also as socioculturally specified in terms of race, class, and gender (Foucault, 1977). In this genre of research, the body is understood as an object to be analyzed, or “the inscribed surface of events” (p. 148) and embodiment is understood as that which is written onto the body. The immediate application of Foucaultian approaches to the body in education follow this template, for instance exploring how bodily habitus is duly inscribed in elementary
schools (Luke, 1992) or even within process drama activities (Styslinger, 2000). Such theories provide a framework within which teaching and learning situations can be analyzed and teachers can reflect on their practice, but there does not seem to be an agenda or even suggestion for improving practice or learning outcomes. Embodiment understood thus seems to have little practical or proactive value to pedagogy; it is a site for analysis but remains silent regarding how the body can be actively engaged in education or any special relationship the body might have to learning or cognition.

Those who have studied labor have cause to take issue with this notion of the unrelatedness of the body to cognition. To open her activity theoretic analysis of work at a dairy processing plant, Scribner emphatically states,

> The enterprise before us – understanding the functional role of knowledge in the everyday world – is haunted by a metaphysical spectre. The spectre goes by the familiar name of Cartesian dualism, which, in spite of its age, continues to cast a shadow over inquiries into the nature of human nature. Cartesianism conceives of mind and behavior as two distinctly different modes of life, each requiring its own terms for description and explanation, each demanding its own method of investigation. Within this philosophical framework, questions about knowledge are referred to specialists of the mind, not to students of behavior. (Scribner, 1985, p. 199)

Scribner’s point is well taken for a study of technical theater. In a Cartesian world, the ephemeral mind is unobservable, but in the real world an observer can see theater technicians thinking on all sides. I do not mean to say just that their thinking is revealed in their behavior or that the artifacts and environment mediate between thought and action. Rather, abandoning the Cartesian mind–body dichotomy entails dismantling the distinction between thought and action. Similar points regarding the interplay of thought, tools, and environment is discussed in other research on work such as Keller and Keller (2008) and Baber (2003). Along with Scribner, Keller and Keller (2008), and Baber (2003) use the concepts of activity theory and activity system (Engeström, 1987) to address the relations among thought, environment, and action. I address activity theory in Chapter Four when I analyze student technicians using power tools.
More recently, developments in cognitive psychology and neuroscience have further served to contest the Cartesian assertion of mind-body dualism. In his review of developments, Clark (1999) concludes, “It is increasingly clear that, in a wide variety of cases, the individual brain should not be the sole locus of cognitive scientific interest. Cognition is not a phenomenon that can be successfully studied while marginalizing the roles of body, world and action” (p. 350). His prediction seems to be borne out, and the interest in embodiment has expanded from cognitive science, with the *European Journal of Social Psychology* (2009) devoting a special issue to embodiment. While literacy per se may not be the field most readily exploring the role of embodiment, other areas of education have taken the topic up. In their discussion of the relation of music to the body, Bowman and Powell best summarize the current thinking:

We cannot continue to think of the body simply as materially given and substantial. The body, we are coming to recognize, is always specific, and always situated – this body, my body. At the same time, bodies are socially and culturally extended. Nor are bodies entities like rocks or trees: they are malleable and fluid. Moreover, bodies are gendered, raced, aged, and variously abled. Once one commits to understanding embodiment in ways that avoid the dualistic portrayal of the body simply and exclusively as material “other” to mind, one is faced with the considerable challenge of illuminating continuities, linkages, and multiplicities. To those ends, our old ways of speaking and their cumbersome (if familiar and comforting) conceptual apparatuses are quite ill suited. (Bowman and Powell, 2007, p. 1095)

The Body and Embodiment

In the previous section, I explained general ways that the body has been understood in education. While a sort of Cartesian dualism provides the context for much thinking about the role of body and mind in education, it is not possible to ignore the body entirely. In fact, alternate traditions and new developments seek to afford some measure of importance to the body. In this section, I describe some alternatives from psychology and from literacy research before considering applications to technical theater in particular.
Embodiment as Multiple Intelligence

In education, the concept most frequently cited in defense of the body was introduced by Gardner in his theory of multiple intelligences (Gardner, 1983 / 2004). Gardner broached the subject of embodiment through his theory of multiple intelligences, which included bodily kinesthetic intelligence. Multiple intelligence theory provides a taxonomy of different modes of thought, including logical–mathematical, linguistic, inter– and intra– personal, in addition to spatial and bodily kinesthetic. While having properties that distinguish them from each other, all of these modes are related by being intelligence.

A wide range of activities are included in kinesthetic intelligence for Gardner, including fine and gross motor control, skilled performances with the expressive body (e.g. acting), and using the whole body or parts of it, e.g. the hands, to “fashion products or solve problems” (2006, p. 8). Applications of kinesthetic intelligence include manipulating objects, creating and interpreting meanings made by the expressive body, and training the body, as in athletics.

Reacting to the popularity of under critiqued multiple intelligence theory, Bowman (2004) writes,

Appeals to multiple intelligence theory have become common currency among educators in the arts, apparently because status as ‘an intelligence’ is seen as a vindication of the educational integrity of artistic undertakings. Unfortunately, ascendency to the status of an intelligence has not been accompanied by a careful examination of what intelligence means. We have become assertive about its plurality, to be sure. But ‘it’ remains more or less the kind of cognitive construct it has always been: abstract, mental, cerebral, disembodied. (p. 29)

Bowman’s critique seems justified to me based on my exploration of the literature. Some of the difficulty may be traced to Gardner’s elaboration of the concepts of intelligence and kinesthetic intelligence in particular. The lead example of bodily intelligence in Gardner (2006) involves the example of kinesthetic intelligence active in a tennis match. Hitting a tennis ball is an example of bodily intelligence in Gardner’s terms, however he
also classifies hitting the ball as problem solving, “the particular computations required to solve a particular bodily-kinesthetic problem, hitting a tennis ball” (2006, p. 10). So, one conception of kinesthetic intelligence involves the precise and accurate control of one’s body, coordinated with response to careful apprehension of external stimuli. The matter is further complicated because Gardner conflates several of the ways in which embodiment may be talked about under his single heading. Elsewhere, Gardner somewhat opaquely mentions inventing a new product or tool as bodily problem solving, although without elaborating on the similarities to hitting a tennis ball. Gardner’s further elaboration (2004, p. 231–235) does indicate that the bodily knowledge required in the invention of a tool involves learning how to use the tool and the properties of the materials the tool works on, but the actual inventing takes place in combination with logical-mathematical and spatial intelligences. It seems apparent that nothing is contributed to the problem solving process that could not have been achieved – perhaps less efficiently – through dedicated application of the other intelligences.

What seems entirely left out of examination of thinking and the body in Gardner is any conception of the uniqueness of bodily experiences. This includes learning about the body and reasoning with the body, both of which will be discussed below. There is no indication that knowing or thinking through the body is any different than learning or thinking in any other way. That is to say, as Bowman (2004) suggests, the qualities of thought for the six mental and one physical intelligences are the same, they are just realized through different apparatus.

Despite this critique I am in fact sympathetic to Gardner and would prefer that his work be more applied more seriously more widely in schools. He is primarily concerned with intelligence, not embodiment, and he comes from a tradition in psychology that until has traditionally considered cognition as the sole providence of the mind or brain. However I also believe that his failure to recognize a distinct nature to embodied experience has led to particular ways in which others have taken up his work in
education. For instance Thomas Armstrong’s *The Multiple Intelligences of Reading and Writing* (2003) applies Gardner specifically to instruction. Some of the methods in the text are derived from Montessori methods (Armstrong, 2003, p. 28) and may well be useful. Others, such as making letters out of clay or carving words in wood, may promote a certain kind of attention to the product that keeps the student engaged with literacy in some sense; these may also be useful for whatever their purpose might be. However, they also do not treat bodily experience as in anyway unique or meaningful on its own. In the case of making letters, the point activity seems to rely on bodily engagement in creation using tools and materials to sustain a tertiary engagement with literacy. The body, bodily intelligence as they would have it, becomes a tool or technique or method like any other mnemonic and is devalued thereby.

This trend is further adopted in the theory of “brain based learning” which as exemplified in Jensen (1998) holds that paying more attention to the brain itself will improve student learning. Gardner explores at some length the neurological, physiological, and theoretical bases for his intelligences as well. Jensen takes up some of these, reclassifying them in terms of how students are receptive to different modes of presentation, e.g. visual or auditory learners. At the same time engagement strategies and physiology are discussed. Teachers are encouraged to have students stand up and stretch to increase blood flow and oxygen delivery or to solve puzzles to heighten attention. While I would welcome the chance to get up and move in most classes, it is difficult for me to not read this as a reinforcement of the antagonistic dualism between mind and body discussed above. When students are asked to get up and stretch the body is realized the obstacle to learning. It is an unavoidable obstacle, but at least brain based learning helps one get over it and back to the books.
Embodiment in Literacy

While recent research in education has considered what are loosely termed embodied literacies, this research has tended to theorize the concept of embodiment in one of two ways frequently seen as incompatible. Cheville (2005) points to this tendency of the body to be seen either in terms of a cultural object and embodiment to be the performance of the body in cultural contexts, or in terms of the cognitive or neurological roles of bodily functions (p. 85). As a cultural construct the body is frequently analyzed as an object to be controlled or constructed (Luke, 1992; Styslinger, 2000) in the process of education. These analyses have the body contributing little to the educational process, however. Reflecting the ongoing influences of the specter of Descartes, the body is an object that needs to be controlled to allow the mind to learn. No unique knowledge or kinds of learning arise from such a theory of the body.

Frequently in education any focus on embodiment has not been on the body per se but rather ways in which the body can be appropriated as a learning tool to enhance student performance and engagement (Wilhelm, 2002; Armstrong 2003) or understanding of an abstract, i.e. disembodied, concept (Schneider, Crumpler & Rogers, 2006). In some examples, the body is even seen to distract from the learning experience, as claimed in an article in College Teaching (McClelland, Dahlberg & Plihal, 2002) which goes so far as to claim, “There is a lost sense of body when engaged in a good learning experience” (p. 6). As striking as this focus on the mind is, more striking is the implicit assumption that good learning experiences cannot be embodied. This sort of antagonism between the body and learning is a symptom of the prevalent dichotomy of mind and body that obscures the role of the body in learning.

Further implementations of embodiment in literacy have appended to other prevalent literacy topics, such as critical literacy. Gonzalez (2006) advocates helping students develop a “critical consciousness” through participation in drama and theater, including elements of technical theater such as stage design. Johnson and Vasudevan
(2012) “argue that teachers and researchers must expand current verbo- and logo-centric definitions of critical literacy to recognize how texts and responses are embodied” (p. 34). Their point of contention is that researchers and teachers recognize performative aspects of spoken and written texts, but take less account of other bodily expressions. While this is a welcome change from trying to eliminate the body to achieve optimally successful teaching moments, it also represents the tendency to treat the body indifferently, just one more way to produce a text that will be read in the same way a spoken or written text would be.

**Embodied Learning in Technical Theater**

The embodied nature of work in technical theater points to the need for additional resources to understand the body in learning. Outside of education, in neuroscience and cognitive psychology for instance, embodiment has been more explicitly explored in relation to language (Lakoff & Johnson, 1999; Johnson, 2007), cognition (Giere & Moffatt, 2003), extended cognition (Clark 2008), and personal agency (Noland, 2009). While exciting and suggestive, this research is highly specific, exploring individual cognitive or bodily processes, and perhaps difficult to apply more broadly across a multi-faceted learning situation.

Citing Valera, Thompson, and Rosch (2001) Bresler (2004, p. 7) defines embodiment as the “the integration of the physical or biological body and the phenomenal or experiential body…. That integrates thinking, being, doing and interacting within worlds.” Such a definition is apt for technical theater, but does not immediately suggest ways of understanding the actual work of technical theater.

A limited amount of research focusing on hands-on physical work has explored embodiment in depth in wide ranging situations, most notably Rose (1999, 2004) and Crawford (2009). Rose emphasizes cognition, describing the physical and mental challenges of integrating knowledge of materials and tools, visual and tactile sensory
information, and physical skills and capacities with literate practice such as reading blueprints or technical manuals. Crawford emphasizes sociological aspects of labor, examining the continuing need for physical labor and the concurrent devaluing of such work in a technologically advanced, post-industrial culture.

Crawford’s study in hands–on work (2009) suggests that technical theatre, an activity that features manual and mechanical skills, is likely to be undervalued and regarded neither as creative or cognitively demanding. A number of advanced handbooks and manuals on specific aspects of technical theater and more general technical theater texts such as Technical Theater for Nontechnical People (Campbell, 2004), do imply there are certain attributes enjoyed by technicians but not enjoyed by the nontechnical people to whom the book is addressed, but this hardly reads as a full scale endorsement of the technical. However, Campbell’s and similar introductory books, such as The Perfect Stage Crew (Kaluta, 2003), do offer an introduction to the complexity of this work and present at least six distinct areas of technical theater, including lighting and sound, prop building, and stage management, that require extensive knowledge and physical skill to perform adequately.

Having participated as a teacher of technical theatre, I understand that what is taught includes construction skills, the use of tools, the properties of building materials and so on, but the work of technical theater also includes creativity, critical thinking, and literary interpretation. A technician makes any number of decisions in the course of building a prop. Some are based on the technician’s skills with tools and knowledge of materials. Other decisions may be more critical and reflective, encompassing the student’s background, intentions, idiosyncrasies and understanding of the play, as well as the context in which he or she works, which may include their being part of the technical crew for the production and the emerging design of the production as a whole. Embodiment is central to all of this thinking and interpretation (Giere & Moffatt, 2003; Eisner, 2005).
The Work of Technical Theater

Given this background it is useful to consider for a moment the physical nature of the work of technical theater. Perhaps the most striking thing to me as a technical theater participant and observer is its variability. Novel situations continually arise as students collaborate in new groups or make meaning with new materials. Students variously learn, teach, or apply skills and information. In the course of their work they use their bodies and tools as they think. They communicate with each other through words, texts, and actions and with the audience through what they build and perform on stage. All this is done in the service of a particular literacy event (Goodman, 2003) based on one of the most traditional forms of literary text, the stage play.

The curriculum and pedagogy of technical theater tends to value student independence and collaboration. The technical director and other teachers are not in a position to control the meanings students create in these situations, and the unusualness of this sort of student–teacher collaboration is an aspect of technical theater that merits investigation. The work itself in many cases may offer students opportunities for creative expression and reflection (Zurmuehlen, 1990), but all of these things happen in the context of shared or joint enterprise (Wenger, 1998) and the unswerving approach of opening night. School plays are a hallmark of school culture and the contribution of technical theatre students to the productions is, literally, visible to the whole school. As Crawford (2009) would predict and my experiences confirm, their work, seen as merely physical labor, is not similarly valued in school culture as the more glamorous and literary roles of the actors. How students and faculty view participation in technical theatre in terms of the thinking, learning, and social positioning involved influences student participation in tech, whether as a class or extracurricular activity. Despite what seems to be its lower status, tech is a popular activity at Lincoln, suggesting a complex relationship between the student technicians, their understanding of tech work, and their participation in the school culture and technical theatre subculture. This confluence of
embodiment, participation, collaboration, and interpretation makes technical theatre a rich activity to explore.

With a range of topics and themes to explore, I proceed from several theoretical frameworks. Multimodal literacy theory (New London Group, 1996) has been extensively applied to literacy work on composition (e.g., Ranker, 2007) and found to be particularly useful for understanding students’ construction of meaning in forms other than traditional text. However, much of the work of technical theater involves the use of the body in ways foreign to language arts classes and not generally associated with literacy. Particular ways of understanding the body and cognition are useful in explaining the thinking that occurs in these situations. The framework I used is in accordance with the philosophy of John Dewey, discussed more below, that holds that thinking occurs as part of a complex system that involves objects outside the brain and even outside the body. This fits my observations about the tool mediated work of technical theater. Students use their bodies in these ways in a process of making meaning, and to analyze this I borrow from diverse sources, including art education, philosophy, and contemporary literacy theory.

Constructing meaning and staging a play are of course not the only motivations for students to work in technical theater. As Gee (2000) put it, “Whenever any human being acts and interacts in a given context, others recognize that person as acting and interacting as a certain kind of person…” (p. 99). Explaining those actions and interactions and the type of person a theater technician is and becomes through the work of technical theater requires special attention. Several theoretical frameworks suggest themselves, including “communities of practice” (Lave & Wenger, 1991; Wenger, 1998), “affinity spaces” (Gee, 2004, 2005) “figured worlds” (Holland, Skinner, Lachicotte, & Cain, 1998) and activity theory (Engeström, 1987, 2001). The theories have different strengths and limitations for an exploration of technical theater. Holland et al. are particularly interested in the socio–historical development of community. I mention in
Chapter Three a disruption to the technical theater community caused by a temporary shift in staffing for the director positions. Holland et al. provides an excellent approach to analyzing that situation, but one that I feel moves somewhat away from my primary concerns with teaching and learning. Gee’s concern in developing affinity spaces are largely concerned with teaching and the ways in which knowledge circulates in communities. It may be that his approach would have worked well for technical theater, but I feel that his emphasis on virtual communities detracted from the emphasis of hands–on learning by doing pervasive in technical theater. Such concerns helped me to decide on employing primarily Lave and Wenger’s (1991) situated learning approach as it is best able to capture the forms of collaboration, participation, apprenticeship, community membership in my data. I supplement this framework with recent versions of activity theory (Engeström, 2001) that, as mentioned above, are useful for describing mediating factors in thought and action such as tools, goals, and position in a community. Lave and Wenger (1991) and activity theory are discussed at greater length beginning in Chapter Four as they become relevant to the data.

Philoosophical Approaches to the Body and Cognition

A core belief I bring to my work is that the importance of the body has historically been undervalued in research on thinking and cognition. From Plato’s theory of universals 2500 years ago to Descartes Meditations in the early 17th century the highest forms of reasoning and knowledge have been associated with immateriality. That is, what one could learn through the application of an unemotional, disembodied mind was most valued. As psychology sought to establish itself as a science at the end of the 19th and beginning of the 20th centuries the dualism between mind and body was maintained. As the developing field of education took its lead from the psychology of the time, the body was in many cases either ignored or seen as an object to be controlled or scientifically managed (Taylor, 1919) for the sake of efficiency (Eisner, 2005).
Fundamental to my understanding of the issues posed by my research is that cognition of many kinds does not take place exclusively in the mind (or even brain), but in the body as well. This includes higher level thinking skills (Bloom, 1956; Anderson, & Krathwohl, 2001; Krathwohl, 2002) such as reasoning and problem solving, as well as lower level skills such as remembering, applying knowledge, and perception (Damasio, 1994). My conception is that, as Wilson (2002, p. 626) writes, summarizing one view of embodiment, “The environment is part of the cognitive system. The information flow between mind and world is so dense and continuous that, for scientists studying the nature of cognitive activity, the mind alone is not a meaningful unit of analysis.” Three related points central to my understanding emerge from my thinking and reading on this topic:

- Cognition is an emergent property of systems
- In humans the system certainly includes the brain, but includes also the rest of the body
- Systems can extend beyond the boundaries of the body

Support for these positions can be found in a number of sources including continental phenomenology, American pragmatism, and contemporary psychology. While this may seem like esoteric sourcing for a theoretical framework, each area represents an established tradition that for reasons discussed above has failed to yet gain standing in education. In some cases this is to be expected, but in others there is a certain irony. In education, John Dewey’s influence is notable for its wide range and enduring importance. Dewey is not only America’s premiere philosopher of education, but also America’s foremost philosopher of any sort of the 20th century. While some of his more popular works such as *The School and Society* (1899) and *Democracy and Education* (1916b) have been directed toward and become classics of education, other of his most significant philosophical achievements such as *Experience and Nature* (1900) and *Logic: The Theory of Inquiry* (1938) have not been seen as widely applicable to education.
Given the traditional view of the field towards the body and mind-body dualism, the pragmatist approach developed by Dewey represents a very different way of understanding cognition and learning. The relevance of Dewey’s pragmatism ought not be overlooked and deserves exploration.

Pragmatism as a philosophical movement started in the late nineteenth century with the work of Charles Sanders Peirce and William James and was most fully elaborated by George Herbert Mead and John Dewey in the twentieth century. It features a strong affinity for empirical inquiry but without the sort of belief in infallible laws such as held by positivists. Among the general tenets of pragmatism are that philosophical inquiry should proceed first from clarification of language and positions in order to reveal sources of disagreement, that truth is conditional and best assessed in relation to experience in material and social contexts. Also important from my standpoint is the tenet that abstractions and dichotomies should be treated as suspect. The approach can unsettle traditions, e.g. from Kant’s necessary truths found through the exercise of “pure reason” (Kant, 1781 / 1990) and Descartes’ mind-body dualism. Once this dualism and the belief in the superiority (or even existence) of the mental realm to the material realm are denied, new possibilities for understanding human activity arise. Mind-body dualism is so firmly entrenched, however, in language and culture as well as philosophy that “acknowledging the embodiment of mind requires us to rethink some of our most cherished assumptions about human nature” (Johnson, 2006, p. 50).

In Logic: The Theory of Inquiry (1938) Dewey promotes what he calls “the principle of continuity,” which he employs to refute dichotomies such as between mind and body. He argues that the material world exhibits a continuum of levels of

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1 Johnson (1999) also examines some of the reasons that mind-body dualism may seem so intuitively correct and natural. In short, our perceptual mechanisms are not well equipped for attending to themselves and the brain further works hard to hide the processes of thinking and perceiving so as not to interrupt them. See also Damasio and Damasio (2006) in this regard.
organizational complexity from inanimate objects, to simple organisms, more complex organisms with mental or psychological processes but not what he would consider minds, and eventually to very complex organism that have, or exhibit, minds. The difference between places on the continuum is a matter of degree, the presence of increasingly sophisticated processes in bodies and brains, not of the addition of a new substance; having a mind is being able to perform sufficiently complex procedures such as remembering, decision making, having emotion. Literacy is implicated in this theory of mind as well, as Johnson elaborates regarding early pragmatist views of mind as they relate to language use:

To say that I have a mind is to say that I am an organism whose potential for very complex interactions has risen to the level where I can share meanings, engage in various modes of inquiry and reasoning, and coordinate activities with other creatures who have minds, using symbols that have meaning for both of us. (2006, p. 50)

Unlike education philosophers such as Hirst (1975) who require an overlay of symbolic meaning to make sense of experience, Dewey understood that experience was in fact part of the meaning. In Essays in Experimental Logic (1916) Dewey summarizes his argument so:

Upon this view, thinking, or knowledge-getting, is far from being the armchair thing it is often supposed to be. The reason it is not an armchair thing is that it is not an event going on exclusively within the cortex or the cortex and vocal organs. It involves the explorations by which relevant data are procured and the physical analyses by which they are refined and made precise; it comprises the readings by which information is got hold of, the words which are experimented with, and the calculations by which the significance of entertained conceptions or hypotheses is elaborated. Hands and feet, apparatus and appliances of all kinds are as much a part of it as changes in the brain. Since these physical operations (including the cerebral events) and equipment are a part of thinking, thinking is mental, not because of a peculiar stuff which enters into it or of peculiar non-natural activities which constitute it, but because of what physical acts and appliances do: the distinctive purpose for which they are employed and the distinctive results which they accomplish. (pp. 13-14)
These appliances – frequently a cordless drill in the case of theater technicians – are as much part of the thinking as the body is, and both are as much part of thinking as the brain. Rose (1999, 2004) explores a similar idea in his research on physically involved work.

Relevant to my work, contemporary philosopher and Dewey scholar Mark Johnson (2006) brings to light some of the implications of this view, upon which I build to arrive at some further points. One is that body, brain and mind always being different aspects of the same system implies that changes to the body can have a direct impact on mind or mental processes, e.g. reasoning in a certain context with which one had a history of relevant bodily experiences. Second, a pragmatist understanding of mind appears to be compatible with other psychological or sociocultural theories following the so called “cultural turn.” The typical pragmatist view is that cognition exists to serve the needs of the organism, and organisms as complex as humans have needs that are social, moral, spiritual, etc. and the actions and responses of the people happen in contexts of power, gender, economics and so on. This is to say that understanding mind as emergent from the complex interactions of brain and body does not prohibit the body from simultaneously being a culturally constructed artifact.

Third, the system that gives rise to mind is not limited to a single mind and body. Johnson (2006) takes up this line of thought when discussing implications of the non-dualistic theory of mind such as advocated by Dewey and William James. He summarizes:

In all of these accounts it should be clear that ‘the mind’ cannot be reduced to ‘the brain.’ Likewise, ‘the body’ is not merely a material lump of skin and bones…. [Q]uite importantly there is ‘the body’ that does not terminate merely with the fleshy boundary of our skin but rather extends out into its environment, such that organism and environment are not independent, but rather interdependent aspects of the basic flow of (bodily) experience. (p. 53)
Further, Johnson is clear in including physical and social settings, shared practices, cultural artifacts and so on as plausible elements of the environment with which the body and mind interact. Embodied cognition is, “often social and carried out by more than one individual” (Lakoff and Johnson, 1999, p. 114).

In this modern extension of pragmatist theory, Lakoff and Johnson (1999) further elaborates the role of the body in meaning making, taking issue with the dualistic concept of mind that leads to a higher form of meaning in terms of language and propositional content devoid of association with the body. In my view, the prevalence of the dualistic concept of mind and association of meaning with language exclusively makes it difficult to talk of other kinds of meaning; trying to explain non-propositional meanings by way of linguistic propositions is a daunting task², as I will be address in relation to Susan Langer’s work below. In pragmatist fashion, for Lakhoff and Johnson meaning is seen as an interaction between person and environment wherein “the meaning of a thing is its consequences for experience” (p. 10) and “a result of the nature of our brains, our bodies, our environment and our social interactions, institutions, and practices” (1999, p. 12).

Other things regarding philosophical pragmatism are appealing to me as well. One is the contemporary interest in and revitalization of pragmatism (Dickstein, 1998; Putnam & Conant, 1994; Misak, 1999; Malachowski, 2010) that has taken place in the last two decades. Another is the compatibility of pragmatism with contemporary psychological research on embodiment (Damasio, 1999, 2006). Much of contemporary cognitive science takes the embodiment of mind or embodied cognition as an accepted truth, although the particulars of the role of embodiment remain elusive (Wilson, 2002). As Johnson puts it, “[e]mbodiment theory is now well supported by research in the

² This is seemingly the need fulfilled by art historians, theater critics and, book reviewers who contemplate the complex, non-propositional meanings alive in paintings and performances, or literary elements like theme, and attempt to explain or re-express them in language.
cognitive sciences but there remains considerable debate as to what this term *embodiment* might mean” (Lakoff & Johnson, 1999, p. 119). In the introduction to the 2009 special issue of the *European Journal of Social Psychology*, Schubert and Semin explain embodiment as:

> Approaching human functioning from an embodied perspective means examining how biological constraints give expression to human functioning in socially situated contexts, and how that varies with ecological, material and existential conditions. This perspective contrasts with approaches in psychology that conceptualize psychological functioning in terms of a closed loop of symbols or an internal model of the world, with the meaning of each symbol defined only by other symbols.” (Schubert, 2009, p. 1135)

The concept of closed loops of symbols here refers to the “grounding problem” which has troubled philosophers of language by asking how language, conceived as a set of syntactic rules and lexical items in which all linguistic meaning is defined in terms of the language itself, ever connects to real life experience. More recent work bridging cognitive science and philosophy explores ways in which linguistic meaning is grounded in lived bodily experience (Gibbs, 2003; Lakoff and Johnson, 1999).

I claim no expertise in neuroscience or related fields. Nevertheless, it bears noting that there has come to be certain overlap between the work of philosophers who study the so-called mind–body problem and neuroscientists. For instance in *Descartes’ Error* and *Minding the Body* Damasio (1994, 2006) approaches the topic of embodiment from the perspective as a philosophically minded neuroscientist and Johnson approaches embodiment form the standpoint of philosophy that considers neuroscientific research such as Damasio’s (Johnson, 2006).

Despite the empirical tendencies in pragmatist and phenomenological philosophy, the research on embodiment based in them remains relatively undeveloped in actual material and social circumstances. What seems to be missing is consideration of embodied systems at work in the actual contexts of authentic cognition, “the ongoing, open-ended evolution of real life situations” (Damasio, 1994, p. 50). Technical theater
offers a rich example of this, featuring as it does a dynamic social interactions and shared endeavor that determine the environment of cognition, and tool and material use that extend cognition beyond the body, and of course student learning.

So far I hope to have shown that there is a robust theoretical background literature in pragmatist philosophy to ground my research on a conceptual level. While there may be reason to believe that support for embodied cognition will be forthcoming from more scientific fields, for this research more readily applicable grounding is required.

For practical and methodological background I draw heavily on the work of Rose (2004, 1999), who also explores relationships among workplace literacies, cognition, hand and tool use, and bodily experience to show how cognition is situated in both a material and social environment. Rose’s approach is not to measure or test cognition, and he does not frequently employ the term embodiment. Instead he describes it through ethnographic means, primarily observation of people at work and follow-up interviews. Careful attention is paid to many parts of the system, including the person observed and his or her degree of expertise, the person’s use of his or her body during work, the tools he or she employs, cognitive demands related to the work such as literacy or numeracy required to understand the specifics of the particular job, the social context in which the work takes place, and always the material results of the work.

An instance of this is given in his observations of a hair stylist at work, a very complex interactive activity. On one hand, there are numerous semiotic resources in use. These include the language of the stylist and customer; gestures used in describing the proposed hair style; images and text the customer may have brought with them (e.g. from a magazine) that must be read both as a literal depiction of the style and as a figurative representation: The customer interprets the style in the picture (e.g. it’s “sassy”) he or she gives to the stylist hoping to evoke in the stylist a similar interpretation, and expecting that the stylist can translate the interpretation they negotiate into a style for the client that takes into account his or her particular features – facial features, hair color and texture,
etc.. And finally, there is the haircut itself. All of these resources must be negotiated between stylist and customer according to their understanding of how the style will be read in the contexts the customer will inhabit. This communication initiates while the stylist is beginning to plan the cut, an embodied cognitive act involving eyes, hands, and tools. As Rose puts it, “She keeps her eyes on Lynn’s hair as she moves her fingers through it, lifting up, then pulling down one section, then another, gesturing with her hands around the hair, indicating shape and movement. (p. 31).

It is easy not to notice the sorts of cognition involved in the physical aspect of this planning due to the proficiency with which experts carry them out, or to disregard them because hair styling is not generally considered intellectual work, perhaps because of its overt physical component. Rose continues, “There’s a lot of touching, of handling the hair… hands, comb and scissors engaging the hair, a fluid, attentive performance. But if you watch the hands closely, or attend an introductory-level course, or page through a standard textbook on hairdressing – if you devise a method to regard the manual skill here – then you begin to see the finesse” (p. 38). Rose here is considering the work done by the body to be “manual skill” and indeed it is, but consider how intimately connected it is to the cognitive aspect of the haircut planning. Acting, perceiving, and planning can be regarded as discrete analytically but are inseparable in experience. Different perceptions of the client’s hair engender different courses of action by the stylist and further modified perception while different tools – comb, scissors, mirrors – potentiate particular results in the hair cut or methods of achieving similar results as well as recall different knowledge and experience in the stylist.

Rose’s work further illuminates the relation between body and cognition in his study (Rose, 1999) of a clinical physical therapy class. Here the striking example is of learning the concept of resistance, not as a disembodied mental concept but as a felt reality that the physical therapist students come to be able to perceive in the bodies of their patients as they manipulate them. Multiple pedagogical strategies are employed,
including demonstrations, guided- and independent practice, and various methods of representing information, including speech, writing, drawing, and introspection. Particularly relevant to me is the way this work shows the level of cognition involved in developing and then applying a physical skill, which is central to the learning in technical theater.

Meaning and Meaning Making

I have been using numerous notions of meaning – linguistic, propositional, bodily, embodied, etc. – some of which provide necessary background and others of which are more directly related to my research. Technical theater, considered as undertaken to produce a play, allows for understanding it as a process of meaning making in which technicians, the technical director, drama director, and actors collaborate in interpreting the text of the play collaborate to create a somewhat loosely defined and variable meaning or collection of meanings that is the final staged play. In doing so technicians have opportunities – as they make props to their own design specifications, interpret instructions for painting in ways that suit them, etc. – to construct more personal or idiosyncratic meanings. In both the collective or individual case the work students do as makers of meaning can be regarded as instances of art making or literacy.

Literacy research of the last decade had been broadly influenced by the work of the New London Group (NLG, 1996) and its continuation by, among others, Kress (2003, 2004) and Kress and Van Leeuwen (2001). In particular their concepts of multimodality and available design, which are central to the multiliteracies pedagogy the NLG proposes, have found widespread application. Because “literacy pedagogy now must account for the burgeoning variety of text forms associated with information and multimedia technologies” (NLG, 2000, p. 62), multimodality is crucial to the enterprise. The concept points to the availability of multiple modes to encode information, the visual, audio, spatial, and gestural in addition to the linguistic.
The appeal of the NLG multiliteracies framework in literacy derives from a number of sources. On one hand it provides an integrated framework for understanding traditional print based literacies along side of other modes of communication and, as noted by Kress (2003), it provides a way to understand the change in traditional print literacy in a context where communication is increasingly influenced by image, video, and audio either as separate methods of communicating or in combination with text, as is frequently done on the world wide web. At the same time, multiliteracies pedagogy can also be seen as extremely textual or syntactic: Each mode has a grammar to be learned and the focus is on the design of texts, using existing knowledge to conceive of completed projects.

At a glance theater technicians at work can be seen engaged in literacy events (Heath, 1982, 1983; Goodman, 2003) like writing or reading instructions; occasionally applying math, geometry, or physics as they solve problems; hanging lights and running electric cables; building structures, costumes, and props; and painting props, backdrops, structures, etc. The last three of these I see as representing the essential character of technical theater and suggest that they can be best understood as the creation of non-discursive symbols (Langer, 1950, 1951; Eisner, 1982, 1994, 2002; Shahn, 1957). Put simply, natural language and invented languages such as math or symbolic logic are discursive, whereas images, non-linguistic sounds, movement and other communicative modes typically associated with the arts are non-discursive, or expressive. The essential difference is that discursive systems communicate through a “vocabulary of symbols that can be combined [systematically] to present a coherent structure” (Langer, 1951, p. 173). Nondiscursive symbols such as images on the other hand are apprehended all at once or

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3 Manovich (2001) working independently of the New London Group members makes similar (but less programmatic) points about the emergence of multimodality, the impact of new media and the changing of old media in response.
as a gestalt and only afterwards are their compositional elements distinguished. Part of this spirit is echoed in Kress (2004), in which Kress examines at some length the differences between a written description of a cell as from a biology textbook and a diagram of the cell. I quote him on this important point at some length:

The written text – as indeed the spoken – forces the reader (and the listener) to stick to its order: the elements have to be read in the sequence in which they occur. That is not the case, or far less so, with the image text. Yes, the elements are there in certain spatial relations, but how the reader reconstitutes them is largely up to the reader. The order of the written text is fixed; the order of the image text is (relatively) open. (Kress, 2004, p. 113)

At the same time, the structural, syntactic nature of multiliteracies pedagogy seems to run counter to Langer’s point. Particularly the idea that non-written texts are designed and then executed and eventually interpreted according to a metalanguage needs more explanation. Examples such as the one Kress discusses, in which the diagram of the cell is paired with a written description, seem more apt for this sort of analysis than the more nuanced, indeterminate, or vague multimodal texts produced in technical theater.

Technical theater activities are essentially involved with the production of non-discursive symbols. Frameworks for exploring this therefore exist both in art, and in (multimodal) literacy as well. A literacy analysis and an analysis grounded in the arts seems to break down following the acceptance of the concepts of multimodal literacies that integrates multiple modes or representation. The relation between multimodal literacy accounts and art making accounts (e.g. Beittel, 1972) is a an important topic I explore at some length in Chapter Five. Of particular interest are the concept of design and the making of design choices as applied to collaborative and innovative activities such as technical theater, in which multiple actors with varying amounts of contact with each other all contribute to a completed project.
Community and Social Space of Technical Theater

Central to sociocultural theories of meaning making in art or literacy, and relevant to embodied cognition theories that take into account context, is the social environment in which meaning making or cognition takes place. In order to provide a systematic description of people’s behaviors as well as attempt to understand them in the technical theater environment at Lincoln high school requires a theory that takes into account the salient aspects of the environment and the reasons participants enter into it. Several possibilities in the recent literature are plausible candidates.

Gee (2004) describes an “affinity space” as an example of one kind of situated learning relevant to technical theater. His premise is that a “generator” creates a “space” in which interested people can interact (p. 80). In the space, whether virtual or physical, people take part in activities related to the generator. For Gee the generator is an interactive online video game, whereas for the student technicians the play itself would likely be the generator. Interactions centered around the video game might emphasize social interaction such as in chat rooms or message boards; pay strict attention to the generator, as in tutorials and tips; and might extend the generator itself, as in user created content for the game. This parallels technical theater wherein students socialize before and after work sessions and performances, work on preparations for the play at other times and work on miscellaneous projects between play productions.

For Gee, an affinity space is a particular kind of “semiotic social space” (p. 78 ff.). This concept, developed in the years following his participation in the publication of “A Pedagogy of Multiliteracies,” (NLG, 1996) with its emphasis on the sociocultural aspects of semiotics in meaning making, meshes with the idea that behavior and literacy are to be understood in particular social contexts. Shared knowledge of the rules for making and interpreting meaning are developed by the participants in the space. Member practices in the space are understood most immediately in terms of the specific local context and history and evolve as membership changes and members interact.
While Gee’s affinity space theory has useful features for describing the
local circumstances of technical theater, it must be remembered that the ultimate goal of
the technical theater enterprise is presenting the completed work to a larger audience. A
weakness of Gee’s theory is its lack of attention to how the participants and practices in
an affinity space relate to other spaces. Exploring cultures more broadly, Holland et al
(1998) considers a more extensive range of elements than individual spaces in developing
the concept of “figured worlds” to describe interactions across a wide range of contexts.
Some of the contexts they examine are groups with fairly restricted membership such as
alcoholics anonymous, while others are almost completely open, such as undergraduate
dating in college. The figured worlds they describe are sets of cultural activities
developed through the historical participation of members of the culture and reproduced
through continuing participation (Holland, 1998, p. 40).

The narrower, local scope of Gee’s affinity spaces lends itself to his focus on the
rules of the space in terms of interpretation of a participant’s actions and his or her
learning the appropriate modes of behavior and expression within the space. The
expansive histories and scope of activities within figured worlds, on the other hand, give
them a more deterministic feeling. Although part of the goal of the figured world project
is accounting for individual agency and interpretations of the figured world, participants
can encounter difficulties exercising personal agency not highly determined by the
precepts of the figured world. All figured worlds value and assign significance to actions
differently – the significance of alcohol consumption is different at an AA meeting than
at a college mixer – and promote different outcomes (Holland, 1998, p. 52) with the
contribution of individuals incapable of inducing significant change. Important to both
theories is the way in which the ongoing actions of the participants shape and reinterpret
the practices. However, whereas Gee’s local affinity spaces are dynamic and responsive
to member actions in the space, Holland’s figured worlds, which take into account a
greater breadth of social conditions, reveal subjects as less agentive and more readily understood as positioned by the figured world than actively constructing it.

As much as each of these concepts can contribute to an explanation of technical theater at Lincoln, their respective limitations – the narrow context of situation in Gee and the broad context in Holland – point to the usefulness of a middle ground between emphasis on group practices and larger context. The concept of a “community of practice” (CoP) was discussed in Lave and Wenger (1991) and expanded in Wenger (1998). Wenger’s theory may steer a middle ground course, though hardly without susceptibility to critiques itself (see Barton & Tusting, 2005 and Hughes, Jewson & Unwin, 2007a, 2007b). Some of these critiques also serve to expand the scope and applicability of the theory for a community such as the Lincoln technicians as well as speak to the popularity of the theory, as does the array of other work adopting it (see Nelson, 2008 & Holmes, 1999). One particularly useful element of the CoP theoretical apparatus is the concept of “legitimate peripheral participation” (Lave & Wenger, 1991) which specifically addresses learning in situations of apprenticeship and community participation, an apt characterization of technical theater teaching and learning.

In general I am hesitant to endorse a CoP theory because I am more concerned by its challenges – both theoretical and practical – than I am persuaded by its usefulness. Fortunately these various takes on “situativity” (Greeno 1998, used in Rose, 1999, p. 153) while differing in particulars, seem to me compatible at least in their appreciation of the relevance of context in explaining the actions of individuals as members of groups. Another approach, rooted in a Vygotskian tradition of social psychology that also explores learning as a social phenomenon has been developed (Engeström, 1987, 2001)

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4 Engeström (1987) traces three distinct, successive “lineages” of activity theory, beginning with C. S. Peirce, the primary instigator of philosophical pragmatism. The second lineage begins with G. H. Mead, a friend and fellow traveler of Dewey’s. While the third lineage develops from the work of Vygotsky, it remains possible to see the connections with pragmatism.
which focuses in the first instance on the complex, ongoing, interrelated activities within situations. Activity theory has found application in education (Roth & Tobin, 2002; Rose 1999) and applies well to technical theater.

In summary form, activity theory begins with a subject whose activity is directed towards some object to achieve an outcome. In Roth and Tobin’s analysis, a teacher acts upon a student (or the student’s knowledge) to achieve some educational outcome. The actions are mediated by the tools available to the actor, the rules relevant to the situation, the community the actor (and object) are members of, and the divisions of labor within the community.

In technical theater, this could be understood as a technician’s activity being directed at various materials that are to be turned into a prop. Tools, including both things like hammer and nails, and written instructions, will mediate the technician’s actions, as will the school and shop rules, the influence of other technicians, and the organization of labor in the project, be it a solo project or one which puts the technician in the role of mentor or mentee. This sort of framework seems to do an admirable job of capturing the aspects of tech work that I think are most relevant, including the relevance of objects like Gee’s generators and the evolving social practices of Wenger’s CoP theory. As Engeström (2008) puts it,

Activity theory is a theory of object-driven activity. Objects are concerns, they are generators and foci of attention, motivation, effort and meaning. Through their activities people constantly change and create new objects. The new objects are often not intentional products of a single activity but unintended consequences of multiple activities.

Baber (2003) puts the emphasis somewhat differently: “One of the foundations of [activity] theory is that of tool mediated activity. In other words, tools mediate the relationship between tool users and their environment.” Baber shows how activity theory can be applied to a range of activities requiring tools, including jewelry making and surgery, considering such factors as the layout of workbenches and surgical tool kits to
the interactions of practitioners around tools. Similarly, Keller and Keller (2008) focus intently on the human-tool interaction in their exploration of blacksmithing, developing a view of how tools interact with constellations of knowledge in designing projects but also facilitate re-designing the object as the activity continues. These applications of activity theory hold promise for examining students in learning situations where their work is mediated by tools, but at the same time it may be that activity theory is problematic in complex collaborative situations common backstage at the Lincoln theater, such as when multiple participants act on a common shared object with different objectives, or at least different understandings of the common objectives. Whether this is a theoretical or merely practical problem is not entirely clear, but in any event the development of activity theory has anticipated this concern. Engeström (2001) approaches this challenge by suggesting analysis at the level of multiple, overlapping activity systems, a potentially useful but cumbersome approach I return to in Chapters Four and Six. Engeström describes the progressive generations of activity theory so: “The first generation built on Vygotsky’s notion of mediated action. The second generation built on Leontiev’s notion of activity system. The third generation, emerging in the past 15 years or so, built on the idea of multiple interacting activity systems focused on a partially shared object” (Engeström, 2008). This allows also for the possibility of multiple shared objects at different levels of proximity, i.e., a technician carving a slotted spoon is working on her own costume, the props of the play, and the play as a whole.

The developed analyses employing these frameworks in Chapters Four and Five will be useful in making discriminations, both practical and theoretical, among the theories I have sketched here, each of which has advantages and drawbacks. However, it may not be necessary to limit consideration to one theory alone. As Rose (1999) shows, activity theory, practice theories, and situated cognition can be combined in one study. He changes his focuses from individuals practicing particular skills, to instructors teaching concepts, to the interactions among teachers and students, to the history and
current appreciation of physical therapy. My approach to data begins with a similar assumption that multiple compatible theories can be useful to describe complex phenomena.
CHAPTER III

METHODOLOGY, DATA SOURCES, AND DATA COLLECTION

I organize this chapter in the following manner. I begin by describing my experiences with theater and address why this project became the topic of my dissertation research. Because I began the study acquainted with technical theater at Lincoln and because I use participant observation (Smith, 1978; Atkinson & Hammesley, 1994) a discussion of my history with technical theater is a useful way of positioning myself in relation to the subject.

I conducted my research at Lincoln High School, but because I am also familiar with the technical theater program at Revere High School I follow the section on my history with a comparison of the Revere and Lincoln programs. By contrasting teacher attitudes and student participation at these two schools I hope to explain some of the practical dimensions of technical theater at Lincoln as well as introduce the teaching philosophy enacted by Linus, the technical director at Lincoln.

One important dimension of student participation in technical theater at Lincoln is its variability. Students may be at every after school and Saturday work session or drop in for a couple hours one time. It is important to any study to understand the nature of subject participation, so student roles and trajectories are addressed in the section following introduction of the setting. The following section explains my data collection methods and my rationale for them. During this study I collected data through observation, participant observation, informal conversations with adults and students, and formal semi-structured interviews with adults and students. The nature of student participation was influential in my decisions about data collection. For example, because I was uncertain if individual students would continue to participate, I decided against attempting to track the development of individual students. At the same time, because of
my experience with the technical theater program at Lincoln I suspected there would be veteran technicians who could would give insightful interviews.

In the final section of this chapter I discuss my data analysis procedures. I begin by discussion what I identified as data, followed with my interpretative procedures. Especially useful to me were the techniques of theoretical sampling and constant comparison (Glaser & Strauss, 1967, chapters 3, 7). Theories used to analyze particular pieces of data are discussed in later chapters as those data are introduced.

My History in Technical Theater

I was a teacher in the language arts department at Lincoln High School for three years. I began working in technical theater there on a volunteer basis in the second half of my first year. For the four years following my volunteer experience I was hired as an assistant technical director in the drama department, with the title master carpenter. This, like technical director or drama director, is an auxiliary position in addition to other duties, contractually similar to a coaching position. After my third year of teaching I was transferred to the language arts department at Revere High School because of district wide layoffs and budgeting issues, however for the first two years I taught at Revere I continued in my position as master carpenter at Lincoln. After leaving the master carpenter position at Lincoln, I worked for four years as master carpenter at Revere High School. The fieldwork for my dissertation was completed at Lincoln during the period I was working at Revere. I have since resigned both my teaching and master carpenter positions.

Many of the staff at Lincoln are personal friends, including Linus, the technical director and June, the artistic director, whom I consider among my closest friends. Bob, the current assistant technical director at Lincoln was a student there with whom I worked when I was assistant technical director. They are the Lincoln personnel who were most involved with the fieldwork portion of my research. When I initially suggested my study
to Linus and June, they were both immediately enthusiastic supporters of the idea. Bob was similarly enthusiastic.

I mentioned in the introduction that many members of my family are interested in hands-on work of various sorts. I was president of my high school industrial arts club during my junior and senior years. Along with a few close friends, I spent about half of my school day in the industrial arts building – a corrugated afterthought across the elementary school playground from the school’s academic building – and the rest of my school day in standard and advanced traditional academic classes. Along with an introduction to building materials and tool skills, those classes inspired a certain fashion sense that I also retain to this day: if you might spend time welding or running a table saws, it is best not to wear nice clothes or neckties. Because of this I was frequently referred to as a “shop-head,” our term for kids who spent a lot of time in the shop building, and with, I suppose, an implication about academic interests and occupational prospects and assumptions about recreational drug use.

I was generally able to turn my tool skills into occupational assets. I received jobs in cabinet shops, on construction crews, and as a farm handyman on the basis of those skills. My interest in technical theater is comparatively new. After some time out of graduate school in linguistic, I decided to return to the University of Iowa to pursue teacher certification in language arts. Thinking to fill in a couple months before the start of classes, I took a job at a temp agency. The first assignment they sent me on was to Heartland Scenic Studios, a small theatrical production company in Omaha, Nebraska. I was fascinated by what they did there and demanded that they hire me. I do not think that I ever worked on anything that was actually for a theater, but the things I did and that others did were very much in keeping with one aspect that continues to fascinate me in technical theater. What we were doing was creative problems solving using tools and materials to construct a tangible product that an audience will observe and have a predictable reaction to.
The company employed a man who did welding and metalworking and a woman who made sculptures. I had never worked somewhere that employed a full-time sculptress. There were also a couple electricians, a couple cabinetmakers, a theater carpenter, some special project people, and along with me a couple other guys who went out to locations to build and install things. A lot of the people had studied theater or had other interests in it; the secretary, who sometimes helped explain projects to us, was a choreographer and director at the Blue Barn, a respected local theater. We made displays for local stores and the ‘set’ for a local children’s amusement parlor’s tricycle racecourse. A large number of us collaborated on the stage display for Manheim Steamroller’s Christmas performance. I learned a lot about using power tools differently than they were intended to be used, and materials like plexiglass, acrylic blanketing, and fiberglass resin that are not typical construction materials. I also learned a lot about technical theater itself from my buddy Grant, who had a college degree in it. I remember being decidedly upset that nobody had told me about it fifteen years previously.

Research Setting:

Many people with whom I have talked about this project told me that there were not technical theater programs in their high schools, or if there were they were not aware of them. I do not recall one at my high school, although we did have plays and I imagine there were sets for them, although I can only imagine this, as I do not recall ever having gone to a play or other theatrical performance while I was in high school. As I mentioned in Chapter One, the term ‘technical theater’ covers a lot of territory, and the ways one could approach teaching in that space are numerous. As a way to help explain the setting I include a broad overview of the way technical theater is implemented at Lincoln. As a way of helping to contextualize the approach to technical theater at Lincoln, I compare it briefly to another technical theater program with which I am also familiar.
A Tale of Two Scene Shops

To explain differences in the way technical theater is conducted, I begin with a brief comparison of two high school technical theater programs, Revere High School, where I taught and worked as master carpenter in the theater department, and Lincoln, the site of this research. At Revere, technical theater is best described as a teacher-centered activity (Zemelman, Daniels & Hyde, 2005). Overall it is characterized by a lack of student input into design decisions and construction methods, with students provided little explicit explanation of how to use tools or the reasoning behind building a prop or set piece in the way it has been decided to build it. The technical director, in collaboration with the drama director, me, and occasionally other members of the performing arts department and parent volunteers, devise a plan for the set, props, scenery, and so on. A construction timetable is determined in coordination with the schedule of one or two volunteers or hired assistants with backgrounds in construction.

Technical Theater at Revere

Few students are typically involved in the initial set construction projects. For instance, at the beginning of the production of several play, the Revere’s technical director and I have completed the initial layout of the stage and arrangement of equipment on a Friday evening before a Saturday work day when four or fewer students have joined me, the technical director and a few adult volunteers. The technical director’s oft-stated goal is to get major construction completed without much assistance from the students, and he schedules work sessions with the other adults to achieve this. I cannot remember a pre-production meeting that did not include him saying words to the effect, ‘If we can just get a bunch of parents in here, we can knock a lot of this building out…’ on the first or second Saturday workday.

If more students than expected did come on one of these early Saturdays at Revere, it was difficult for us to accommodate them, that is, to keep them busy doing
productive work on the set; without chances to contribute, their opportunities to learn are curtailed. Two factors contribute clearly to this. The first is that the course of the production tends to be somewhat linear, beginning with the first work days devoted to the initial heavy construction of major set pieces. Obviously, finish or trim work, painting, and the like cannot take place until these pieces are sufficiently built, but with attention focused on the major construction small props and set pieces are not begun till later in the production cycle. The second factor is that the work on the initial construction is considered to be the purview of knowledgeable adults who may work with other adults or one or two students who are regarded as assistants or ‘gofers’. Taken together these two factors lead to few projects available for students to work on and few jobs for students on the projects there are. As will be discussed below, the lack of clear ways for students to contribute to the set building at these times, as well as the lack of expectation that they will, is important to understanding teaching and learning at Revere. Lave and Wenger (1991) develop the concept of legitimate peripheral participation to describe situations in which individuals learn and become members of a community by making meaningful contributions to achieving the goals of the community. Students at Revere with no way to contribute do not learn and do not become members of the technical theater community, and by not indoctrinating new members that community becomes increasingly defined by the participation of adults and a limited group of students.

Following the initial stage of heavy construction there is considerably more opportunity for student involvement. Parent volunteers and students participate in smaller projects to build props and finish the set, the students frequently in the role of helpers to an experienced adult who directs their activity. Later still in the production other tasks, such as painting things black, discussed below, become available. The discourse among parents and the technical director on the topic of set construction included frequent evaluation of the sorts of tasks for which student helpers will be suitable, the typical view being repetitious ones such as assembling pre-made parts or
building standard items like platforms. Student participation is thus seen to be monotonous, closely controlled by adults, lacking in creative or analytic input, and exclusively in the service of realizing someone else’s idea of the set.

The enactment of technical theater is considerably different at Revere than at Lincoln, as detailed in the next section. There is also a tension at Revere between the way technical theater is enacted and at least some of the ways it is discussed. In addition to the conversations described above, the technical director at Revere often expresses a desire to do a better job teaching students involved in technical theater, and he sees potential value in more extensive participation of well trained student technicians. His concept for providing the training for these students involves a mythical state of affairs in which a production is ahead of schedule thereby allowing him extra time to teach students, or opportunities outside of the actual production work of a play that are also seldom realized. In contrast, learning to be a theater technician at Lincoln is seen as a natural outcome of engagement in the work of a technician.

I wish to draw a contrast to Revere with my description of the program at Lincoln, but not pose it as a polar opposite. For instance there is also a tradition of parent volunteers at Lincoln, however the tradition is influenced by the volunteers’ backgrounds in theater and art and the current operation of the two programs. Students are involved in the production work at both schools, although in different ways, and students also have opportunities to learn lighting and sound at both schools. During performances the members of the stage crews at each school are entirely students. Both schools also attract a committed group of student technicians who work on all or most plays, sometimes for their entire high school careers. Both departments receive significant institutional support for their theater programs, and consequently their technical theater programs as well, including having a technical director position and the availability of a class devoted to technical theater.
Technical Theater at Lincoln

Plays at each school may require major building projects for the set. Both technical director’s are very concerned with student safety and at Lincoln the technical director or experienced adult would participate in any large building project that required special engineering or posed a safety risk, for instance a two story building or walkway that would support students. The progression of the set at Lincoln depends largely on the completion of projects, which I discuss more thoroughly below. Projects typically involve between 1 and 4 technicians working together to build, create, or paint something such as a set piece, prop. In addition group members may share knowledge of tools, materials, or techniques with each other. There is a whiteboard on which Linus sometimes has projects listed, but typically students wait for him to assign them a project. Projects clearly vary in complexity but overall are conceived to be manageable. As Cori, a veteran technician with whom I conducted an interview put it,

He [Linus] gives pretty clear directions. I don’t think anything’s too complicated… and if it is complicated then he has either a techie who kind of knows what they’re doing… instead of giving to like an actor (laughs)... or he gives it to one of the adults who are helping…. (Interview, April 12, 2010.)

Project assignments tend to be open-ended. Instructions may include specific engineering requirements but more likely will consider the meanings or effects the completed object is to convey, e.g. to make a cabin look rustic and poor or a hat be comically decorated. Frequently students teach each other how to use tools and materials, but if no student in the group has experience working with the materials or techniques required the project begins with Linus giving a practical demonstration. Following Linus’s demonstration, if the student technicians feel comfortable using the tools and materials they are left to collaboratively plan and complete the project. As Cori mentioned, at other times, particularly when the tools or materials are especially difficult to use, the object under construction is large or has special engineering requirements, or when safety is a concern, the technical director or other adult will work with a group of
students in a collaborative fashion similar to students working together. Even in the settings where students work closely with an adult, the overall character of the work is collaborative and the project emerges from shared vision. Student opinions and questions are respected and one of the implicit goals is enabling students to complete similar projects themselves. This is returned to in Chapters Four and Six where the topics of situated learning, apprenticeship, and collaboration are addressed.

There are significant differences in the approaches taken by these two schools. Numerous factors influence these differences. The number of students participating in technical theater, the skills and availabilities of parent volunteers, and the material and financial resources available to the theater department all are important. Many of these also relate more or less directly to the ways in which the technical director envisions the technical theater curriculum and the satisfactions that student technicians find through participating in that curriculum. While the work of the student technicians in the study is the primary concern of the research, the role of the technical director as teacher and organizer of this learning environment is also an ever-present concern in the background and which occasionally takes center stage.

While I am using Revere as a foil, I want to be careful lest I paint Revere’s technical theater program in a bad light. In this regard I should note a few other things. Like Linus, the technical director at Revere is a friend of mine, and the students seem to like him; stage crew positions are always filed and there is not often a shortage of students to help on work days when he asks them to come. He and I frequently talk about what he sees as his long term goal: the development of a strong crew capable of undertaking more projects for themselves. He frequently laments the lack of time available to spend teaching students, and feels instead that he has to take a more directly controlling role in ordering the work to maximize efficiency. His predilection as a technical director is not building or carpentry, but rather lighting and sound, perhaps helping to explain his desire to get carpentry out of the way as quickly as possible. He
works with students more in those areas and has arranged for the school to hire students
to perform certain jobs like turning on lights, microphones, and speakers in the theater for
evening events.

There are also differences too many to mention between the two schools in
general and their tech programs in particular. One that I will point out is that Revere does
not have a scenic artist like Lincoln does. This is a severe limitation on the way sets can
be conceived and built, and it means that the number, kind, and place in the production
cycle of many types of projects are limited. Early in a production cycle at Lincoln, June
could work with students painting a backdrop or working on other artistic elements, but
with nobody to work with students and painting at Revere, these options are not
available. During my time at Revere, I came to understand that this was a substantial
difference. It limited the kinds of projects we do, and therefore the options for students to
participate, and many students enjoy painting and begin their technical theater
experiences with it, at least at Lincoln. As discussed at length below, the opportunity for
students to participate in a meaningful way is key to the success of the Lincoln program.

Research Site

One of four high schools in a district that according to its website serves
approximately 17000 students, Lincoln has an enrolment of between 1600 and 1800
students from ninth to twelfth grade. The Midwestern city where the school is located is
the second largest in the state. Citing the 2010 census, the city’s website reports the
population of the metropolitan area in which Lincoln is located at approximately 250,000
people, about half of whom live in the city limits. Within the district Lincoln is regarded
as being the most racially / ethnically diverse and having the greatest range of economic
disparity among student families. District records show about a quarter of the students at
Lincoln identify as racial or ethnic minorities, and approximately thirty percent of the
total students qualify for free or reduced lunch. The school has and promotes a history of
academic excellence. At the national level this includes winning national Blue Ribbon School awards from the department of education as well as being highly ranked in “best schools” lists by rating organizations and in popular magazines. A large number of AP students and composite standardized tests scores in the 80th percentile are further achievements.

Although the total number of technicians at Lincoln is less than five percent of the student body, there are many ways for students to participate in technical theater at. One is by enrolling in Stagecraft, a class offered for language arts credit and open to all students. Students may also participate in technical theater as an extra-curricular activity after school, in the evenings, and on weekends, also open to all students. Stagecraft class and volunteering are different paths of participation that occasionally cross. Some students take Stagecraft and then decide to participate in technical theater as an extra-curricular activity, and some enroll in the course after participating extra-curricularly. Some students participate actively in extra-curricular technical theater but never take the course. Students can take Stagecraft multiple times for credit and more experienced technicians sometimes enroll and serve as informal TAs or use the time to work on special theater projects. My research focuses almost exclusively on technicians as they work in the theater but some research participants are also technicians for other school activities. For instance, the school’s three show choirs have technicians, and some technicians are present at most large gatherings such as school assemblies and band performances. Boundaries between groups of techies are permeable; the focal students who took part in my research work primarily as theater technicians.

As I mentioned earlier, students have different degrees of engagement and participation, but technical theater is a popular activity at Lincoln both as a class and extra-curricular activity. According to Linus, Stagecraft is typically fully enrolled or at least close to capacity every trimester and the backstage roles such as stage manager, properties manager, and lightboard operator are all always filled. Several dozen students
can take part in busy Saturday work sessions during production of the yearly musical, which tends to be the largest production. Saturday work sessions for the smaller play averaged fewer than ten students. A number of topic specific evening work sessions were attended by only four or five students. In later chapters, I provide data that addresses why students choose to participate in the experiences offered to them in technical theater.

Student Roles in Technical Theater

One of the challenges to data collection in technical theater comes from the range of ways that students participate. In this section I introduce the participants in the study. To do so requires first understanding some of the ways that students can participate in order to contextualize the participation of the students in the study. I begin with an overview of ways students can participate in technical theater and follow this with a brief introduction to some of the people discussed more fully in the data found in Chapters Four, Five, and Six.

Student Trajectories, Or What is a Techie?

In this section I share an overview of different ways that students participate in technical theater, keeping in mind that these descriptions are generalities and there will certainly be exceptions. There is no single student trajectory in technical theater for numerous reasons, some of which I list here and expand upon below. Students can be involved in technical theater at Lincoln through an official school class, as a volunteer after school activity, or both. There are multiple facets or distinct activities and students can chose to participate in those that interest them. Students can volunteer for as much or as little time as they like. Participation and acquisition of skills is generally non-linear, so participating in one play is not a prerequisite for participating in another. Students can
Figure 3-1  Floor plan of drama area showing Little Theater, Auditorium, Scene Shop, and Linus’s Classroom.
specialize in one area, such as lighting, sound, costuming, or construction, or they can work in many different areas.

Technical theater accommodates different levels of interest and engagement from its participants, with more and less formal ways to participate. Volunteering is open to everyone and is understood by the students to be noncompetitive. Students can work formally as an official member of the backstage crew for a play, or informally on by dropping by to help during a work session. Some technicians aspire to leadership positions such as stage manager or properties manager, while others will not. Some students will have conflicts with other activities such as athletics, and they may be active in technical theater only during their sport’s off season. Other will be consistently involved with theater, sometimes as an actor and other times as a technician.

Because participation varies, it is unclear to me at what point a student assumes the identity of a “techie,” as the veteran technicians describe themselves. Figures 3-2 and 3-3 show items on the walls in the theater area. During this research, a logo was adopted by the techies, a stylized drawing of a two-way radio headset technicians use to talk among themselves during rehearsals and performances. This sign is approximately six feet across. Albert, a long time adult volunteer at Lincoln, designed the logo, and Linus painted it on the wall of the shop; although not visible in the photo, the design is outlined with blue invisible paint that glows in the fluorescent lighting used during performances. I asked Linus for student reaction to the logo. Students technicians have used it on T-shirts they have had made and put it on items around the shop. Linus summed it up, “The kids love it. This is our logo, and we know it's like nothing else in the school.” (Linus, March 2013 email exchange)

The other photograph in figure 3-1 also shows a great deal of deliberation, if not the same sense of scale as the logo. It is posted in “the booth,” a small room at the back of the theater from which technicians operate lighting and sound equipment during performances, and affixed to the wall using black gaffer tape, a special product used by
technicians for jobs like holding down electrical cords or microphone cables. The original sign a number of common tools used by technicians, along with an image of the more specialized lighting instrument. Also shown is a riff on the initial sentiment, transforming the original subject-predicate structure, “techies rule” to an identification, “techies equal rulers.”

Figure 3-3 shows a whiteboard, also in the booth. At the top, Linus has begun a shopping list for trips to three different stores. Below, students have appropriated space for their own messages. These include a maintenance related message about broken dimmers, including specifications of the problem and initial diagnostics along with the temporary solution – unplugging the broken items – that the techie(s) took. It also includes a number of congratulatory messages, including numerous examples reading, “yay tech crew” and an iteration of the “techies rule” sentiment from the other sign, replete with a (labeled) drawing of a crown.

It is not clear who made the sign or left the messages on the whiteboard. Most of the time the booth door is locked and no students can get in. Other times, during rehearsals and performances, techies are in the booth. Few actors or adults enter the booth, so it is reasonable to assume that most, if not all, the messages were left by techies and for techies. What I do think is clear from this is that there is a sense of that a techie community exists. I am not in a position to detail the requirements for or benefits of membership, but I am sure that the trajectories of some student technicians lead them to being techies.

Important to casual participation in technical theater is that even infrequent participants make meaningful contributions to the play as a whole. These contributions do not have to be glamorous or require special skills. An example of a meaningful contribution is routine painting. Many sets have areas that need to be painted black, such as braces supporting scenery of underneath open stairways. Painting these areas is crucial to the production because the flat black paint hides these areas during
performances. Infrequent participants might also take part in a large construction project, perhaps by assisting others in their work and perhaps by building a discrete element of a project, such as one of the platforms used in the pathway around the orchestra pit discussed below in Chapter Five.

Moreover, even casual drop-ins have opportunities to learn during their participation. In the examples above the student involved in building projects might learn to use power tools such as a cordless drill or chop saw, whereas the painter could learn proper painting techniques, how to determine what needed to be painted, and the rationale for painting it black. Both these students would learn about the materials they were using and learn through experience how it feels to use them. Although casual help can distract veteran techies, drop-in participation is appreciated by the techies as well as the directors. It is important to understand that building a set is a nebulous project that ends because the first performance begins, not because the set is complete. There are always more tasks that can be done, if time permits, and any help allows more of those tasks to be completed. Linus described it like this:

So it kind of depends on, you know, sometimes it gets down to a list of: all right, this is what we absolutely have to do, this is what we would really like to do, here’s this awesome stuff that if we get the time to do, we’ll do. And you know, that third list is kind of the stuff that, that’s kind of what makes it, the vision come to life, or to come true. That sounds really highfalutin… but you get the idea. (Interview December 3, 2010.)

In my experience with the program and in my experience as a researcher, Linus and his technicians accomplish most of those items that Linus would “really like to do,” and some of the “awesome stuff” as well. Given his stance, increased participation from students can always be accommodated. It allows for some elements of the set to be completed more thoroughly or with more detail, and for more of those awesome touches to be included. This is a philosophic element of the program at Lincoln that distinguishes it from the Revere program, where extra student volunteers sometimes have no way to participate.
Figure 3-2  Two techie signs. At top is the Lincoln techie logo. At bottom is a sign of unknown origin posted in the booth.
Just as there are numerous ways to participate, there are numerous ways to become involved. Frequently students with no history in technical theater are introduced to it by a sponsor (Brandt, 2001) who does have experience as a technician. In many cases this a friend or sibling. In the following chapters I develop a conception of teaching and learning in technical theater that is inherently social and based on participation in the technical theater community. This situated approach to teaching and learning differs sharply from the overt instruction of many classrooms. Given that learning in technical theater is so different than in traditional classes, and even from learning in the Stagecraft class discussed below, a sponsor can be an important element of a new student’s introduction to the community.

In this study, Erica, introduced more fully below, was a sponsor in this sense. She introduced her friend Lilly to technical theater, and Lilly was an enthusiastic participant until she had to change schools. Other students such as Jonas and Cori, also introduced below, had informal introductions to technical theater in middle school that they developed more fully in high school. Other times, especially with the musicals which require far more preparation than other plays, actors are encouraged or loosely required by the drama director to help with production, typically for four hours one Saturday. Some actors find ways to avoid this altogether, some do just the required amount, and others do considerably more. Occasionally an actor will discover that they preferring being a technician to being an actor. Somewhat more common is that students who prefer acting find that there are more opportunities available to them as technicians. Grace, introduced below, was an occasional actor and occasional technician who tried out for plays and when she was not cast, worked as a technician instead. Other students who have small parts in a play may also spend more time doing technical work. Learning in technical theater at Lincoln takes place in all of these situations.

The theory of learning that I use to explain learning by doing as a member of a community is based on the concept of legitimate peripheral participation (Lave &
Figure 3-3  Combination shopping list and message board.
Wenger, 1991; Wenger, 1998), explained in detail in Chapter Three. As an introduction to the concept, one of its central features is the ability of participants to make meaningful contributions. Above I indicated that the nature of the construction work and approach to completing it adopted at Revere curtailed the opportunities for students to participate, whereas at Lincoln students had more opportunity to participate through scenic painting, making smaller props and working on mid-sized projects as well as on major construction. All of these contributions are valued at Lincoln, so on all occasions when a student comes to a work session, he or she has an opportunity to be involved in meaningful work, establish some degree of membership in the community, and learn from participation.

The technical director also advertises the need for help and after school meetings are held to introduce new students to technical theater, the directors, older technicians, and the shop and stage areas. Many students begin technical theater in their freshman or sophomore year through activities such as these. A beginning technician could expect to help build props and set pieces prior to the first play or plays he or she worked on. Typically a new technician works with more experienced students and in some cases the technical director or another parent volunteer on these projects as they learn the skills to be able to do them on their own. A newcomer might be asked to perform a technical task during the performances including the relatively simple raising and lowering of curtains or helping to change scenery between acts.

Students with more skills typically take more prominent roles during the production stage of the play, for instance being asked to work on more important or highly visible props. Experienced technicians may also be asked to work on projects requiring skills and materials with which they are familiar, and to guide less experienced students in the project. This depends on the more experienced technician’s expertise being in the relevant area. For example, if a student had learned to use the foam cutter he or she would not be assumed to have proficiency with the table saw. Experienced
technicians might also take more demanding roles during productions, including running fly lines or sound effects.

A junior or senior who has been involved with technical theater through most of high school would likely be asked to do the more involved tasks during play performances and to take a lead role in many production tasks. These students would run the soundboard or lightboard or be stage manager or properties manager. All of these roles require a good deal of organizational skill and involve leading groups of other students. The stage manager for instance is in charge of the technicians who move the scenery during the play, and the properties manager is responsible for all of the props used in the play as well as for making sure the actors put them away when and where they are supposed to. During preparation for a play such students might also assume the lead in projects such as hanging and focusing lights, building larger props or scenery, and painting detailed elements of the set. This might involve making design decisions, showing others how to use hand tools or power tools, and explaining construction techniques. In other words, they would assume the role of sponsor to less-experience students.

These are only general trends, influenced by many variables. As with all school activities, mundane concerns such as schedule conflicts or being able to get a ride to or from school also shape participation. Students can choose the plays on which they participate, working on some and not on others. For instance students might choose to work shows when they are not involved in sports. Also as mentioned above, acquisition of skills is non-linear and to a certain extent, jobs are exclusive. The stage manager and properties manager are likely to learn something about each other’s jobs because they work in close proximity to each other, but they would not learn anything specific about programming the lightboard as a dimension of those roles. Cori was a prominent technician who took lead roles in building projects and was stage manager for major productions, but was not a lightboard operator until her final play at Lincoln. Another
student, James, had interests outside of technical theater through which he acquired exceptional knowledge and skill with sound and sound equipment like microphones, soundboards, cables, speakers, and so on. His senior year he became more interested in set construction, but prior to that he contributed to productions almost exclusively as an expert ‘sound guy’ but not as a carpenter, painter, or crew member.

Cori, Linus and June on multiple occasions have pointed out that technical theater, especially the afterschool volunteer variety, is a social activity. It is decentralized, students work in groups and can talk to each other as they work, and can visit with students in other groups freely. Cori, Linus, and June all also mentioned in some way that technical theater provided participation opportunities for students who were not involved in other activities and opportunity for students to socialize in different groups than they usually did. While the possibilities for participation may be endless, not all are equally likely. As discussed in the next section and more extensively in Chapter Four, participation in the technical theater community of practice (Lave & Wenger, 1991; Wenger, 1998) is a more powerful influence on trajectory than participation in Stagecraft.

I hope to have described in a very general way some typical trajectories and exceptions to them. I turn now to some brief specific examples.

**Participation in Stagecraft Class**

A distinction needs to be made between technical theater as a part of Stagecraft class and as a volunteer activity. Stagecraft is an elective class for which students receive language arts credit. Moreover, students can take it multiple times and continue to receive credit. Students do not receive any credit, or in many cases any recognition, for volunteer technical theater participation. Stagecraft class and volunteer technical theater are similar in that they both involve technical theater, but as technical theater is such a broad category, there is no necessary overlap. Linus has a flexible curriculum for Stagecraft that he revises each time he teaches it. Within that curriculum he also has
opportunities for overlapping the class with a play production if there is one taking place, but this overlap is not guaranteed.

It is useful at this point to draw distinctions between various modes of participation. Throughout this dissertation I use the term “volunteer” to refer to participation in after school technical theater activities. My primary reason for using this term is to draw a distinction between participation through enrollment in Stagecraft class and participation at times after school for which the students do not receive credit. Volunteering – for anything – is complex in its own right and while I think the term is appropriate for making the distinction I am interested in, I realize it glosses over a number of points. As an example, at the schools I have worked at teachers and parents were encouraged to volunteer to work at concession stands during athletic events, but I have never heard anyone talk of students “volunteering” for the basketball team; there are assumptions about playing basketball that include it being enjoyable and beneficial for the student. Volunteering in technical theater is also enjoyable and as I argue, very beneficial to students, even if common understanding of the term associates it more with work and responsibility.

Although similar to service-learning, enrollment in Stagecraft and volunteering should also be distinguished from it. Bringle and Hatcher (1996) provide a definition of service learning:

We view service learning as a credit-bearing educational experience in which students participate in an organized service activity that meets identified community needs and reflect on the service activity in such a way as to gain further understanding of the course content, a broader appreciation of the discipline and an enhanced sense of civic responsibility. Unlike extracurricular voluntary service, service-learning is a course-based service experience that produces the best outcomes when meaningful service activities are related to course material through reflection activities such as directed writings, small group discussions, and class presentations. (Bringle & Hatcher, 1996, p. 222, cited in Zlotkowski, 2000, pp. 63-64).
Volunteer technicians clearly provide a service to the school, but receive no credit for it. Stagecraft students receive credit and sometimes provide a service to the school, but the class is not organized on the principle of providing such service. While some Stagecraft activities do directly relate to production of a play, others are relevant only to teaching the students in the class.

A few quick examples illustrate what I mean. In one data moment discussed in Chapter Five, during Stagecraft Linus demonstrated how to hang and remove lighting instruments, a sort of basic skill of technical theater. The students learned how to do this, but it was just an exercise; the lights they were hanging and removing were not being positioned for any performance. This is an interesting example of experiential learning or learning by doing (Rose, 1999, 2004; Lave & Wenger, 1991; Lewis, 2005). Also in Chapter Five I discuss a pathway built around the orchestra pit that actors perform on, and which the technicians have difficulty lighting properly. This project required many individual parts, and with his Stagecraft class Linus used building these parts as the means to teach various tool skills and construction techniques. The students learned general principles and deployed these skills to make objects used in the play. On another occasion I observed Stagecraft class while the students were in a computer lab learning to use Google Sketchup¹, a free software program used to make three dimensional drawings using basic geometrical shapes. At that time students were working on drawings of individual projects completely unrelated to any play production.

One possible student trajectory is that he or she would enroll in the Stagecraft course as a freshman or sophomore. They would like it, decide to participate after school as well, and become a regular technician. This is not very common, however. More likely is that a student would first become interested in technical theater by another route.

They would volunteer, enjoy it, become a regular technician and perhaps take Stagecraft later. While Stagecraft is an introductory class, there are reasons an experienced technician might enroll. One is to learn additional aspects of technical theater more systematically than is possible working on plays. Another reason is to experience a class that features different ways of learning and more physical activity than other classes. As a further part of some students’ trajectories, experienced technicians will frequently enroll in Stagecraft if they have an opening in their schedule. This allows them to work on special projects or serve as informal assistants to Linus during class.

As an advocate of technical theater and hands-on learning, it is interesting to me that the Stagecraft class, although popular itself, did recruit more students to regular after school participation and is not a good gateway to the technical theater community. In fact, participation in the community may be more likely to serve as the gateway to Stagecraft class. An additional element to consider comes from my interview with Linus. I asked him a general question about what and how students learn in technical theater and he responded, “I’ll guess I’ll probably just start with the extra-curricular stuff, because those are the kids I think probably get the most out of what we’re doing. I’m not saying that the kids who take the class don’t get anything out it or don’t get a lot out of it” (Interview, December 3, 2009). This suggest to me that while there is learning in Stagecraft, it is of a different character than the learning at out of school work sessions. This argues for the need to understand learning and participation in after school technical theater differently, in terms of situated learning, apprenticeship, and legitimate peripheral participation (Lave & Wenger, 1991) as more fully addressed in Chapter Four.

**Participation as a Volunteer**

Most of the work involved in preparing for a show takes place either during after school work sessions, evening topic specific work sessions, or during Saturday work sessions, or “builds” as they are frequently called. These sessions begin up to six weeks
before opening night in the case of the fall musicals, which are the largest productions of the year. Preparations for children’s theater\(^2\) begin three or four weeks before the opening, depending on scheduling considerations.

After school sessions typically begin fifteen minutes after the end of classes and last for two hours or less. Usually these are opportunities for experienced technicians to come to the scene shop and work on a project that interests them, and while Linus is in the area, perhaps working on a project of his own, he does little to organize these sessions. Exceptions to this may occur close to opening night when many things need to be completed, but generally students are working largely on their own at these times.

This is in contrast to the topic specific evening sessions. These tend to involve between four and six students who have skills in a particular area or interest in developing those skills. Frequently these evening sessions involve light rigging, and frequently Bob the assistant technical director is present. Because of the limited number of students and their specific interest in the topic, the directors have opportunities to teach in-depth or esoteric lessons. For instance one evening Linus showed two students how to dissemble a particular kid of light and replace parts in the base, where the light bulb plugged in, that had a tendency to wear out over a period of years – a useful skill given the age of many of the lighting instruments but beyond what a technician would do on a regular day.

Most of the work in preparation for a play is completed on Saturdays. Attendance at these, and the other technical theater activities, is voluntary and open to all students. Linus may check with particular students to make sure they are coming, and the drama director may urge actors to participate. Many veteran technicians attend all the work.

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\(^2\) “Children’s theater” is a tradition in this school district that was unfamiliar to me before working at Lincoln. These plays are short, with a running time of less than an hour, and feature characters from popular fairytales, children books, animated movies and so on. At Lincoln, seven performances of the children’s theater play are given with audiences of several hundred elementary students and parents attending each.
sessions unless they have a schedule conflict such as attending the performance of a show choir for whom they are also a technician. Work sessions begin at 9:30 am and are scheduled to 5:00 pm, although they frequently go longer. Students may stay for all or part of that time, and often leave and come back, making keeping track of the number of participants complicated. Small plays or off days may have only ten students participate, while busy days for the musical may have forty or more students working at a time.

Clicking the video below shows several days of production work for a musical prior to this research. This set was different than the *Into the Woods* set in that more of the construction was dedicated to a central upstage structure, whereas the *Into the Woods* set had multiple smaller pieces that were moved on and off set and a smaller structure, the mossy knoll discussed in Chapter Four, upstage. Keeping in mind that the video records only one of the work areas shown in figure 3-1, the auditorium stage, and not the scene shop, little theater, or outside, all of which are also used as work spaces during set work, the video captures the amount of activity typical of Saturday work sessions.

*Go, Dog, Go!* involved almost no intricate backdrop painting; the drop was almost solid pink with a lone tree in the distance. The production did require extensive painting on props, which allowed students more latitude to personalize their creations. While students with artistic painting abilities or interests took lead roles in painting the props, other students worked on building the “party tree,” a massive structure unlike any most of them had built before but which called upon skills using the chop saw and cordless drill that they had developed in other projects.
Because the amount a student participates is variable, so are opportunities to learn, although frequent participation is not a guarantee of learning lots of new things. A student could attend frequently, participate in the building of a large number of props but never paint anything. One student happened to learn a painting technique used to make painted boards look like wood grain, and he gained a reputation for this and was called on to use that technique many times over several shows. While he continued to gain expertise in that technique, he may have missed opportunities to learn other techniques.

On occasion, actors who come to a work session build a personal prop that they will use in the show. Although this is not always the case, I discuss two examples in
detail in Chapter Six. I speculate, and June and Cori agree, that many actors like to paint; certainly many do when they are required to drop by for work sessions. Beyond whether they want to paint, as a practical matter teaching them how to paint is frequently easier than teaching them to build something. When I asked Cori during an interview it led to the following exchange:

Cori It’s definitely helpful. I mean, I can paint, I don’t really prefer it. And most of the actors would prefer the painting instead of building. But then they get tired of the painting and so they’re like, ‘I want something else to do.’ (Interview, April 12, 2011)

Me Um…

Cori Which you kind of understand. But then it’s like, ‘well, unless you know how to use tools, I don’t really want you using them.’ (Interview, April 12, 2011)

Although she greeted the situation with good humor and indulgence, she also noted an attitude of entitlement in some of the actors, which she expressed thus:

You always come across the actor where, they want to everything. But like (loughs) only for a day. Then they’re done with it. (Cori, Interview, April 12, 2011)

Dramatis Personae

In this section I provide brief introductions to some of the prominent technicians in the study. Their views on technical theater are discussed most fully in Chapter Six where I detail the interviews I led with them. Because they are also involved in other data in Chapters Four and Five, I introduce them here. In addition I discuss general concerns about the way I selected students to participate in the study, especially those I asked to have interviews with me. I do not have background information on a number of students who are discussed in the study. Those students are introduced as needed in later chapters.

Linus Mcclimon, the husband of June Mcclimon, is a language arts teacher and the technical director at Lincoln, a position he had held since 1993. Along with language
arts, Linus studied technical theater while a student in college, and he worked as the technical director at a smaller high school before coming to Lincoln.

Two years before I began this study, Linus assumed the position of drama director at Lincoln when the previous drama director retired. At that time another man was hired as a language arts teacher and technical director. This man proved to be a bad fit and left the technical director position after two years and eventually left the district entirely. Linus returned to the technical director position and another teacher replaced Linus as drama director. Although there were considerable adjustments and readjustments, overall, Linus is pleased with the final staffing in the drama department. I mention this because in later chapters I consider technical theater at Lincoln to be a community of practice (Wenger, 1998; Lave & Wenger 1991) and issues of continuity in a community, the introduction of new members to the community by veteran members, and the evolution of community practices are important concerns for communities of practice. Although Linus was continually involved with technical theater, the introduction and subsequent removal of a technical director could certainly have impacted the community. I do not investigate the ways the community reacts to Linus returning as technical director; I did not collect data on the community myself during Linus’s hiatus, and the information I have from students is unsolicited and derogatory. Students may have quit or joined technical theater because Linus returned as director, and I have no way to – or interest in – investigating that. But it is important to note that all the students participating are doing so in the context of the previous director leaving and Linus reestablishing his directorial and pedagogical approaches in the community.

June Mc Climon, the wife of Linus Mc Climon, is the artistic director for the drama department. She is also the principal’s secretary at Lincoln. Unlike Linus, she did not become involved in theater by plan. Although she has had no formal training beyond some community art classes, most of her life she has pursued painting as a serious hobby, and this led to her being asked by her church to do some scenic painting for an Easter
musical show. She continued to work on similar productions until her two daughters were in school at Lincoln, at which time she became involved in scenic painting for the drama department. She has never taken formal classes in scenic painting and had considerable challenges adjusting the way she painted to work on the large scale of a backdrop or scenery.

Cori was one of the veteran technicians during my study. The first time I met her she entered Linus’s room after school and politely interrupted our conversation. ‘McClimon,’ she said, ‘I need the keys to the booth.’ The booth she mentioned was the lighting boot, a room at the back of the auditorium from where the lightboard is operated and which is used as a storage area for electronic equipment and which has the ladder to the loft above the auditorium. Linus tossed her his wad of keys, asked her to do some technician chore for him, and she agreed to and left. Keys of course carry great practical and symbolic significance. Cori said she needed them, and Linus gave them. He trusted her, with expensive equipment and dangerous locations, but also to competently perform whatever job she was doing. It occurred to me later that she never said why she needed to get into the booth; I presume to work on something. From their rapport, her easy confidence, and the fact that without being asked she was present after school to work, I could tell immediately she was a student I would be interested in observing. She seemed to be engaged in technical theater and to be veteran in the community.

Before coming to Lincoln, Cori went to another high school outside the district. She did not mention this much to me, and Linus told me that while he thought the other school musty have a good department, Cori was careful never to draw comparisons. Following her graduation, I have maintained contact with Cori; she is now studying technical theater at a university, and will share pictures of projects that she has worked on.

Two technicians, Erica and Grace, are featured prominently in Chapter Five as lightboard operators. Erica is a veteran technician and a regular at Saturday work
sessions. Hers mother was a theater technician, and Erica shared with me that she had
done tech work with her at other theaters in addition to Lincoln’s. Erica is a very skilled
with construction and power tools, but seems to prefer lighting work. She frequently
positioned and focused lights, repaired them, and helped other students to do so.

Grace is somewhat of an anomaly in that she prefers acting and works as a
 technician primarily when she does not get a role in a play. Nevertheless she got the
position of lightboard operator, alongside Erica. Grace’s mother also provided a link to
theater for her, as she had been in plays in high school and college. Of all the students I
interviewed, Grace spoke most powerfully about what she learned as a technician,
especially developing a respect for the work of technicians that she thought actors did not
understand or appreciate. She mentioned that when she explained the complexities of
lightboard programming to her mother, even she had had no clear idea of what it
required.

Jonas is another student who was not a full-time regular technician. I invited him
to participate in an interview when I learned that he had been asked to be the student
director for Go, Dog, Go! Most plays do not have student directors, so I was interested to
learn more. I was also interested to explore how he thought about technical theater from
his standpoint as director. Jonas was not a traditional student at Lincoln. For a number
of personal reasons he missed extensive amounts of school and eventually chose to
complete a General Educational Development Diploma (GED) program instead of
attending regular classes his senior year. Had he not chosen the GED option his class
schedule during his senior year that would have not allowed time for music or drama. He
continued at Lincoln only part time in those areas. At the time I spoke to him he had
completed his GED and been accepted to one prestigious acting conservatory and was
waiting to hear back from another.

Albert is a long-term parent volunteer at Lincoln. I taught one of his daughters in
class while I was at Lincoln, and another daughters was part of the stage crew for a play
that I was in while I was a teacher at Lincoln. Albert works with computers at Acme, but studied art and photography in college. Photography was the route that led Albert to participation in technical theater at Lincoln. He began with projects like taking pictures of cast members to use in bulletin boards before a show, and cast and crew pictures during or after a show. This led to invitations to photograph other events for the performing arts department. At some point he started helping during Saturday work sessions and has never stopped. As discussed in Chapter Four, in part based on his familiarity with the students and presence in the performing arts department, he was cast in the role of Mysterious Man for the production of Into the Woods. Since then his interest in performing has grown and he has performed in several plays at other venues around town. As with Linus and June, Albert has become a close personal friend of mine.

Research Questions Revisited

In the next sections I discuss my data collection and analysis procedures. While data collection and analysis were influenced by numerous practical and theoretical concerns, the overriding concern was to illuminate the research questions that guide this study. These questions focus on student learning opportunities in technical theater, how the pedagogy of technical theater shapes those learning opportunities, and the ways in which technical theater facilitates students’ meaning making. At relevant points in the next sections I explain how my rationale for particular decisions align with my research goals. I relist my research questions here to facilitate referring to them below:

1. In what ways are learning opportunities made available to students in the confluence of hands-on skills, critical problem solving, and artistic interpretation in the technical theatre curriculum?
   a. What learning opportunities are afforded?
   b. How are these learning opportunities constrained?
c. How do these opportunities align with the learning opportunities available in traditional language arts classes?

2. How does the enacted pedagogy of technical theater shape the kind of learning that occurs during both in school and out of school activities?
   a. What constitutes teaching, learning, and assessment in technical theater? How do these resemble and differ from teaching, learning, and assessment in traditional classrooms?
   b. How do technical theater activities shape the interactions of the students and teachers who participate in them?

3. What processes and resources for meaning making are available to technical theater students? What is the nature of the meanings these students construct?
   a. How are the meanings related to the students themselves, to the written text (the play script), and to the enacted text (the performance) as a whole?
   b. What possibilities for making meaning arise in the acts of hands-on production, critical problem solving, and artistic interpretation?
   c. How do the meanings evolve through processes such as collaboration, iteration, and discovery?
   d. How and to what extent are meanings circulated among theater technicians, actors, and directors?

Data Collection

In this section I move from the setting and participants to a discussion of processes and methods. The nature and scope of technical theater presents interesting challenges to data collection and unified description under a narrow theoretical framework, i.e. there are so many interesting activities and interactions that occur that a narrow focus would obscure the rich complexity of the subject. No single method of data collection or analysis seemed expansive enough to ally my exploration of the intricacies of technical theater that were important to me. Further, the hectic nature of technical theater, Saturday work session in particular, posed particular challenges to me as a
As the sole researcher, I found at times that it was difficult to recognize, let alone observe, all the constituent elements of a particular project and to follow a student of interest for an extended period of time.

I have approached this by making choices to not explore certain entire areas of technical theater, such as costuming and performance. I have further narrowed my exploration by focusing on several key projects that illustrate themes that emerged from initial reflection on my observations. By focusing on key literacy events (Heath, 1980; Goodman, 2003) I hope to provide a high level of detail to particular projects as well as describe enough projects to give a feel for the whole activity. To retain a greater degree of flexibility I augment the key examples with other relevant observations of either the students in the key event as they work on other projects or of other students working on a similar project.

Collection Methods

During this study I collected data through observation, participant observation (Smith, 1978; Atkinson & Hammesley, 1994), informal interviews and conversations with adults and students, formal semi-structured interviews with adults and formal semi-structured interviews with students (Fontana & Frey, 1994). I have also taken supplementary photographs of equipment and props, and as evident in the introduction, I use photographs taken by Albert and published on Facebook with his permission.

The degree of my participation in activities at any moment was shaped by the activity. Certain events lent themselves primarily to observation, including during lessons in Stagecraft classes, technical rehearsals, and performances, at which times it would have been inappropriate for me to participate in the activities. During after school and weekend work sessions participant observation frequently was a better choice. On some occasions the technical director asked me to supervise a project or teach students something, and on other occasions I just joined in with students working on a project, as
is not uncommon for other technicians to do. On a few occasions, such as the leaf making project described in Chapter Six, students asked me to join them on a project, and on dozens of occasions students asked or I took the initiative to teach students how to use tools.

Other factors influenced my participation. As discussed below, Linus could not manipulate his orchestration of work sessions to better suit my data collection because it would have been too unlike the normal functioning of the community. Similarly, to be accepted in the community, I felt I had to do at least some work during all my observations; I could not just sit and watch people working for four hours. At some times this meant working with students I was observing and recording notes as soon afterward as possible. Leery of the accuracy of recollected field notes, and suspicious of the ways my participation would affect the students’ work, this was not my preferred method. Other times, I watched a particular project, but alternated that with helping on another project being worked on nearby. In that way I could monitor the progress of the project and record notes more frequently while still maintaining some credibility as a practicing technician. This method meant that I necessarily missed details of the project in which I was interested while working with the other group.

Data Collected

In this section I detail the opportunities I had to collect data in different settings. Following these descriptions, table 3-1 at the end of this section summarizes the information.

I attended meetings of Stagecraft class approximately twice per week during the first 12-week trimester of the 2009-10 school year and recorded observations in my field notes either as an observer or, less frequently, as a participant observer.

I made participant observations of afterschool work sessions, most often on Saturdays but in the afternoon or evening after school as well, during three plays in each
of the 2009-2010 and 2010-2011 school years. I recorded a total of 52 entries from these occasions. Some of these entries run over 2000 words, but most are much shorter. Frequently they include notes on multiple projects or students that I observed in a day. I also recorded six voice memos on my cell phone. This was convenient in that it did not require me to have my computer with me, but listening to the memos proved tedious and I gave this up as a note taking technique.

In addition, I observed some events that were not strictly speaking technical theater. I observed and took notes during two “operation backstage” events at which high school theater technicians introduced elementary school students to technical theater work back stage of the theater. On another two occasions I observed and participated in the setup for a large annual show choir event hosted at Lincoln and that more than 30 schools attend. It is a massive event and the student technicians, along with Linus, adult volunteers and some professional companies, turn the main gymnasium into a temporary stage and set up light and sound systems. I have also made notes based on three instances when I happened to encounter student technicians unexpectedly, the most significant of which occurring when I talked with a group of technicians painting props for Go, Dog, Go! after one interrupted a district meeting I was attending in Linus’s room and I followed to see what she was up to.

I conducted formal, semi-structured interviews with Linus, June, Cori, Jonas individually as well as a joint interview with Erica and Grace, who worked together as lightboard operators. These are in addition to numerous casual conversations with Albert, Linus, and June that I do not consider part of the research process per se, but which nevertheless were useful as I developed my understanding of technical theater.

I asked students for interviews based on a range of factors including if I had worked with the student on a project, if I had established some sort of rapport with the student, if I had observed the student repeatedly engaged in activities I found interesting, and on the recommendation of the technical director. A number of other interviews were
also scheduled but canceled due to student illness, a snow day, and a miscommunication among Linus, me, and the student. These data location opportunities are captured in table 3-1 below.

Table 3-1 Data collection opportunities organized by researcher role.

<table>
<thead>
<tr>
<th>Role</th>
<th>Setting / Location</th>
<th>Recording Methods</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observer</td>
<td>Stagecraft class</td>
<td>Field notes</td>
<td>Approximately twice per week for 12 weeks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reflections</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Operation Backstage</td>
<td>Field notes</td>
<td>2 occasions, 1 per year</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reflections</td>
<td></td>
</tr>
<tr>
<td>Participant Observer</td>
<td>After school work session</td>
<td>Field notes</td>
<td>52 occasions during 6 plays over two years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reflections</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Technical rehearsal</td>
<td>Audio recording</td>
<td>3 plays</td>
</tr>
<tr>
<td>Interviewer</td>
<td>Private interviews</td>
<td>Audio recording</td>
<td>2 interviews with adults</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 interviews with students</td>
</tr>
</tbody>
</table>

Considerations for Data Collection

As with any study, this one was shaped by my options for data collection. Some elements of the technical theater environment are particularly relevant in this regard. Most Saturday work sessions are very busy, with multiple groups of students in multiple locations working simultaneously on projects of different nature. Even when limiting my attention to a single area, there could be several groups working at once, and I was concerned that I was missing too much relevant detail. Although I had permission to
make audio recordings and did so during technical rehearsal, discussed in Chapter Five, the environment was generally too noisy to make useful recordings. This lead to reliance on field notes as a primary data collection technique.

Another issue arises from the fluidity of technical theater participation. Although I came to know a number of techies, I could never be certain who would be at any work session, so tracking a particular student over an extended period of time was not a plausible option. Many of the technicians I observed I may have seen only once. This fluidity is reflected in the way I chose to organize and analyze data, specifically in terms of short incidents or projects that a technician participated in throughout, and the community as a whole, which supersedes any individual technician’s participation. This is discussed further in the analysis section below.

I understand that variable participation in a study and concerns are not unique to technical theater. For instance Teitle (2012) reports similar challenges to researching the unpredictable activity of “hanging out” at a youth center, where she was never certain who would show up or what they would do. Researching technical theater posed similar challenges in addition to the amount of physical space technicians had in which to work and the large number of students who might participate. As a practical approach to the situation I took a two faceted approach. As I became familiar with the veteran technicians, when I noticed them at a work session I made a point of checking on what they were working on. I also kept an eye on Linus’s whiteboard with projects listed on it, and checked in with Linus – frequently over breakfast before a work session – on the projects likely to be worked on that day. I would then make choices about how to divide my time among all the activities taking place, frequently updating my decisions as students came or left or projects were completed.

Two final points regarding the ways in which my research was shaped by my options for data collection. First is that although I may have been able to persuade Linus to orchestrate projects to facilitate my data collection, I never had any inclination to do
so. I describe in Chapter Seven the way the technical theater community operates and believe that had Linus manipulated the procedures of the community for me even in seemingly innocent ways the data and the community would have been skewed. This relates to the second point, regarding my role in the community. Although students knew me to be a teacher and a friend of Linus, June, and Albert, I wanted them to see me primarily as a member of the technical theater community – an expert like Albert, older but not otherwise remarkable. I return to the topic of my position in the community in my discussion of the failed leaf making project in Chapter Six. In Chapter Seven I argue that an important element of the behavior of the community is that adults take an active role in the same work as students. I felt that my presence as a non-participant observer would not be readily accepted by student technicians and like Teitle (2012, p. 38-40) felt working as a volunteer was useful for establishing my role in the community. Further, during most work sessions there is a pervasive disposition towards pitching in to help; for me especially as a master carpenter it was frequently difficult to sit and take notes when others were working, especially if I could help them work better.

Having provided some indication of the amount of data and collection methods, I turn to the principles I adopted regarding classification and analysis of the data in question.

**Analysis**

Data analysis for this research began during primary data collection and has continued through writing this report. Three elements characterize my approach to analysis: a personal practical level, an intuitive or interpretive theory construction level, and theory application level. At the level of theory application, I chose pieces of data I had collected and analyzed them according to existing theories of composition in literacy (New London Group, 1996) and art (Beittel, 1972; Ecker, 1963) and of learning more generally (Lave & Wenger, 1991; Wenger, 1998; Barton & Tusting, 2005; Engeström,
1987, 2001, 2008; Engeström, Miettinen & Punamäki-Gitai, 1999). Data was analyzed using multiple theories and either comparisons were drawn between approaches or the approach providing the best explanation was pursued in detail. At the interpretive level I use an approach derived from grounded theory (Glaser & Strauss, 1967; Strauss & Corbin, 1994) and the constant comparative method (Charmaz, 2000, 2006) to make connections between observations and emergent conceptual categories.

At the personal practical level, I made choices about what I would consider data and how I could go about collecting it, the specificity of the data I would be able to gather, and how I could initially organize it into manageable units. For instance, I knew from experience that I would be able to closely observe and record in field notes brief incidents such as mini-lessons without being intrusive. I quickly learned that that it would be difficult to observe and record a project such as the walkway building in Chapter Four in the same way. Not only would it have been exhausting, but it would have been intrusive as well. The ways I was able to observe and record activities affected both the nature of the data and how I came to conceptualize it. The led me to decide on the incident, the project, and the community as a whole as three levels or units of analysis.

Units of Analysis

In their guide to grounded theory Birks and Mills (2011) write, “One of the most important things that you will do in the planning stage of your study is to specify the unit of analysis.” Following their advice, before beginning discussion of my means of analysis, it is useful to consider the units of analysis I employ in this study. There is wide variation in the size and scope of units of analysis employed in different theories (Lewis, 2005). A theory as narrative analysis (Wortham, 2001) can considers a single utterance or part of a sentence an appropriate unit to for analysis, a level of detail difficult to capture in my research setting. Ranker (2007, p. 404-405) proposes a similarly fine-
grained analysis of multimodal composition, focusing on the level of individual compositional elements. In some instances I examine student compositions at the level of individual elements, but wish to avoid an overemphasis on texts or other finished products for reasons I discuss in Chapters Four and Six. My interests focus more on processes and activity.

My conception of a unit of analysis is influenced by Rogoff (1995) and relates to the granularity of the data to be considered helps to explain the scope of the different items that I consider to be data. Like Rogoff, I consider multiple units of analysis as a way of foregrounding certain activities while remaining mindful of the relations among activities across the units of analysis. In the early stages of data collection as I began preliminary classification of my observations I found I had interests in data on multiple levels. In the course of the study I classified these as the levels of community, project, and incident. There is precedent for such a classification in the relevant literature. Wenger (1998) discusses the community of practice as a mid-level unit of analysis (pp. 124-26), excluding individual encounters between people as too small and whole corporations as too large to be usefully analyzed with community of practice theory. Seaman succinctly summarizes this position, “When studying and analyzing communities, the primary unit of analysis concerning communities of practice is the community itself” (Seaman, 2008, p. 275).

A broad community level focus is useful for understanding the pedagogy of technical theater, but elements of that pedagogy are sometimes enacted in brief incidents that have their own internal structure. This is apparent in the recent evolution of activity theory. Engeström expands the scope of activity theory analysis writing, “The emerging third generation of activity theory takes two interacting activity systems as its minimal unit of analysis,” (Engeström, 2001, p. 133). Implicit in this is potential of considering a single activity system as a unit of analysis (e.g., Engeström, 1987). It is worth expanding on this point briefly. The possibility of considering the interactions of multiple activity
systems provides a broader scope and more complex level of analysis to activity theory, but at the same time does not reduce the significance of the individual activity systems. In fact, analysis at the level of individual systems is entailed in the analysis of their interactions. When focusing on incidents or projects, I consider them in the context of the technical theater community, and in considering the community I remain mindful that it is constituted by multiple individual incidents. Discussing the use of “activity” or “event” as a unit of analysis, Rogoff (1995) argues that the individual and the social are “inherently in the others’ definition,” but explaining why this does not preclude analysis at multiple levels continues, “Nevertheless, the parts making up a whole activity can be considered separately as foreground without losing track of their inherent interdependence in the whole. Their structure can be described without assuming that the structure of each is independent of that of the others. Foregrounding one plane of focus still involves the participation of the backgrounded planes of focus” (p. 140).

Activity in technical theater can productively be analyzed on multiple levels, and I employ multiple theories to do so. Below is a brief description of the levels and projects that apply to each.

Community as Unit of Analysis

The role of a community is explicitly important in situated learning theory (Lave & Wenger, 1991) and activity theory (Engeström, 2001), concepts I introduce in Chapter Four. While the community is assumed as a presence in Chapter Four, in later chapters, (particularly in Chapters Six and Seven) the nature of the community is more important and I consider the technical theater community as a unit of analysis. First, my rationale for choosing the tech theater community as a unit of analysis stems from interview data in which participants often speak in general terms about their experiences in technical theater and move beyond the context of individual events. Second, I take into consideration Linus’s teaching philosophy and the reasons why he structures lessons,
projects, and participation the way he does. His philosophy and pedagogical choices are a determining factor in the functioning of the whole community. They also supersede any individual project or incident.

My first and second research questions regard the ways in which the pedagogy of technical theater provides learning opportunities for students. Learning opportunities are made available to students as members of the technical theater community as part of the way in which Linus’s pedagogy is enacted. As I will argue below, particularly in Chapters Six and Seven, learning in technical theater is best understood as a social process that occurs as an integral part of membership in the community, e.g. through apprenticeship or legitimate peripheral participation (Lave & Wenger, 1991).

Consideration of the entire community is essential to understanding Linus’s pedagogical philosophy, which is embedded in the functioning of the community, and therefore analysis at the community level is valuable for understanding how his philosophy is enacted.

Project As Unit of Analysis

The work of technical theater at Lincoln is frequently divided into projects, as described above. All of the projects I discuss at any length below involved building or otherwise creating something. I might have considered an activity like hanging a number of lights or the moving of all the lights from the little theater to the auditorium as projects; the key elements seem to be concentrated work over an extended period of time for a goal outside of the activity itself. I am not inclined to consider the light hanging lesson in Stagecraft class as a project, the goal of the lesson being contained in the lesson itself, but a similar amount of labor hanging lights for a show would fit with my definition of a project.

Projects analyzed in Chapters Four through six include the bookstand project, in which two students collaborate to make a bookstand for a character in a play, the
walkway project where Albert and two students build a walkway on which Albert will perform during in the play, and the tree building project in which two technicians build a magical tree that a friendly spirit lives inside. Also included is the lightboard programming for *Into the Woods*, a protracted project the tangible product of which is the completed lighting program and the resultant stage lighting.

Exploration of projects is relevant to all of my research questions. Projects typically involve students learning through creating, problem solving as they build scenery or props. As discussed in Chapters Four and Five, the project is a central component of the pedagogy of technical theater at Lincoln. Working on projects also represents a clear example of students making meaning through composition. These projects in particular were chosen to analyze because they are relevant to a number of my sub-questions as well. The walkway build illuminates hands-on learning and composition; the tree building is an example of students engaged in a creative project that allows them to explore meaning making collaboratively; and the lightboard programming is important because it displays not only sophisticated student learning, but also a aspect of technical theater pedagogy not seen in other projects.

**Incident as Unit of Analysis**

I also discuss a number of incidents as units of analysis. Incidents are smaller than projects; any project will compose multiple incidents. The usefulness of examining incidents is that it allows me to discuss more closely observed data spanning a shorter length of time. This is particularly useful when considering individual learning moments such as mini-lessons, or specific instances of physical activity. Keeping in mind that foregrounding an incident does not involve disregarding other levels of analysis, analysis at the level of an incident does not require extended observation or discussion of the community or project the incident is part of.
Mini-lessons are prime examples of incidents. Particular incidents examined include the table saw incident, in which Bob, the assistant technical director, superfluously teaches Cori and Erica to use the table saw they had recently taught other students to use, the wrench incident in which a girl in Stagecraft class works through her difficulties hanging and removing a light using a special light hanging wrench, and several mini-lessons in which teachers and students teach other students to use particular tools or materials.

Mini-lesson incidents are important to discover because they represent occasions of direct instruction in technical theater. As lessons occur between students and other students as well as between adults and students, they are relevant to both the pedagogy of technical theater and the interactions among participants. The wrench incident is particularly relevant to the concept of hands-on skills in my first question. The table saw incident is relevant to parts of my second questions involving learning and assessment in technical theater and interactions between adult experts and students.

Grounded Theory

The data in this study are analyzed initially using concepts derived from the method of grounded theory (Glaser & Strauss, 1967; Strauss & Corbin, 1994). Grounded theory methodology involves the use theoretical sampling. As Glaser and Strauss define it, “Theoretical sampling is the process of data collection for generating theory whereby the analyst jointly collects, codes, and analyzes his data and decides what data to collect next and where to find them, in order to develop his theory as it emerges” (Glaser & Strauss, 1967, p. 45). Thus, data are not merely collected and considered, but “theoretical sampling” directs the researcher toward further sources of data. The method of theoretic sampling was combined with the technique of “constant comparison,” in which coding of data and development of theory is a single symbiotic, iterative procedure in which the
theory is designed as data is examined and redesigned as data is further analyzed or more
data is collected.

Grounded theory is not an appropriate choice for all research projects, but is well
suited to my interests in technical theater. Suddaby (2006) explains that, “Clearly,
[grounded theory] is most suited to efforts to understand the process by which actors
construct meaning out of intersubjective experience…. It is less appropriate, for example,
to use grounded theory when you seek to make knowledge claims about an objective
reality, and more appropriate to do so when you want to make knowledge claims about
how individuals interpret reality” (Suddaby, 2006, p. 634). As an experienced theater
technical, it would have been impossible for me to engage in this research without
background assumptions or preformed expectations of what data I would discover and
why I would find it interesting. Given this familiarity with technical theater and my
ability to both observe and participate in the research setting, grounded theory
methodologies were an appropriate choice. Referencing Strauss and Corbin (1998),
Suddaby again makes the point clearly:

Exemplary research using grounded theory also requires
considerable exposure to the empirical context or subject area of
research. Contradicting prevalent ideals of scientific detachment
from context, the constant comparative method implies an intimate
and enduring relationship between researcher and site. Because of
this close and longstanding connection, the personality, experience,
and character of a researcher become important components of the
research process and should be made an explicit part of the
analysis.

While I make no claims to conduct exemplary research, this method does allow me to
build on my initial knowledge of technical theater

Coding and Logging

Taken together, the methods of theoretical sampling and constant comparison
guided my approach to data collection and initial coding. Theoretical sampling was
particularly important. After multiple initial observations of Stagecraft class and
volunteer work session, during which I was considering practical matters such as appropriate units of analysis mentioned above, I began developing a rapport with student technicians. This allowed me to ask them questions about projects they were working on or assist them either by teaching them how a tool worked or by working on a project with them. Information I gathered from these interactions was typically recorded in field notes, which often contained reflections I wrote after an observation, or in separate documents dedicated to reflections. As time allowed, I reviewed these notes and reflections and used them to help me select the projects or incidents I would be interested in observing.

Much of my early coding emerged from these reflections as I categorized and reviewed them. Along with this, I made attempts to gather more evidence and refine my thinking through conversations both with technicians and others. One clear instance of this began early in my research when I observed instances of students building objects, and at various points associated them with composition, revision and materials. These observations provided the basis for a number of discussions with Professor McGuire involving the nature of composition in theories of student art creation. The first item mentioned by Suddaby (2006) on his list of what grounded theory is not is that “grounded theory is not an excuse to ignore the literature” (p. 634). My conversations with Professor McGuire led me to explore the literature on art composition, notably Beittel (1972) and Zurmuehlen (1990) which in turn helped direct my observations toward instances in which students were engaged in processes that might fit my understanding of artistic composition. This trend to my observations also led to a number of conversations with students during or just after their composition processes, some of which are related in Chapter Five.

As research continued I began to schedule interviews, first with Linus and June, and later with student technicians. My observations led to many of the lines of questioning pursued in those interviews and responses led to further refinement of my
observations. One example should serve illustrate this point. During our interview, Linus and I discussed the slotted spoon, a prop an actor created and became especially attached to. Linus provided an explanation, related in Chapter Six below, of why the student actor had worked on the prop so earnestly that I was able to compare to my notes on the incident as well as align with my developing understanding of composition processes.

Appendix A includes a detailed discussion of my coding and logging procedures.

**Analysis**

As I mentioned, my goal was never to derive new substantive or formal theory for technical theater, and my coding was never directed toward this end. My primary goal was closer to applying existing theory to data from technical theater rather than the construction of new theory, and data was coded with this in mind. Much of my initial exploration of the relevant literature involved considering how theoretical frameworks could account for the observational data I was gathering and how those data might be coded differently if considered from the perspective of a different theory. Ultimately, three major concerns dominated my interests and theoretical frameworks applicable to each were chosen. In particular, I wanted to understand how particular events – projects and incidents – fit into what I had come to consider the technical theater community. I wanted to explore the concept of embodiment at it related to learning. And, I wanted to describe text making in technical theater and explore its relationship to literacy. These concerns remain consistent with my original research questions although they do represent a slight change of emphasis that reflects my developing understanding of learning in technical theater as a feature of engagement in the technical theater community and the projects and incidents as constituent activities of the community.

After coding and logging, further analysis involved careful examination of the tenets of existing theories and the development of an explanation of the data in
accordance with those theories. The first example of this in Chapter Four is the walkway project that is analyzed as an example of text creation using the multimodal literacy theory first advanced by the New London Group (1996). In the spirit of Leander and Boldt (2012) I approached understanding the project by asking what would be relevant to a multimodal analysis, what questions would a researcher in the multimodal literacy tradition try to answer, and what insight would derive from such an analysis to help us better understand the event. In addition to this, I considered what must be an overarching concern, whether the theory provided a satisfactory account for the data. Conceptual categories I had developed through previous reflection on the data proved useful in addressing the concern of the adequacy of the theory. Concepts of embodiment and embodied composition, motion and affect, and texts, performance, and interpretation in theater all suggested that the multimodal literacy account of the event was missing elements that my initial analysis of my observations suggested was widely important in technical theater.

The results of this approach are presented in some detail in the following three chapters. On many levels I find my conclusions compelling. This is not to say that having completed data gathering and analysis I am entirely satisfied with my approach. A more systematic approach to initial stages of coding may have revealed important aspects of the data outside of the categories that became important to me. Likewise, more time spent developing those categories before considering outside theories would have led me to more substantive attempts at theory construction of my own. There were many factors to weigh in this decision making process, including the breadth of data I wanted to consider and my knowledge of multiple competing philosophical traditions to understanding the body which I did not find it likely I would improve upon through my research here. I am not certain I got the balance exactly correct but I have respected the data from all of my sources as well as the range of outside theories I employ without letting any exert undue influence on the others.
CHAPTER IV
THREE WAYS OF THEORIZING TECHNICAL THEATER

In this chapter I describe several key moments from my observational data. In doing so I begin to address the questions of what learning takes place in technical theater and how best to understand the mechanisms through which the technicians are learning along with the behaviors associated with the learning. Naturally, these are not independent concerns: how learning is conceptualized influences how behaviors are understood, and how behaviors are conceptualized influences what and how students can be understood as learning from engaging in those behaviors. A view of learning that for instance privileges memorization, discrete skills, disembodied abstractions, and appreciation of classic texts (e.g. Hirsch, 1988) would see little of value in technical theater, whereas a conception of student behavior that understood them as participating in a culture that valued informal learning groups, self-expression through creation of multiple forms of text, and collaboration to solve emergent problems (e.g. Jenkins, 2007) would consider the technicians to be richly engaged in learning. While there always exists relationships between how behaviors and learning are theorized, this may be of particular importance when analyzing technical theater.

Technical theater is a non-traditional learning environment for literacy. Among other things, this means that students consult few written texts and the primary texts which students make are not written; the physical environment is many times the size of traditional classrooms and in using the space students are more physically active, loud, messy, and so on than in classrooms; the technicians use a number of hand- and power tools; they engage in activities not typically associated with literacy such as carpentry, painting, and electrical wiring; and the students operate with great independence and minimal supervision from the technical director. The unusualness of the learning
environment indicates the importance of careful consideration of the theoretical background.

Technical theater is a hybrid activity. As mentioned in the introduction “technical theater” is a loosely defined and broadly applied term that covers activities during a performance as well as before and after a production’s run. Elements of performance during a show vary from play to play but typically including such jobs as running spotlights, running the sound and light boards, changing scenery, and raising and lowering curtains. While these performance aspects suffice to make for a complex undertaking, technical theater also includes pre-performance production elements of even greater extent, including carpentry and electrical work, light and sound rigging, sound checks and light checks, painting and set decoration, prop organization, costuming, and other fabrication work using a wide range of materials (Hoggett, 1975; Kaluta, 2003; Campbell, 2004).

While some of these activities relate in clear ways, for instance the sequencing of first building and then painting a set piece, others are not so related, for instance hanging lights that will eventually shine on the set piece but which can be hung at any convenient time. Further, the activities themselves – building, painting, lighting – are dissimilar and likely not to be conducted by exactly the same groups of technicians, although there may well be overlap among the groups. Although all of these activities are crucial, they differ in significant ways, including the type and amount of work involved, the skills required for the work (Lawler, 2007) and the perception of how important the work is to the production. Running the light board might involve triggering two hundred light cues in the course of the play and requires constant attention but little physical exertion. Performing two or three scenery changes during a play requires moments of intense physical activity but also allows considerable idleness during the balance of the show. Further, in accordance with their difficulty and desirability, some jobs may be reserved
for more experienced techies or limited in the number of technicians who are able to participate.

At Lincoln, the different forms technical theater takes compounds this messiness. Although my attention is primarily on after school and weekend work sessions, technical theater also has a part in the official school district curriculum in the form of Stagecraft class for which students earn English / language arts credit. This is a somewhat atypical situation in that some students are involved in both, others are involved in technical theater exclusively as either a member of the for-credit class or as a volunteer in the after school and weekend activity. The relationship between the Stagecraft class and the volunteer activity is complex and variable depending on factors including the production schedule for the current play, if one is imminent; the skills, knowledge, and enthusiasm of the Stagecraft class students; the demands of the production; and the rate at which the class completes the requirements for the Stagecraft curriculum. So, if students in Stagecraft class were enthusiastic and had already completed learning carpentry skills in class, they might end up working on the set for an upcoming play during class, but they might not if, for instance, they were scheduled in the computer lab to work on their set design project.

Focusing primarily on the volunteer work sessions helps somewhat to reduce the messiness, but work sessions can be exceptionally busy. On busy days such as described in the introduction a few students may work by themselves while a dozen groups of between two and four students may be each working on a separate project or sub-part of a larger project. Composition of groups gradually but continuously shifts as projects are completed, students arrive or depart the work session, the technical director reorganizes to balance the student abilities in various groups, or the students for reasons of their own move from one group to another. These groups may be under the direction of the technical director, working in collaboration with an adult volunteer, under the more or less formal guidance of a peer leader, or collaborative without a clear project leader, all
of which situations allow for different possibilities of learning both in terms of what is learned and the mechanisms of how it is learned.

Not all work sessions are similarly busy. Some are more specialized and directed to students who already have skills in a particular kind of work or who are especially interested in learning skills in that area. As an example, the evening lighting clinics, to be further discussed below, were open to all students but attended by only a few student technicians with experience in lighting and a few novices interested in learning. Other sessions are small due to factors outside of technical theater per se. For instance, there is considerable overlap in participation in technical theater and other performing arts activities. Show choir, speech, and band contests are frequently held on Saturdays and those events draw both students and adult volunteers away from theater tech work sessions, the rationale being that competitions are more important than ‘regular’ workdays\(^1\). Athletic competitions and other school activities can also interfere. Consequently, some work session may have only a couple groups of students participating.

Some days or work sessions are comparatively small and focused. For example, I observed three evening lighting clinics, each attended by four or five students, the technical director and an assistant technical director. These sessions dealt almost exclusively with lighting, including hanging, focusing, and gelling lights, along with a considerable amount of moving lighting instruments. The small group size and high expert to novice ratio allowed for intensive teaching and learning as well as completion of significant amounts of delicate work, along with a substantial amount of less delicate,

\(^1\) This is an ongoing source of friction among the various elements of the performing arts department as the schedule is very full and any time a director seeks to add an event to feature his or her work with his or her students, the event is likely to conflict with another scheduled event. In such a case, many students involved in both activities will have to choose which event to attend. Students frequently choose to miss technical theater because their main commitment is in another area.
more laborious, work. As an example, moving lighting instruments requires a lot of labor. Lincoln has two performance spaces that share a common backstage area and construction space, or “scene shop”. Although the “little theater,” which seats around 150 depending on the show, and the much larger auditorium, which seats about 600, are adjacent to each other, the walk from the stage of one, to the backstage area, through the scene shop, around the wall that separates the two performance spaces, and to the stage of the other is lengthy. More than one hundred lights are used in a typical show, and only one or two can be carried at a time, potentially requiring fifty trips from one theater to the other. The small size and focused nature of these evening session allowed for certain short-cuts to be taken, such as carrying lighting instruments across the roof from one theater to the other – a favorite activity of the students – as well as hoisting lights from the floor to the loft above the auditorium using a rope and pulley system. Instructions on testing lights, replacing light bulbs, repairing and replacing broken parts on the lighting instruments, electrical wiring, and differences in the functions of various instruments were also part of these sessions.

The small size of these groups made it easy to keep track of the instruction, work, camaraderie, and learning on these occasions. On one particular evening three students moved lights, most of which were hanging the little theater, to the floor in the area of the orchestra pit of the auditorium. From there they hoisted the lights using the pulley system mentioned above, with one student on the floor attaching lights one at a time, and two students many feet above in the loft lifting and staging the lights where they would be used presently. During this, following a brief reminder of the process from the technical director, a fourth student helped guide a fifth through replacing defective parts in a number of broken lighting instruments. After organizing the activity and the brief reminder on lighting repairs, during most of this time Linus and Bob, the assistant technical director, worked independently of the students to solve a computer networking problem related to running the light board remotely.
As a researcher in such a diverse, and occasionally chaotic, setting I was presented with a number of decisions to make regarding the direction of the research. On one hand, the extensive amount of small group project activity meant that innumerable opportunities for collaboration and negotiation arose even as student technicians were sharing information and teaching each other skills relevant to the projects they shared. Such moments could easily be lost in a slightly wider focus that more emphasized the performance of the group of theater technicians as a community that has developed and continually re-develops ways of conducting itself, indoctrinating new members recognizing the status of experienced members, and fitting into the context of the drama department, school, and community all in service of the community’s goals of staging the play. A somewhat different focus would draw attention to the technical director as the architect of the learning environment in which this kind of technical theater takes place, paying attention to the ways in which his philosophy of teaching and learning is enacted across these different contexts from chaotic to calm. A further potential focus would privilege the products of the technicians’ labors – the props, scenery, lighting and other texts involved in the production – and understand learning in technical theater as traceable to the decisions the technicians made in the construction of such texts.

Instead of sacrificing the richness of these different possible foci, or forcing a single theoretical perspectives into service where it is less apt to provide insightful results, I take what Gutierrez and Stone (2000) call a *syncretic* approach, or “the principled and strategic use of a combination of theoretical and methodological tools to examine individual actions, as well as the goals and history of those actions.” For me, this involves using frameworks that allow for both the examination of individual instances of learning as well as how those instances fit within the larger social milieu of technical theater and how technical theater fits more broadly into the school setting as a co-curricular and educational activity. The use of multiple perspectives does not suggest that the theories involved or their respective analyses do not relate to each other. Quite
the contrary, the hope is that the theories inform each other in ways that demonstrate compatibility across the frameworks at the same time they further the possibility of analysis each can provide. Other researchers have employed a similar approach. I borrow also from Moje and Lewis (2010) who employ activity theory, critical discourse analysis and cultural studies in unison. Their goal is to provide multifaceted look at power, agency, and identity in a single classroom lesson. While this rather narrower data corpus allows for considerably more overlapping of analyses than I will be pursuing across multiple settings and activities, the methodological principle of mutually compatible theories informing each other remains constant.

**Technical Theater and Literacy Theory**

Watching the robust physical activity and interpersonal interaction of technical theater it is easy to conclude that whatever frameworks will be adequate to describe it will take into account the role of that activity and interaction. Much of this activity takes place around the construction or co-construction of physical texts such as props and scenery, and much of the activity involves a number of tools and pieces of equipment seldom if ever seen in traditional classrooms. Further, little overt formal instruction occurs during technical theater work sessions, and so any appropriate theory for the analysis of technical theater needs to extend its scope beyond didactic teacher- or student-centered interactions. At the same time, my ultimate concerns in studying technical theater involve the teaching and learning that takes place during technical theater, and any choice of theoretical framework needs to also account for learning in this range of diverse situations.

A number of theories address some of these topics by incorporating social aspects into their understanding of literacy. One such group of theories holds that literacy is best understood as a social activity (Barton & Hamilton, 2000; Lewis 2001). Barton and
Hamilton provide six propositions about the nature of literacy to support their assertion that “literacy is a social practice” (p. 7), the three most immediately relevant I list here:

- Literacy is best understood as a set of social practices; these can be inferred from events that are mediated by written texts.
- There are different literacies associated with different domains of life.
- Literacy practices change and are frequently acquired through processes of informal learning and sense making. (Barton and Hamilton, 2000, p. 8)

Barton and Hamilton go on to state that their “interest is in social practices in which literacy has a role; hence the basic unit of a social theory of literacy is that of literacy practices. Literacy practices are the general cultural ways of utilizing written language which people draw upon in their lives” (p. 8). As can be expected from the second clause of their first proposition, the concept of literacy that Barton and Hamilton are employing entertains a wide view of the elements of literacy, whereas it is seen from the second sentence that the concept of literacy itself is fairly traditional focus on the written text. While nothing in Barton and Hamilton (2000) prohibits a broader understanding of literacy and their work provides a good grounding in the importance of considering literacy as a social phenomenon, other theories are more attuned to an expansive view of literacy such as is appropriate for technical theater. Technical theater, as mentioned above, involves a messy combination of literacies many of which are not primarily linguistic, and any approach to understanding technical theater should incorporate this at its core.

A group of theories broadly classified as sociocultural and taking for their starting point Vygotsky’s (1978) insight that learning and human development are mediated by or interconnected through interactions with other individuals and groups, culturally significant artifacts or objects, and linguistic signs or symbols (Lee & Smagorinsky, 2000). Lewis, Enciso, and Moje include among these, “activity theory (Engeström, 1999), distributed cognition (Rogoff, 1995), situated cognition (Kirschner & Whitson,
1997), communities of practice (Lave & Wenger, 1991), and cultural psychology (Cole, 1999)” (Lewis, Enciso, and Moje, p. 5). These theories “address the elements of human action in context” and view activities as “social practices situated within communities invested with particular norms and values” (Lewis et. al., p. 5). Along with social practice theories such as Barton and Hamilton’s this group of sociocultural theories moves away from overtly rationalist or cognitivist theories that endorse conceptions of knowledge as abstract and decontextualized, and learning as solitary and disembodied. Even casual observation of a technical theater work day at Lincoln poses difficulties for theories that hold that learning and knowledge are (exclusively) abstract or disembodied. The sociocultural theories have the further advantage over social practice theories in their ability to consider non-linguistic texts and other objects as mediators of activity. As mentioned above, technical theater involves the use of a wide range of objects, both tools and props, and as will be described below, tool choice is an important aspect of behavior by technicians and impacts learning and interaction with other technicians.

I use three frameworks as analytical tools, mentioned briefly here and taken up at some length below. First, there is good reason to consider the students as engaged in text making, and because of the multimodal nature of the texts considering them through the lens of multimodal literacies (New London Group, 1996; Cope & Kalantzis, 2000) is the most appropriate choice. I also use situated learning and legitimate peripheral participation (Lave & Wenger, 1991) which is useful for examining both individual moments in which learning takes place as well as describing the prevalent overall approach to teaching and learning that I see pervading technical theater at Lincoln. While the situated learning framework differs from the multimodal literacy framework in that its focus is on behaviors and learning rather than focusing specifically on texts and text making, its focus on the way I will be employing it here to examine individual examples of learning makes it unwieldy as a tool for understanding group interactions and ways in
## Table 4-1  Comparison of key elements in three theories applicable to literacy.

<table>
<thead>
<tr>
<th>Primary Unit(s) of Analysis</th>
<th>Multiliteracy Theory</th>
<th>Activity Theory</th>
<th>Legitimate Peripheral Participation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Guiding Questions</strong></td>
<td>Texts / grammars</td>
<td>Activity system</td>
<td>Individual in a learning community or community of practice</td>
</tr>
<tr>
<td></td>
<td>Students as text makers</td>
<td>Learners as part of an activity system</td>
<td>Within a particular community, what constitutes meaningful activity</td>
</tr>
<tr>
<td></td>
<td>What design elements are present in the completed text?</td>
<td>What is the activity?</td>
<td>How do members move from the periphery</td>
</tr>
<tr>
<td></td>
<td>How did the text creators use available designs?</td>
<td>What is the goal / objective of the activity?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>How were available designs reshaped in the redesigned?</td>
<td>Who are the participants?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>What are their roles?</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>What are their relationships?</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>What are their motivations?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>What tools, artifacts, routines, and rules or norms are part of the activity?</td>
<td></td>
</tr>
<tr>
<td><strong>Application</strong></td>
<td>Examining construction processes</td>
<td>Understanding technical theater in the context of the drama department and school</td>
<td>Analyzing teaching and learning moments</td>
</tr>
<tr>
<td></td>
<td>Exploring</td>
<td>Explaining teaching philosophy in technical theater</td>
<td>Interpret collaboration and interaction both among students and between adults and students</td>
</tr>
<tr>
<td></td>
<td>Investigate</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Evidence of Learning</strong></td>
<td>The finished text reveals design decisions that indicate familiarity with content and design metalanguages</td>
<td>Changes in activity system</td>
<td>Learners move toward full participation in their community</td>
</tr>
<tr>
<td></td>
<td>Learners have a larger stock of available designs and are thereby better able to interpret and design texts.</td>
<td></td>
<td>Learners are able to act meaningfully, or engage in new meaningful activity, within their community</td>
</tr>
</tbody>
</table>
which those moments of learning and the overall work of technical theater fit into the drama program and school environment of Lincoln as a whole. To examine these aspects I turn to activity theory (Engeström, 1999, 2008, 2000; Wells, 2007), which is useful for examining the ways in which systems, or groups of people, act but which itself can be unwieldy in examining individual moments of learning. As an introduction to a discussion of the theories, table one outlines some of the basic concepts of each.

**Multimodal Literacy and the New London Group**

As initially described by the New London Group (NLG) (1996) and developed extensively elsewhere (Kress, 2003, 2001; Kress & Van Leeuwen, 2001; Cope & Kalantzis, 2000, Bezemer & Kress, 2008), multiliteracy theory is based on a theory of social semiotics, meaning that to communicate interlocutors deploy shared semiotic resources that have “evolved to satisfy societal needs and… are organized to function with respect to these needs…” (Jewitt, Kress, Ogborn, & Charalampous, 2001, p. 6). It should be clear that this definition situates multiliteracy solidly within the realm of social literacy theories in that semiotic resources are developed and deployed collaboratively in specific historically defined contexts and, as in the sociocultural theories mentioned above, doing so has implications for the evolution of personal identity and group interaction in that “Through their co-engagement in Designing [creating and sharing texts], people transform their relations with each other, and so transform themselves” (NLG, 1996, p. 14). Acknowledging the importance of context and citing recent sociocultural work in literacy, the NLG introduces the concept of “Situated Practice” (p. 21) to describe immersion in a community of learners that is actively engaged in authentic versions of the practice. Situated Practice is the key to mastery of the practice because, as they explain, “… human knowledge, when it is applicable to practice, is primarily situated in sociocultural settings and heavily contextualized in specific
knowledge domains and practices,” a sentiment entirely consistent with activity theory and situated learning.

Further, the multiliteracy theory conception of literacy is broader than those of traditional print literacy in at least two important regards. First, as semiotic resources are developed by participants in social contexts it avoids postulating static or fixed meanings. Second, while multiliteracy includes traditional literacies, e.g. reading and writing, it also includes other modes of representing meaning, including the spatial, visual and gestural mentioned above, and the multimodal mode, which is involved in combinations of the others. As technical theatre is expressly concerned with the staging of a play, i.e. those aspects of a production that are other than the written and performed linguistic text of the play, multiliteracy theory relates directly to the production work in technical theatre. In addition to the set pieces, lighting, props, etc., the body in this system can also be read as a text, e.g. the performer of a semiotic gesture or as part of a visual text.

While fully cognizant of the personal and social implications of shared semiotic activity, multiliteracy theory is at the same time heavily invested in its explanation of the construction and interpretation of texts as an emergent process. The concepts of design and redesign are crucial to the social, dynamic, evolving nature of multiliteracy theory. Designing, “the process of shaping emergent meaning” (NLG, 1996, p. 14) involves manipulating available designs, the semiotic resources available to the designer, to express meanings in a predictable way in a certain context. As the act of design is always a creative process, the result is always something new, the redesigned. The redesigned may then itself become a resource for further communication, i.e. be added to the stock of available designs. The social semiotic system constantly evolves through the process of design and incorporation of the redesigned, such that successful communication depends on the predictability of meanings that arises from sharing grammars of design. Each mode of representation has its own grammar, where grammar is understood as descriptive, a “metalanguage that describes patterns of meaning” or “patterns of
representation” (NLG, 1996, p. 77). Although design grammars continuously evolve, their evolution is sociocultural in nature and therefore the evolved grammar is also shared and predictability is ensured.

It should further be noted that designing representations of meaning is a deliberate process. While, “Some Designing is more premeditated – planned, deliberate, systematized – than other instances, for example, a conversation as opposed to a poem,” all communication is designed and “…the authors of meaning in some important senses bear the responsibility of being consciously in control of their transformation of meaning…” (NLG, 1996 p. 81).

Two Theories of Situated Learning

Situated learning (Lave & Wenger 1991) and activity theory (AT) (Engeström 1999, 2008) are similar to multiliteracy theory in that they both conceptualize language as mediating interactions between people, however they differ substantially in that situated learning and AT are concerned with interactions outside those involving semiotic texts and therefore include other mediating objects, community rules, group association, and so on. Foregoing such an explicit and highly theorized account of texts as is found in multiliteracy theory and text making allows not only for consideration of a much wider range of activity but for particular emphases to be put on learning, identity, and community maintenance.

Activity Theory

The utility of activity theory for describing interactions of individuals as mediated by objectives, artifacts, divisions of labor, discourse, and community makes it an invaluable tool for understanding the multiple groups and projects involved in any technical theater enterprise. Further valuable is its scalability, or its potential for applying to smaller communities such as the technicians themselves, as well as to larger communities such as the entire drama department, school, and neighborhood of which the
techies are a part. As mentioned above, Engeström traces three lineages of AT, however for present purposes I limit discussion to the Vygotskian tradition. Engeström (2001) further delineates successive generations of the Vygotskian tradition of AT, all of which start from the insight that human activity does not take a direct route from stimulus to response. Rather, “…the simple stimulus –response process is replaced by a complex mediated act…” (Vygotsky, 1978 p. 40) in which the basic unit of analysis is a triad of stimulus, response, and mediating object as on the left in figure 4-1; or subject, object, and mediating artifact as on the right in figure 4-1. The “object” in this and subsequent diagrams is understood to be the goal of deliberate action. Frequently, as in the diagram below, the object is followed by a more nebulous “outcome,” indicating that outcomes are not typically identical to objectives.

The concept of mediation is central to the insight provided by AT and should be understood not merely as an object intervening between a stimulus and response, but as an interaction in which “the individual actively modifies the stimulus situation as part of the process of responding to it” (Vygotsky 1978 pp. 14-14, pp. 54-55). In Vygotsky’s original formulation, the entire triangle / triad was taken to be the mediating event, thus the un-arrowed line between stimulus and response representing the need for the subject to actively make a mediated connection between the two. In the typical continuation of the theory as shown in the right triangle, the subject assumes a place in the triad and the ubiquitous arrows indicate mutual interaction among all the elements of the triad.

Although Vygotsky was initially interested primarily in (linguistic) signs as mediating objects, the concept of mediation is extended in activity theories to numerous other elements that comprise an activity system. Typical of many extensions made by Engeström (1987, 1999, 2001) and employed by others (e.g. Roth & Tobin, 2002; Keller & Keller, 1996; Baber 2003) figure 4-2 shows the increased complexity and inter-
mediation of larger activity systems. While all of the elements in an activity system potentially interact with each other, not all can be assumed to be of equal importance, and among the requirements of analysis are understanding the elements and describing the relations among them in service of a rich understanding of the system. As Engeström puts it, “The model suggests the possibility of analyzing a multitude of relations within the triangular structure of activity. However, the essential task is always to grasp the systemic whole, not just separate connections” (Engeström 1987, p. 74).

This diagram represents what Engeström considers the second generation of AT. Despite its increased complexity as compared to the original Vygotsky triad, it remains fairly simple in that it represents only one activity system and / or one perspective. As a tool for analysis of yet more complex activity networks subsuming multiple activity systems, the diagram would need to be multiplied, for instance with a separate system for students and a teacher in a typical classroom situation, with some areas of overlap and some areas of discrepancy in their respective objects, goals, or outcomes. Although this
suggests a potentially powerful development for the future of AT, this type of analysis introduces an added level of complexity not always necessary. A more straightforward approach assuming a certain unity of perspective is frequently best suited for the level of analysis I propose for the study of technical theater at Lincoln and that will generally be employed in what follows. However in particular instances the more complex formulation of AT will be useful for describing disparities in participants’ perspectives. This ability to include progressively more perspectives does additionally point to the important aspect of the AT framework, namely scalability, which will be discussed more fully below. While AT will not prove to be the best tool for analyzing individual instances of learning, it is useful in understanding how those instances fit more broadly into the technical theater enterprise at Lincoln as a whole.

Figure 4-2 Second generation activity theory diagram showing typical constituent elements.
Legitimate Peripheral Participation

What is missing from activity theory, the plausibility of fine-grained analysis of particular learning moments in technical theater, is provided by situated learning which examines the participation of individuals in the social contexts definitional of learning. Lave and Wenger’s (1991) focus on learning arose from their initial studies of apprenticeship, a concept that their investigation found to be under theorized and most widely applied to European and other western examples and most commonly associated with learning a specific craft or trade (p. 61 ff.). Other examples of apprenticeship, such as Yucatec Mayan midwives in Mexico (p. 66 ff.) and Vai and Gola tailors in West Africa bore little resemblance to the traditionally studied Eurocentric forms. Lave and Wenger’s consideration of this more diverse range of examples convinced them of the need to go beyond a mere “distillation of apprenticeship” (p. 61) to find principles of learning that were applicable to all forms of apprenticeship and other learning as well. The principle that they ultimately arrive is legitimate peripheral participation (LPP). LPP is seen as an outgrowth of their related term situated learning and the two, along with communities of practice (CoP) are sometimes conflated (Lewis, 2007) despite attention being drawn to their differences (Lave & Wenger, 1991, pp. 29-36).

As LPP is the defining concept of Lave and Wenger’s theory of learning it is worth quoting their description at some length:

Learning viewed as situated activity has as its central defining characteristic a process that we call legitimate peripheral participation. By this we mean to draw attention to the point that learners inevitably participate in communities of practitioners and that the mastery of knowledge and skill requires newcomers to

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2 'CoP is a term found in Lave and Wenger (1991), and while noting the eventual need for a more developed treatment, it is left without rigorous theoretical explanation (pp. 42, 98-100). In Wenger’s (1998) extension of the framework, CoPs take a more prominent role and are the object of extensive elaboration and definition, if not clarification. Despite this elaboration, the Wenger (1998) formulation of a CoP is not unproblematic (Barton & Tusting, 2005; Hughes, Jewson, & Unwin, 2007) and in general I refer only to the initial Lave and Wenger version. Any reference to the Wenger (1998) version will be clearly identified.
move towards full participation in the sociocultural practices of the community. “Legitimate peripheral participation” provides a way to speak about the relations between newcomers and old-timers, and about activities, identities, artifacts, and communities of knowledge and practice…. A person’s intentions to learn are engaged and the meaning of learning is configured through the process of becoming a full participant in sociocultural practice. (p. 29)

From this wide ranging description of LPP special attention should be given to the inevitability of learners engaging in LPP and moving towards, and potentially achieving, full participation. Lave and Wenger emphasize that LPP is not a specific pedagogical approach but an analytic tool for understanding learning in general:

We hope to make clear as we proceed that learning though legitimate peripheral participation takes place no matter which educational form provides the context for learning, or whether there is any intentional educational form at all. Indeed, this viewpoint makes a fundamental distinction between learning and intentional instruction. Such decoupling does not deny that learning can take place where there is teaching, but does not take intentional instruction to be in itself the source or cause of learning, and thus does not blunt the claim that what gets learned is problematic with respect to what is taught. (pp. 40-41)

Thus, while different instructional strategies may lead to different qualities of participation, e.g. those through which resulting learning is more or less closely aligned with an institution’s or teacher’s educational objectives, whatever is learned can be understood as having been learned through the individual’s LPP. Understanding learning as an outcome of LPP rather than any particular educational strategy appeals to Lave and Wenger’s examination of diverse apprenticeships as well as to technical theater, in which learning and instruction opportunities come in a variety of improvisational or semi-structured lessons, observations, and hands-on practice.

In this regard Lave and Wenger draw a distinction between a learning curriculum and a teaching curriculum (1991, pp. 97-103). A learning curriculum consists of “situated opportunities for the improvisational development of new practice.” Key to such a curriculum is that it is viewed from the learners’ perspective as they engage with learning resources during the everyday practices of their learning community. A
teaching curriculum, on the other hand is “constructed for the instruction of newcomers” and “the meaning of what is learned is mediated by an instructor’s participation, by an external view of what learning is about.” This is to say that overt structuring of learning opportunities from outside of the regular practices of the community is likely to result in a disconnect between what is actually learned and the practices of the community.

This is to say that in many situations in which classroom practices differ largely from the practices within the community to which the classroom learning supposedly appertains, students may learn to “do school,” or perform well in those classroom situations according to the practices of the classroom community, but nevertheless be unprepared and incapable of performing meaningfully outside of the classroom, according to the practices of the community that they had wanted to prepare to enter. Such an example is given in Lave and Wenger’s (1991) discussion of novice butchers whose training courses, following changes in the meat industry and shopping habits, had become fossilized in the previous era in which butchers’ responsibilities and typical activities were very different than what was required of contemporary butchers. Of somewhat more relevance to the hands-on nature of technical theater, Theodore Lewis (1998a, 1998b) and Michael Apple (1998) discusses the felt need to add traditional academic content to vocational education classes to better justify their place in high school curricula as well as to increase the perceived social status and workplace viability of vocational courses. This resultant “new vocationalism” fails, Lewis argues, because of the inappropriateness of explicitly vocational education in the general education curriculum as well as its inability to adequately address within schools the social, power, and identity issues differentially associated with different forms of work (Lewis, 2005).

Perhaps the most telling example is given by Hodges (1998) who recounts the situation of a student in a university elementary education program whose strong academic skills allowed her to excel in her coursework, but who found it impossible to translate these experiences into acceptable participation and growth in the actual
community of practice where she student taught. This student’s experience provides both a check to the assumption that school learning transfers to outside of school situations, but also to the rather unproblematized assumptions in Lave and Wenger (1991) and Wenger (1998) that community membership is the natural result of association with a community and that trajectories unproblematically trend towards full participation from peripheral participation even in situations where participation and membership are desired. All of these considerations, from the apprentice butchers, vocational education and Hodge’s discussion of failure in a teacher education program relate to the messiness of technical theater mentioned above. The difference between the more overt instructional environment of Stagecraft class and the more authentically situated environment of afterschool work sessions highlights these differences and will be discussed below.

The distinction between teaching and learning curricula is particularly useful in describing technical theater at Lincoln. Several features of apprenticeship described by Lave and Wenger in support of this distinction stand out because they are atypical of contemporary education. One, that almost all student apprentices acquire mastery of their trade, is especially atypical inasmuch as very little explicit instruction takes place. While applying an apprenticeship model to most classrooms – be they focused on new or traditional literacies – may be challenging, the central example presented in this chapter involves three technicians, one informal ‘master’ and two apprentices, working on a building project in which the acolytes learn over the course of a couple hours the use of power tools, measuring and calculating skills, refined judgment in the selection of materials, discrimination in process analysis for building procedures, and collaboration skills, all with fewer than five minutes of explicit instruction. However, understanding this moment of situated apprenticeship also requires understanding the context in which it occurred, the grouping of these three technicians to complete this particular task as part of a larger community engaged in the overarching objective of producing the play.
Analyzing Data: Combining Three Theories Applied in a Syncretic Approach

The success of a syncretic approach employing distinct but compatible frameworks is to be found in its ability to adequately describe the complexity of the technical theater activity in a way that illuminates the learning and the context of the learning in ways that a single approach could not. With this in mind, in the remainder of this chapter I consider several pieces of data and the ways in which the theories introduced above can be used to analyze them. Keeping in mind that the theories are not exclusionary, it does become apparent that due to their different elements and foci each provides different insights into the data. As a researcher, I have therefore made decisions about the suitability of the match among data and theories. The data is arranged beginning with an extended example followed by three shorter incidents.

Walkway Moment

I collected these data while observing one group of three technicians working in the afternoon of an all day Saturday work session about half way through a production of *Into the Woods*. This was a busy day, even by Lincoln technical theater standards, but by and large other groups stayed in other locations, leaving this group was mostly to themselves. Two students and Albert, an adult volunteer, were building a hill that dominated center stage in the production as shown in (Figure 4-3). The support structure of the hill was primarily a series of irregular trusses made in part from fresh 2x4 lumber and in part from reused boards of various sizes. Reusing lumber as often as possible is a common money saving practice at Lincoln, but one which adds complications to the building process. Not only is there an on-going consideration of how to minimize the use of fresh lumber and when to salvage old lumber, but irregular or dissimilar sizes and shapes of lumber are frequently used for similar applications or to construct similar pieces as a result. While this reduces building efficiency, it does create the need for
considerable ad-hoc problem solving to match available supplies to purposes. The irregularly formed trusses of this frame were eventually to be covered in wide weave burlap erosion cloth and made to look like grass. As actors needed to move on the hill during the production, the group observed this day was building a plywood walkway attached to the trusses. Because the fabric covering the majority of the hill was not structural, properly locating the walkway was crucial: anyone stepping off the path would fall through the fabric.

Actors in a play at Lincoln frequently attend one or more work sessions to help with preparations for the play and Jake, one of the students observed this day, had a leading role. Albert is well known to the students as he frequently attends work sessions and the technical director regularly asks him to take the lead in building projects. Unusual about this particular play was that Albert had also been cast in the role of the Mysterious Man (Sondheim, 1987). As both Jake, the student actor / technician, and Albert’s parts involved acting on the hill, a situation arose in which they were building the space in which they themselves would later perform. I choose this moment to examine because it illustrates a confluence of issues clearly, and while similar situations in which actors are contributing to the creation of their own scenery props are not the norm, nor are they so uncommon as to be remarkable in that regard.

The moment in question began after lunch break. Numerous tools, including tape measures, sketches and scrap paper, cordless drills, a framing square and several speed squares used for measuring angles and drawing lines, a circular saw and jigsaw for cutting plywood, an electric miter saw for cutting 2x4s, and various sizes and styles of clamps, rested on stage or on makeshift work benches. New sheets and smaller pieces of plywood left over from earlier projects were also on stage, along with full and leftover pieces of 2x4 lumber. As Albert looked at a sketch of the finished stage Jake and the other student approached to help him with the walkway. Albert shared the sketch with
them and the three looked back and forth among the sketch, the framework, and the materials on stage.

![Image of the center stage hill showing support structure and walkway](image)

**Figure 4-3** The center stage hill showing support structure and walkway pictured after the construction described here and subsequent minor alterations, with an actress for scale.

The first part of the walkway they built ran along the stage left side of the hill, straight from downstage to upstage. These first three pieces were put on with comparatively little deliberation. Albert led the project, both sharing the labor and teaching the students the building techniques he was using. Albert’s leadership did not extend to design decisions, which the group made collaboratively, and which the walkway presented in abundance following the first three pieces. In addition to acting concerns discussed below, two kinds of decision stand out. First, together, through much
talk, gesture, and experimentation with materials, the group developed a vision of the surface of the walkway in which it alternately rose and fell a couple of inches in every span between supports, creating an undulating, more natural looking path. Second, they had to decide how many trusses each section of the walkway spanned. The questions seem innocent, but the devil proved to be in the details.

Making the gently rolling hill proved almost impossible due to the rigidity of the plywood they were using. Once a piece of walkway was made to slant upwards, it was almost impossible to make it then slant back down without cutting it in two. However, after cutting two pieces of the plywood and reattaching them to the trusses, they found not only that the pieces were still rigid, coming to pointed peaks instead of gently rolling curves, but further that they had created gaps where the edges did not meet exactly that both were unsightly and potential trip hazards. Further deliberations regarding the number of trusses to span with a single walkway piece considered two factors: the amount of additional bracing required and the degree to which the path could curve or angle. As each walkway piece required bracing at both ends, longer pieces were desirable, but longer pieces were more difficult to make curve. Talk and action were constant in the process, typically overlapping, in a decision making process that included brainstorming possibilities, debating alternatives, and sometimes just starting to build something. At the end of the day the final product was a compilation of ideas and compromises. Some curves and rises were kept despite requiring extra labor and engineering while others were sacrificed for simplicity. In all, the walkway (and subsequent performances on it) was devised (McKean, 2007) with input from the entire group. Decisions about engineering, materials used, and as described below the movement of the body through the emerging space were all part of the composition process and inseparable from aesthetic decisions.

After the third piece of the downstage to upstage walkway was attached, the builders consulted their scripts, regarded the hill from a distance, and decided to begin
work on the middle path on which they would more often perform. They had more
leeway in the construction of this path and their conversations became dominated by
decisions relating the walkway to their performance. Along with the concerns mentioned
above, they considered where and at what angle the middle path should branch off of the
first path and how wide it should be at various points in its run. While they considered
many factors in their decision making process, the blocking of the actors’ lines emerged
as a key variable that they approached understanding in a practical, physical manner.

Their discussion focused on where in their performances they wanted to be when
they moved between parts of the path. While Greg, the other student technician, looked
for a large piece of scrap wood to use as the next section of the path, Albert and Jake
again alternately consulted their scripts and regarded the hill for some time, presumably
considering their options. The decision was ultimately made in a straightforward way
shown in this conversation:

Greg: [holding walkway piece] Umm… [captures their attention]
where do you want to put this?

Jake: Umm… (pause)

Albert: Might as well in the middle somewhere. That gives us more…
(pause)

Greg: Like right after the second piece (of the existing walkway)?

Albert: … uh-huh, more room to adjust.

It turned out they needed the room to adjust. Albert ran his lines as he walked on
the emerging platform but ran out of walkway space well before he ran out of words.
Adolphe Appia, father of modern technical theatre, pointed out as early as 1921 that,
“The written word does not, then, contain the norm of Time needed to speak it; its
duration is approximate and left to the discretion of the actor” (Appia, 1932, p. 650).
This was a concept Albert employed to modulate his performance in time and space, on a
second, slower, reading. However, he still ran out of walkway. Subsequently Albert ran his lines on and was dissatisfied with two other the locations of the branching walkway before they moved it back to its original location. His difficulty matching his lines and performance to his desired location on the path led to the following conversation during which the three technicians develop a ‘lurk,’ a sort of bobbing and pivoting motion Albert performed on the first path while finishing his lines before stepping onto the branching path.

Albert: Here, I’m going to try something [climbs on platform]
Albert: How about if I do something like this [attempts ‘twirling’ lurking maneuver]
Jake [polite laughter]
Greg: [polite laughter]
Jake: (being helpful) Try to go slower.
Greg Yeah. You want to be…. Something like…. [trails off, everyone nods]
[pause]
Albert: Okay…. Okay… [shifts around, hesitant]

At this point Albert walked back and forth on the walkway and the students seemed to ignore him as they talked to each other. After a few minutes Albert got their attention and tried out a new version of the lurk.

Greg: [inaudible, to Jake]
Albert: [inaudible, gets technicians’ attention]
Albert: [performs second lurking maneuver]
Jake: Can you bend over more? Kinda like hunch... like a hunchback? [performs shoulder hunch]

Albert: [inaudible, acknowledging Jake’s comment]
[grumbles, walks around on platform, practices parts of a lurk]

Jake: [looks at script]

Greg: [fiddles with tape measure]

Here Albert continued to try out different lurking maneuvers while the student technicians talked to each other until Albert again got their attention.

Albert: Okay. What do you think about something like this? [performs a couple lines and the lurk that goes with them]

[pause]

Greg: I don’t know. I think it’s okay.

Jake: Pretty –

Albert: Not too stupid?

Jake: Pretty good. I like the kind of [hunches shoulders] [inaudible]. You’re a lot less... lot more natural.

Albert: Uh-huh. [nods head, looks at walkway]

The discussion of Albert’s acting, largely fragmentary and largely gestural, was reminiscent of their collaboration on walkway construction proper. They proceeded with deliberation through trial and error until deciding on the meaning of Albert’s lurking performance after he completed it, the notable difference being Albert was making a text of and interpreting his own body. Interestingly, after developing the lurk, he went back to building the walkway without running his whole speech with the lurk included.

Jake and Albert at times changed their blocking and starting point for their lines as well as the pace of their movement and talking. Most of their attention was given to modifying the path to accommodate their performance, as the space of the walkway
seemed to interest them a great deal. Albert and Jake would occasionally walk the whole length of the platform, sometimes pacing back and forth across it. At least once the other technician did the same, experimenting with different gaits and speeds as the actors did although he had no lines in the play.

This moment lasted under four hours. The students learned a great deal about using tools and building a set, and Albert learned a lot about performing. I considered the utility of their protracted deliberation and attention to fitting the walkway to their performances. Had other technicians built it without them, surely as actors they would have made due. In all actuality, they would have had very little choice but to use what they were given. In fact the more common occurrence in theater at Lincoln – and elsewhere – is that actors arrive on set and are given props for the design and construction of which the actors had contributed nothing. Jake in particular would have had no problem as he was able to generate a number of distinct performances all of which he found acceptable, regardless of the configuration of the walkway. I was not sure what, if anything, from Jake’s practices would be in his final performance. However, Albert’s lurk seems to have been the genesis of his movement through his entire performance, a hunched shuffling scurry everywhere he went.

A Multiliteracy Analysis of the Walkway Moment

My intent is to show first that high school technical theatre is a mindful, deliberative activity that merits examination in its own right as well in connection with theatre. The technicians described here expended considerable thought, typically with tools or lumber in their hands, as they scrutinized what had already been built. They engaged in collaborative decision making that considered the materials present as well as the actors’ future performances, along with their aesthetic judgments and understanding of the effects they were trying to produce with the finished product. A multiliteracy framework can provide a rich description of the set or the traditional literacy event of a
staged performance of the play as a multimodal text. Multiliteracy theorists make further claims regarding what examination of a completed text reveals of its genesis. As Bezemer and Kress (2008) put it:

In order to ‘get at’ the cognitive processes of pupils’ learning we focus on the texts as an ‘outcome’ of this process (in the form of ‘complexes of signs’). We suggest that pupils’ texts can be viewed as ‘one kind of evidence’ of the cognitive processes that they have engaged in. (p. 7)

Such claims are based on the principle of design.

The principle of design holds that meanings are intentional and that design work is looking for an apt way to express an intended meaning. In this case, the technicians begin with a meaning they want to express and do so by building the path to represent that meaning. At the start they marshal their semiotic resources in the form of available designs, i.e. knowledge of what sort of representations will be read how in the sociocultural context. The multiliteracies framework “sees semiotic activity as a creative application and combination of conventions,” (NLG, p. 74) such that through the design process the designers adapt the existing designs to their purposes, thereby creating the redesigned. Visual design and spatial design are the primary concerns for the technician who as part of the design process consult their relevant design grammars for the visual and spatial modes and come to decisions based on how best to represent the meanings they intend. Because audience and technicians share common design grammars, the audience is able to interpret the technicians’ redesigned representation of their intended meaning, a sort of semiotic reverse engineering.

It seems clear there are several ways in which this account, even in this rough sketch form, is appealing to an analysis of technical theater from a perspective of literacy, composition, and text making. First, it recognizes the meaningfulness of the staging. Because the set is no longer just a place where (linguistic) literacy happens but a part of the (multimodal) literacy event itself, technical theatre work becomes part of the performance. Second, the recognition of the meaningfulness of the set derives from a
broader understanding of literacy as representation in modes other than linguistic. Finally, while texts from theatrical productions to digital video combine multiple modes of meaning making into coherent multimodal representations, the multiliteracies account understands a play or video in its entirety – spoken text, blocking, acting, staging – as a single multimodal text with constituent parts unified by its multimodal design. Therefore although individual modes can be considered in isolation, the sum of those parts is less than the text as a whole, a result I find natural to the way we think about many such texts.

While these may be advantages, there are difficulties aligning the multiliteracies account with the observational evidence presented above. Jake and Albert seem to represent different challenges to the principle of design. Jake seems willing to accept a wide range of differing performances in this space, so many so that it is reasonable to doubt he has any specific intended meaning in mind, or again that he “bear(s) the responsibility of being consciously in control of their transformation of meaning…” (NLG, 1996 p. 81). Rather he seems to be experimenting with combinations of oral performance, physical movement and constructed space, exploring the semiotic options they afford, and appreciating the possibilities of varying interpretations as they emerge. Contrarily, Albert’s intentions seem to be so well developed that representing them materially exceeds his considerable talents as builder and actor. Through multiple attempts, no combination of performance, movement, and space can satisfactorily represent his intended meanings. Neither situation squares with the design notion that the technicians’ intended meanings, what they knew in advance they wanted to communicate, came to be represented in a material form following the technicians consulting their grammars of design and devising a plan in advance for how to do so.

Further, the emphasis on design and the importance of intending a meaning in advance of rendering a representation of it in public form, offers no account of collaboration. As McKean (2007, p. 503) observes, “The communal nature of theatre complicates the attempt to define composition as accomplished by any single individual,”
and these technicians are a case in point. While it is possible that the technicians each intended a meaning when they started, through the collaboration in their building process ideas merged and evolved, were tried, kept or discarded, and the final representation matched nobody’s original idea. Many intentions were partial, undeveloped at their inception and progressed via experimentation or trial and error. Using scrap materials and avoiding difficult engineering challenges were key elements of the building decision making process, further obscuring intentions by recording in the final product choices based on convenience not semiotics. The priority in multiliteracy theory on texts that are constructed for the sole purpose of representing meanings accounts for the emphasis on coevolving semiotic resources and grammars of design that can be reliably used to construct and then interpret representations of meaning in predictable ways. Grammars of design however are equipped only to account for those elements of a representation that were in fact designed. Such a syntactical, rule-governed system seems ill equipped to account for the complex and convoluted processes these technicians used. At best the finished representation only reflects design choices that were instantiated, not ideal ones. It does however reflect choices made for a variety of other reasons, convenience but also enjoying the feeling of moving on stage or disinterest.

Three Incidents of Lessons and Learning

While the above incident shows the student technicians learning a variety of things as beginning members of the technical theater community, including procedures undertaken in a large building process, the role and expectation and methods of collaboration in shared activities, and divisions of labor within and beyond their group, the multiliteracy analysis is most useful vis-à-vis learning as design and interpretation of texts. To better understand learning of other sorts that can take place as a part of the overall construction process, it will be useful to look at specific examples of instruction, the first of which happened during the walkway construction.
The Chop Saw Incident

There are many similarities in the conduct of technical theater at Lincoln and the diverse range of apprenticeships discussed in Lave and Wenger (1991). These include a non-linear progression of ‘apprentices’ through their skill learning, work with a variety of ‘masters’ during the course of a day or even a single project, and the possibilities of students learning from each other as much as or more than from any given teacher or adult. Further, as in most of the apprenticeships discussed by Lave and Wenger, during technical theater work sessions there is a marked lack of overt instruction. The example I wish to consider first, however, is one of two significant examples of direct instruction that took place during the walkway building. This calls to mind the distinction discussed above between their concepts of “intentional teaching” and the “teaching curriculum” as opposed to the “learning curriculum” described by Lave and Wenger (pp. 96 – 97) as well as the utility of direct instruction in certain situations.

In the course of this building, Albert gave Jake a lesson in the use of the electric miter saw, or “chop saw” as it is commonly called either because its frequent use is to ‘chop’ pieces of lumber such as 2x4s to length or because of the “chopping” motion of the blade. Miter saws are used regularly by hobbyists and are practically universal in all manners of professional woodworking situations. For instance, Revere’s and Lincoln’s drama departments each have three chop saws. Almost every piece of wood on a set is cut at least once with the chop saw, making it an essential tool for tech work. Further, its use is straightforward and can be safe, so almost all students who do carpentry as part of their technical theater work become proficient at using it. Models vary in details but all chop saws consist of a table on which the wood to be cut rests, a back fence against which the wood is held, and an electric motor and circular saw blade mounted on an arm above the table. The arm pivots vertically allowing the spinning blade to descend through the wood held on the table. A spring-loaded on / off trigger switch and handle on the arm allow the user to turn on the saw and push the pivoting motor and blade assembly
down through the wood. The saws at Lincoln are fairly typical in size with tables approximately eighteen inches wide and blades ten inches in diameter. While these saws are very safe if used properly, due to their size and power they are loud, potentially scary to newcomers, and quite capable of causing extreme injuries if used improperly.

The rules for using the saw effectively are simple and straightforward: hold the work piece tightly against the fence, do not let it twist or bind the blade, keep your hands away from the blade, make the cut at a reasonable pace. Still, accidents may happen. For

Figure 4-4 A typical chop saw. The one used in the lesson described here is very similar, but mounted to a portable stand.
instance, while I was working at Revere high school, a student cutting a 2x4 approximately twelve inches long decided to make a show of cutting the piece without holding it during the cut. With exaggerated casualness he held the saw handle, turned around to face his friends, leaned back, crossed his legs as he stood, pulled the trigger switch on the handle to activate the saw and without looking pushed the blade rapidly down onto the wood he had positioned on the table. The wood was thrown powerfully backwards, rattled against some part of the saw in passing and splintered upon impact with the wall behind the saw, but not before leaving a gouge in the cinder block’s paint.

Figure 4-5 A staged photo of Linus preparing to use a chop saw.
Lessons and Learning with the Chop Saw

While anyone knowledgeable about the saw would typically model following all the rules most times s/he made a cut, a novice might have some difficulty learning all the rules from observation. The above incident suggests a utility to more direct instruction and limitation to observation. The speed of the cut and holding the work piece would be obvious, for instance. How tightly the wood is held and measures taken to avoid allowing the blade to bind would be less obvious to an observer. The proper distance to keep one’s hands from the blade could be problematic as people comfortable with the tool, myself included, frequently make cuts on smaller pieces of material that require the saw operator’s hands to be closer to the blade than is, strictly speaking, advisable. This tendency of experts to model behaviors which may be inappropriate for beginners presents a further difficulty to learning by observation.3

For these reasons a typical lesson has informally evolved for teaching the use of the chop saw, and an example of this lesson was what Albert taught to Jake. The person teaching the lesson shows the students the parts of the tool, where to put and not to put their hands, how not to bind the blade and, how to accurately position the work piece so as to cut it in the correct place. The instructor also usually explains some of the reasoning behind these procedures. This information is followed by a demonstration of cutting a piece with the saw and then the student cutting a piece or two under the close supervision of the lesson teacher who provides hints and reminders as the student prepares to make the cut. There is little remarkable in the teaching of this lesson itself.

3 I can report anecdotally that students who have watched me use the chop saw have failed to notice how tightly I hold the wood against the fence. I typically apply pressure by taking a half-step back from the saw and leaning forward, holding myself up with the hand that is holding the piece of wood to the saw, allowing my weight to assist as I hold the piece. Although I may have observed it others, I cannot remember being taught this method. I use the saw in this fashion because it is less fatiguing to do so, but because of this it is also not immediately clear to casual observers how much pressure I am applying. Now, especially after the dangerous incident at Revere, I stress the need for holding the wood tightly and demonstrate my technique for leaning against it.
Albert and I, the technical director, other knowledgeable adult volunteers, and some students regularly teach the operation of this saw. Because of the possibilities of mishaps such as the one as described above teachers at both Revere and Lincoln prefer students not to use the saw prior to being instructed on how. No record is kept at either school of who has or has not been explicitly taught to use the saw, and the technical directors at each school typically rely on students who do not know to use the tool to tell them so, as well as look for signs of nervousness or hesitation to use the tool on the part of students as occasions to give or refresh the chop saw lesson.

I take the above example to be an initial demonstration of the complexities involved in teaching and learning in technical theater. Although nobody was actually injured in the incident at Revere, it was a dangerous situation. In the normal course of activities, such as during the walkway building, a knowledgeable community member would give the chop saw lesson to other members who both did not know it and who needed to in order to carryout the project in which they were engaged. However, it is easy to understand how a situation could deviate from the norm. As described in Lave and Wenger (pp. 62-4) traditional accounts of apprenticeship have emphasized learning from observation, which surely takes place in technical theater. The young man using the chop saw at Revere is an example of this. He had many times before this incident used the saw without hesitation in a manner that appeared safe to me, and presumably to the technical director and other knowledgeable adults. It is reasonable to believe both that he had learned to use the saw from observation of others and that he believed he knew all he needed to in order to operate it safely. A challenge arises for both the technical director and student is to distill from practices that seemingly demonstrate full knowledge evidence of a deficiency that needs to be addressed.

At the same time, the apparent dearth of overt instruction in the Revere chop saw incident could, for similar reasons, be replaced by an over-abundance of it. The next moment discussed involves another typical mini-lesson on a different kind of saw. First
are a description of the typical lesson and an unusual application of it, followed by an egregious example of superfluous instruction.

The Table Saw Incidents

This incident took place on a busy, messy work day. It was early on Saturday morning and Linus and I had just finished breakfast at a local diner and were surprised to find a couple students waiting outside the scene shop when we got to Lincoln, and further surprised by the arrival of a number of students few of which I had ever met before. Linus had not expected a large student turnout this day. There was some scrambling on the part of Linus, and to a lesser extent me, to get this influx of new technicians started on projects. Most of these projects were being undertaken on the stage of the little theater, a nice open space for spreading out tools and supplies for easy working and sharing. I eventually took a seat in the front row of the theater and began taking field notes. Initially I was interested in observing how the groups of new students who we had gotten started on projects fared with work that was new to them. What Linus and some more experienced techies were doing did not at first seem important, but later drew my attention.

The table saw is a large piece of equipment, 30 inches deep and over 60 inches wide. It and requires a great deal more space than this to use as a piece to be cut begins all on one side of the saw and slides over the table, passes through the blade and continues out the other side. Cutting an eight foot long piece of plywood therefore requires at least eight feet on both sides of the saw, place the depth of the saw, plus room for the operator to stand. At Lincoln, the table saw does not have a proper place in which to be put away, so it is always around or in the way somewhere, usually towards the middle of the scene shop floor. While the saw is always around, it is used much less frequently than the chop saw, a few times in a typical workday. Some projects however
require extensive table saw use, and such a project was taking place this day, making the table saw a hub of activity, especially for Erica and Cori.

The incident begins when Linus was teaching a mini-lesson to some students on how to use the table saw. Cori and Erica, Phil and a new girl were present. There was a discussion primarily between Linus, Cori and Erica that included considerable gesturing at the table saw following which Linus decided to put the feed rollers on the fence. The feed rollers are an accessory to the saw that help to hold a piece of wood tightly against the fence. The first sentence I clearly heard was Erica nodding and saying, “I do,” in response to some question Linus asks.

After this, Linus prepared to give the table saw mini-lesson as all the students stood by. He began by telling the students where to go to get safety glasses and two students went to retrieve them for everyone. After they all have the glasses on, he began the lesson.

Linus

Here’s the power switch. Green is on, red is stop, see you can just sort of slap it. [gestures a mild slapping motion towards switch]

This is a push button switch enclosure with a green ‘on’ button and a red ‘off’ button, each a rectangle about two inches wide. The two buttons differ in that the green ‘on’ button is surrounded by a molded plastic ring that extends past the button itself such that powering on the saw requires pushing the button inside the raised ring. An operator can easily push the actual button inside the protective ring with a finger but is unlikely to accidentally activate the switch, say by bumping against it, as the protective plastic surrounding the switch prevents this. The off button is not recessed, and therefore easier to push, making any accidental bumping of the switch likely to turn the saw off if it was not already.
Linus And there’s the blade. You want to keep your fingers away from the blade. [begins running the piece through the saw]

By this point, as Linus was beginning the cut, Erica and Cori had moved to different positions surrounding the saw. Erica was in back, opposite Linus, and Cori was standing at the side of the saw to Linus’s left, as they continued to pay polite attention to Linus.

Linus [continuing cut] …And this isn’t real close [the piece is about six inches from blade to fence] so that’s kind of easy to do. And once you get it about this far through, if you have someone around to the back [Erica is already pulling the piece through] they can just finish the cut for you.

[Linus and Erica finish the cut and halfway turns back to the new girl.]

Linus Ok. Now – [new girl winds up and slaps the off button]

[a moment of silence and snorts of stifled laughter from Linus, Cori and Erica]

Linus Um…. (pause) [a loss for words] You don’t really have to slap it. You can just push it. If it’s an emergency, the go ahead, but generally you can just push it.

At this point Linus described a few more features of the saw to the new girls while Cori and Erica waited, appearing attentive but not contributing to the conversation. Linus was preparing to leave, leaving Cori and Erica to supervise the new student with saw, when Phil spoke up. Phil, a Junior at Lincoln and a regular techie, suffered a kind of juvenile stroke as a child which left him a variety of physical challenges including legal blindness (although not total blindness), reduced mobility particularly on his left side, and a general reduction in physical coordination. He was a talkative and pleasant student who seemed to enjoy technical theater, but who, along with Linus, at times struggled with finding things he could do to help.
Figure 4-6  The table saw at Lincoln. In this picture it is next to the wall, but it was in an open area close to the Little Theater stage when the data was gathered. Note the green and red power button on the lower left of the saw.

Linus    Ok. You guys can go ahead –

Phil    [stepping forward] Can I try this [using the table saw]?

I at first imagined everyone else was thinking along the same lines as I was: of course you can’t use the table saw! you’re blind! However, to those present at the lesson Phil’s blindness was not an immediate and irrevocable cause for exclusion. Erica and Cori immediately came to sharp attention
Perhaps due to the seeming ridiculousness of the question, Linus was taken at this moment by a strange lightheartedness. He laughed quietly and shook his head before responding.

Linus  Sure! I'll stand right here (looks at Cori and Erica and makes fingers pointing to eyes pointing to Phil, pointing to wood gestures) and make sure....

None of the techies exchanged exasperated looks. Sam took the wood, felt its size and shape, and lined it up with the fence while Cori kept her hands between Phil’s and the spinning blade. Phil then ran the piece through the saw, with Cori helping to keep it pressed against the fence, as is common for the person standing on her side of the saw, and with Erica controlling the wood after it passed through the blade so that she could finish the cut. Everything worked fine – which is to say the wood was cut and nobody was injured – and while it was clearly not the most efficient measure as it involved four people watching as one used the saw, Phil did get to use the saw. He did not use the saw at this time after his first cut, and I never saw him use it again; he clearly could not have done so safely without assistance.

Following this, Linus left and the new girl made a cut. She seemed nervous and very focused, staring intently at the wood and the blade and her hands as she made the first cut then continued on to several more. Erica and Cori were very attentive during the new girl’s first cut. Then they began a curious alternation of behaviors. In between cuts they played what seemed to be a game similar to pat-a-cake, each playing on their own, not touching each other as they were on opposite sides of the saw. As the new girl began each cut, they stopped the game to help guide the wood as it passed to the far side of the blade. After a few cuts, Phil and the new girl left to get another piece of wood and while they were gone, Linus came back. He said something to Erica and Cori by way of apologizing for the superfluous earlier lesson. I did not get it recorded verbatim in my
motes but it was to the effect of ‘I know you’ve done this a million times before,’ at which point Erica lifted both hands, as fists, into the air and shook them, cheering, clearly amused. A few minutes later Linus walked past me and commented on the events, “I’ve got a blind kid running the table saw. Either I’m better than I thought I was or I’m really, really stupid.”

Apprenticeship and the Table Saw

Most of the work and apprenticeship situations described in Lave and Wenger (1991) and Wenger (1998) along with most other work using the same or derivative frameworks (e.g. Barton & Tusting, 2005; Jewson, Hughes, & Unwin, 2007; Riverin & Stacey, 2008; and special issues of Language in Society, 1999 and Teacher Education Quarterly, 2007) involves long-term participation in a community, as an apprentice, or as an employee. As such it is possible to trace trajectories of participation and track, for instance, growth and identity development over an extended period of time. Perforce, conclusions drawn form a single instance such as two new student technicians learning to use a saw while two experienced technicians and a teacher facilitated, inasmuch as they lack such longitudinal data will be somewhat speculative. Nevertheless it is worth sketching how an analysis might be made and noting the features of learning in apprenticeship situations as described by Lave and Wenger that this incident shares.

Linus’s reaction in letting Phil use the saw supports one of the basic tenets of apprenticeship, especially as compared to traditional schooling, that with but limited exceptions many apprenticeship programs guide apprentices to mastery (Lave & Wenger 1991, p. 30). Apprenticeship learning is also described as non-linear, and not related to the specific order of activities in a work place (Lave and Wenger 1991, pp. 90 ff.). That is, that apprentices tend not to learn the first step of the process first, but rather learn ways in which their participation can most readily be valuable to the community. In the situation here many new students were working on other projects at the same time as
another new technician and an experienced technician – Phil – were learning a different skill and two experienced techies assisted in guiding them rather than work on their own projects. The new girl in particular learned a way to participate meaningfully in the community by using the saw. In this way she was on the trajectory from legitimate peripheral participation to full participation.

This is perhaps particularly relevant for Phil. Lave and Wenger (pp. 34-37) are clear that full participation is a varying concept and that not all members of a community who participate fully do all the same things. Old-timers in many communities will have different specialties, and this is true in technical theater at Lincoln as well, as some students may specialize in lighting, or painting, or carpentry, for instance. It is important to consider this table saw moment in relation to how Phil sees himself on his trajectory from peripheral to full participation in the tech community. Inefficiencies aside, after all it was no less efficient for Phil to learn to use the saw than it was for the new girl to do so, and through making his cut with the saw Phil did meaningfully participate by creating a useful product for the building of the set. Of course, Phil was a regular techie and had contributed countless other times in other ways but the – completely reasonable – assumption by everyone present except Phil that he would not be using the saw points to a sort of limitation in how he was considered to be a member of the community.

Regardless of the fact that Phil, to my knowledge, never again used the table saw, there are at least two important consequences to his having done so once. First is that he learned, as per the situated learning concept, how to behave meaningfully, i.e. cut the correct sized piece of wood, in the tech theater setting. Second, this fact was immediately recognizable, especially to Linus, Eric and Cori, senior members of the community. Not only was he able to enjoy whatever personal satisfaction he felt for overcoming a challenge, but by gaining a new way in which he could participate he moved closer to full participation and changed in status to become a technician who could use the table saw, perhaps becoming more an old-timer himself, more a peer of Erica and Cori. As
discussed in the *Skilsaw* incident below, technicians frequently receive training in tools that they may never use again, and while there may be more obvious reasons why Phil did not use the saw again there does not seem to be any reason to consider his having learned to do so any less significant than the case of any other techie that does not either.

Erica and Cori, as relative old-timers in the technician community, can be seen as full participants having at some point learned to use the saw and being now in the position to pass that along to others. Of particular interest is the ways in which they not only were able to pass along this skill and information themselves, but the ways in which they had mastered table saw use to such that they were able to assist Linus in his lesson. Erica, for instance, helping to finish Linus’s initial demonstration cut proved to be a seamless part of the presentation without any pre-planning. In fact, I would note that there is a sort of etiquette, for lack of a better term, to table saw use in which any knowledgeable person is likely to pause and help somebody using the table saw to complete a cut. It happens all the time that a technician begins a cut and while inexperienced technicians pass by, another experienced techie stops in passing to help finish the cut, even if assistance is not necessary. This is the sort of deeply understood procedure that Erica demonstrated in Linus’s lesson. Finally, Linus’s reliance on the two experienced technicians in the unusual and dangerous situation of Phil using the saw, along with their instant apprehension of the situation and appropriate reaction to it, namely helping Linus with the lesson, protecting Phil from injury, and fostering another member of the community, speak to the degree to which these young women are invested in the community.

While overt instruction is rare in both technical theater at Lincoln and in the cases described in Lave and Wenger (1991), it is worth noting the relation of this mini-lesson with the table saw to the concepts of the teaching and learning curricula mentioned above. The authenticity, or immediately recognizable utility for completing a goal oriented activity, of the lesson is clear. Unlike a situation I observed in Stagecraft class
where Linus presented the same mini-lesson on using the table saw (without Erica and Cori’s assistance) and asked the twenty or so students to all take a turn making a cut on a piece of scrap wood that was not going to be used for anything, Phil and the new girl were engaged in creating pieces that were going immediately to be assembled into some part of the set. Such a situation implies that the distance between the teaching and learning curricula collapses, becoming essentially the same thing. In particular, as witnessed by Erica and Cori’s participation in the lesson and subsequent teaching of the lesson themselves, the mini-lesson can be seen as part of the practice of the community, something community members do as part of their participation in the community that has the effect of enabling the participation of others. They thereby not only increase the immediate utility of the younger technician, but also help to ensure the long-term stability of the community through the passing along of important skills.

While this seems to me to be a powerful endorsement of this sort of community and situated learning, as mentioned above, on occasion learning within a community has glitches that deserve scrutiny. The following incident points to a need to consider a broader range of factors than those immediately evident in the teaching of the lesson. Later in the day during this same Saturday work session Cori and Erica were again hanging out around the table saw. Although I had not done an accurate count or measurement, it seemed to me that these two technicians were sort of ‘camped out’ by the table saw. They had been using it to cut pieces for whatever project they were working on, cutting pieces that they took to the other room where I believe at least one other technician was helping build something. They had stayed at the saw and assisted when Linus taught two other students to use the saw, then returned to their own work. Later they explained to a third student how to use the saw, although the student had only one piece to cut and that cut was made as part of the demonstration.

Erica and Cori teaching of the table saw min-lesson struck me as fairly unusual; I have only observed one other incident when a student taught another to use that particular
tool. Their student was another girl I had not seen before and whom I believe had not used any of the power saws before. The lesson arose in a common fashion: the new girl carried a fairly small piece of plywood over to the saw where Cori and Eric had been working and told them that she needed to cut it. Frequently in such a situation a more experienced technician or adult volunteer will simply make the cut for the student, or if circumstances permit show the novice technician how to use the tool him- or herself. Cori and Erica, the more experienced techies who had already participated with Linus in teaching others to use the saw and who seemed to me to be temporarily at a loss for something else to do, took the opportunity to teach the new girl to do it herself, repeating in essence the lesson that had assisted Linus with.

The glitch in this situation is somewhat ironic. It arose when they were given yet another lesson on how to use the saw by Bob, the assistant technical director, who had arrived later in the morning after the young women’s earlier participation in teaching others to use the saw. This was, of course, ridiculous, and I found it somewhat appalling. It arose, however, also in a fairly typical way. Erica and Cori were again hanging out by the saw, talking, and apparently at loose ends. Bob, needing to cut a piece, came over to the saw. Unlike the earlier girl who saw them standing by the saw – perhaps having seen them use it earlier – and told them she needed a piece cut, Bob saw them by the saw he was intending to use and took advantage of the moment to teach them how to use it. Had he asked them to, surely they would have cut the piece for him, and had he asked them if they knew how to use the saw they surely would have allowed that they did. Bob did not give the full version of the mini-lesson with chances for the Erica and Cori to practice, which also might have compelled the girls to tell him they did not need the help, but rather explained to them what he was doing and why as he was using the saw.

It is difficult to describe exactly the young women’s body language as they used, taught, and were simply around this saw. Impressed in my memory are three particular stances. When they were alone or with Linus, the saw was just a piece of furniture, more
table than saw. They touched it, leaned on it, put their coffee on it, disregarded the blade. It was a tool, their tool, and they were relaxed in its company. They respected it, yet they played games while the saw was powered up. It had become more familiar than frightening, a lion they had tamed – obedient but still dangerous. And, understanding the danger they snapped instantly to tense guarded attention as Phil and the new girl used the saw. They stood straight, half a dozen inches from the saw, leaning over it, arms bent and extended over the saw in the direction of the blade, concentration focused on blade and wood and hands, ready to move in an instant. Doing so they both instructed and protected the other students, as in the first instance when Erica showed the new girl how to keep the wood against the fence and helped her to do so, and in the second when they positioned themselves to help Phil complete his cut and stop him from getting his hands too close to the blade. Somewhere in between these was the stance of polite attention which they demonstrated while first Linus was instructing the new students and second when Bob was superfluously instructing them. Then they stood two feet or more from the saw, looking at each other or the speaker.

Unlike Linus, who knew Erica and Cori knew how to use the saw and later apologized for making them stand through the demonstration, and seemingly assumed they would participate in completing the demonstration, Bob merely left after he made his cut and went on with whatever he was doing. As above, it is difficult to construct a complete analysis of this queer incident in terms of legitimate peripheral participation. It would be easy to just classify it as a simple misunderstanding and ignore it. The misunderstanding does not seem entirely a simple one, however. It seems worth exploring from multiple points of view. It may be worth re-mentioning that Bob in addition to being the assistant technical director was himself a former student technician and had graduated from Lincoln several years before this incident. This was his first semester as a director at Lincoln, and while he had at the time worked a number of jobs tangentially related to theater, none of them involved teaching.
It is interesting to question both why these technicians, clear old-timers in the community, did not tell Bob they did not need table saw instruction, and why Bob thought he should give these clear old-timers some. I suggest that in terms of a trajectory of participation Bob was trying to move towards more full participation in the community of directors by trying to make himself valuable as a teacher to these students. At the same time, doing so hampers his participation in the community of technicians inasmuch as it sets him apart from both understanding what the technicians may need help with and from the authenticity evident in the same lesson as taught by Linus earlier to technicians who had a need to know it. Through his participation in what in effect becomes a teaching curriculum, he draws a distinction between himself as a director and the technicians as students. From the girls perspective, I postulate that they did not feel adequately empowered to interrupt and contradict Bob as to the relevance of the lesson he was providing, for essentially the same reason as Bob felt empowered to perform it, namely that he drew attention to the difference in their roles, he as teacher and they as students rather than all as members of the same community.

This moment has stuck in my mind for a number of reasons. Most prominently perhaps because I had been excited to see the responsibility and initiative that these two young women had been taking and impressed by their overlapping competence and silliness as they goofed off around the saw. I was not able to ask the girls about this incident so I cannot report how they felt about it. All morning they had seemed to be having fun, enjoying the prominence of their role as veteran saw users and novice saw mentors on this day that saw exceptionally high table saw use, a very tangible reminder of their status as fully participating old-timers in the technical theater community. I do not think the incident with Bob spoiled their day nor do speculate that they attribute any condescending attitudes to him. I could not notice any change in their demeanor or activity following the incident. But it has also stuck in my mind as both a reminder of the importance of a successful analysis to consider broader contexts in which moments like
these are embedded, and the tenuous nature of any strategy for organizing relationships among teachers and students that varies from a traditional student–teacher model.

The Skilsaw® Incident

It bears noting that there are significant differences between the adult and largely professional or occupational contexts discussed by Lave and Wenger (1991) and later by Wenger (1998) as well as most of the additional community of practice work mentioned above, and the educational context at Lincoln. While this will be explored in some depth in Chapter Four an example from my observations is a useful illustration at this point, especially as it ties in with the incidents involving Bob and the table saw and Greg, the second student technician involved in the walkway building described above. Greg’s involvement involves his choice of saw to make a long cut on a piece of plywood and his and Linus’s reaction to that decision.

Two handheld electric power saws had been used earlier in the day and were both readily available for this purpose: a jigsaw and a Skilsaw, the ubiquitous name for circular saws based on a parasitic reference (Moulton, 1977) to the Skil tool company’s original design. Smaller, lighter, and quieter in operation, a jigsaw cuts with a narrow oscillating blade protruding an inch or two from the bottom plate of the saw. They are not typically used to make long straight cuts on large work pieces. Rather, the light weight and narrow blade of a jigsaw make it useful for cutting curves, sharp corners, and complex shapes. The top cutting speed of the jigsaw is considerably less than that of the Skilsaw, but operators frequently choose to cut much more slowly than the saw’s maximum speed to be careful or ensure accuracy, a technique that the jigsaw’s quiet operation makes plausible. The Skilsaw at Lincoln is in fact a Skill company model, their construction industry standard worm drive model, so called because of its use of a

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worm gear in its inner workings. Skilsaws, and especially worm drive models, are much heavier and more powerful than jigsaws and cut with a 7¼” circular blade protruding from the bottom plate of the saw. Their weight makes them difficult to maneuver and because a considerable width of the circular blade is in contact with the material being cut, pivoting or rotating the saw during a cut is practically impossible, effectively eliminating the possibility of cutting along a curved line.

Greg’s action in this instance can be quickly told. Immediately following a work break, he chose to cut a large piece of plywood approximately in half along a line he, Albert and Jake had drawn before break. Jake was momentarily absent but Albert and Linus were both in the vicinity. As Linus walked by he engaged Albert in a conversation and remained after Greg had gotten to work. The wood was already positioned on sawhorses and ready to cut and Greg picked up the jigsaw and began cutting. I believe that had I been taking an active part in this project, I would have told him to stop and use the Skilsaw instead. There are a number of reasons for this: the jigsaw would actually be more difficult to use, or at least take much longer; it would be more expensive, in terms of damaged and worn out blades, to use the jigsaw (a real concern as blades are frequently in short supply); and it would make a less accurate cut. Neither Linus nor Albert told Greg to switch tools however, instead continuing their conversation and observing him during the approximately two minutes that Greg was making the cut.

Many students do not like using the Skilsaw. Even though there is an informal mini-lesson on the Skilsaw, it is less standardized and not taught as often as some other lessons, most notably those for the table saw and chop saw. The two most immediate reasons I give for this are first, that while the Skilsaw is ubiquitous on carpentry work sites, it is needed much less frequently in technical theater, at least as it is conducted at Lincoln. Many Skilsaw cuts can be made with a chop saw, and many others can be made on the table saw, and as mentioned these tools are readily available at Lincoln. Secondly,
because it is used infrequently and is somewhat dangerous\footnote{A “Skilsaw” query in an internet search engine will turn up many gruesome instances of Skilsaw injuries and related forum discussions.} for an inexperienced user, an adult who is comfortable with using it is likely to just make the required cut instead of showing a student how to do so. Whatever the reason for students not receiving the Skilsaw mini-lesson as a matter of course, many students, including those who have had the mini-lesson, more often than not choose a different tool, typically the jigsaw, to use instead.

While there is an informal mini-lesson for the Skilsaw, there does not seem to be one for the jigsaw. Although one could easily be devised, the relative safety of the tool,
its ease of use, and students’ apparent lack of apprehension surrounding it make devise
one unnecessary. I have on two occasions noticed students explaining or demonstrating
aspects of the jigsaw to other students, including how to control the maximum rate of the
blade’s oscillation – by turning a dial on the saw – and how to facilitate cutting sharp
corners – by making multiple small cuts. The most frequent interaction between the
technical director and students regarding the jigsaw happens when a student who has
been using the saw breaks or bends a blade and asks the technical director how to replace
it.

In some cases I have observed, there is a practical dimension to student
technicians choosing not to use the Skilsaw, as some technicians are simply not strong
enough to use the Skilsaw safely, at least without extra preparations before making the
cut. However, I believe that in many circumstances a stronger motivation for students
choosing the jigsaw is their comfort: the Skilsaw is loud, can leave the user covered in
sawdust and can sometimes spray that sawdust in the user’s face. It also the more
dangerous tool both in that its size and weight make it more difficult to use and in that its
greater power and larger, more aggressive blade means an injury is likely to be much
more severe6. Other times it may simply seem easier to use the jigsaw because it is more
likely to be already present in the work area whereas the less frequently required Skilsaw
is more likely to still be in the tool cabinet.

Greg’s choice to use the jigsaw seems to provide evidence for the user’s comfort
explanation as he was big and strong enough to handle the Skilsaw, had used the Skilsaw
earlier in the day after he (along with Jake) had been given a version of the Skilsaw

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6 By way of personal illustration, I was writing this section in the car en route to visit my
brother, an experienced carpenter and general carpenter. Upon my arrival, he asked me to help
put away from his van the tools that he had been using on a roofing job. When I noted that the
tools included a jigsaw, but not a Skilsaw, he volunteered that as it was a steep and precarious
roof he chose the jigsaw because it was much safer.
lesson by Albert, and had ready access to the Skilsaw and jigsaw, both of which were on
the floor in the work area. The most interesting facet of Greg’s otherwise straightforward
action happened after he finished the cut, by which point Albert and Linus had finished
their conversation and were both watching from behind him. In fairly typical fashion
Greg blew and brushed sawdust from the top of the wood he had just cut. Then, he bent
over to critically examine the cut and run his hand along the edge of it before turning to
face Albert and Linus and informing them his cut was not very good. I looked at the cut
later and it was in fact fairly wavy, as I had expected it to be when I saw Greg choose the
jigsaw and thought I would have told him to use the Skilsaw instead. This waviness in
the cut was no surprise to Linus, who explained to Greg that while one of the strengths of
the jigsaw was its ability to cut curves when one wanted, this was also one of its
liabilities, in that without practice it was hard not to cut curves when one wanted not to.
This encounter ended with Greg allowing that, ‘I guess I should have used the Skilsaw.’

Apprenticeship and Using the Skilsaw

To work towards an understanding of this event, it is useful to approach it from
two perspectives. Considered as an example of situated learning and apprenticeship it
echoes the chop saw and table saw lessons in that Greg (and Jake) had received the
Skilsaw lesson in a situation where they would have opportunity to use the saw, although
in this case, neither did so independently. Albert had modeled using the Skilsaw several
times previously to this incident, and in terms of apprenticeship it may be speculated that
Greg was at some midway stage between knowing the tool and its uses and becoming
fully comfortable with it. This would place him on a trajectory between limited and full
participation whereat he knows how to behave meaningfully, i.e. use the Skilsaw when
appropriate, but has not incorporated that into his repertoire of ways he sees himself as a
community member. In this regard it mirrors Phil’s use of the table saw earlier, an
acquired skill that is not developed into regular use. Had Albert nudged Greg into using
the Skilsaw earlier in the day, closer to when he had taught him how, Greg may well have
mastered using it.

In arguing against learning the acquisition of mental schemas and for a concept of
learning as developing the ability to do in practice Hanks argues:

… what the effective learner learns is how to actually do
practices…. On this aspect it seems necessary to posit that the
skillful learner acquires something more like the ability to play
various roles in various fields of participation. This would
involve… ability to anticipate, a sense of what can feasibly occur
within specific contexts…. It involves a prereflexive grasp of
complex situations…. Mastery involves the timing of actions
relative to changing circumstances: the ability to improvise.” (Lave & Wenger 1991, Introduction, p. 20)

It seems clear therefore that Greg has acquired two skills – using the jigsaw and using the Skilsaw – but not mastered either. He was unable to anticipate the results of making the cut with the jigsaw, nor to adapt his knowledge of using the Skilsaw in the context of a lesson or guided practice with it to the novel circumstance of a different cut on a different piece of wood by himself without Albert’s supervision.

The outcome of this situation deserves comment; I was glad that I had not intervened to tell Greg to switch tools. This became an excellent example of the sort of learning by doing, and in this case failing to a degree, that is common to technical theater at Lincoln. By coming to the conclusion himself that he should have used the Skilsaw, Greg learned not only that it was the better tool for this purpose, but also that the jigsaw was the worse tool. To return to Hanks’s terms, Greg would have a better grasp of the complex situation of making similar cuts, would better be able to anticipate and improvise in the future, based not on a sort of schema provided by instruction but on experience gained through practice. At the same time, the cut was not horrible, and as Linus also explained to Greg, it would be perfectly suitable for its purpose. So, Greg was able to participate legitimately in the community, and take ownership of his mistake. While it was a safe mistake to make, inasmuch as not making it again would satisfy a desire to move towards more full participation in the community (Lave & Wenger 1991) it also may have provided further motivation to use the Skilsaw that would overcome his inclination to use the jigsaw instead.

In considering application of Lave & Wenger (1991) to technical theater, it is important to acknowledge two distinct topics of investigation in their work. On the one hand, the heart of their framework derives from their attempts to understand examples of apprenticeship in a range of contexts. It is natural that much of the subsequent work they put their theory to involves understanding the original apprenticeship examples. On the other hand, they note that they are specifically not trying to distill a set of common
principles of apprenticeship (p. 31). Rather, their aim is to delineate a new paradigm for understanding learning in the broadest sense, in any situation, as an essentially social phenomenon. This of course subsumes their apprenticeship examples, and although they state their intention to systematically avoid extended discussion of traditional classroom instruction (p. 39 ff.) their theory on the nature of learning applies their as well, as it does in formal and informal situations across the board. As per the above discussion of the learning versus the teaching curricula, their brief comments on traditional instruction go so far as to note that while learning may in fact be taking place in such situations it does so not because of the direct instruction per se but because of the students legitimate peripheral participation in, e.g. the classroom community.

This has a further direct relevance to understanding apprenticeship, legitimate peripheral participation, and teaching in technical theater at Lincoln. On several occasions during casual conversation after work sessions Linus has made comments to me, which I have seconded, regarding certain of Albert’s interactions with students. Albert is a close friend of mine and of Linus, but Linus and I have both observed that several features characterize many of his interactions with student technicians: he is impatient with the rate at which work gets done; he is a “tool hog,” frequently doing all the iterations of a particular task; and he tends more so than Linus or I do to be commanding and relegate student technicians to auxiliary roles, such as holding boards while he screws them in. Lest I provide too unflattering an image of Albert, it is worth noting that these characterizations apply to only some of his interactions with techies, and neither Linus nor I have ever felt the need to mention this to him. Further, Albert also occasionally takes time to provide careful explanations to students, as when he showed Jake and Greg how to use the Skilsaw; he brings many of his own tools and supplies, which he generously shares with other technicians; and he shares work and tools more with students as he gets to know them and their capabilities.
From these considerations there are various conclusions one might draw when keeping in mind that his position is institutionally awkward and without a clearly defined role or boundary. Considered one way there is a very egalitarian aspect to his behavior in that he seems to view himself as a techie at Lincoln, committed to the same goals as them and equally part of the process. This is to say that he does not think of himself as being along the lines of a teacher or assistant technical director, and that he works with the students rather than teach them. His commitment to the objective of preparing for the play offers explanations for the characteristics mentioned above: his impatience with the rate of progress derives from his investment in the success of the play while his bogarting the tools and directing student technicians in supporting roles has definite advantages in terms of efficiency of production.

On the other hand, his participation parallels cases of master–apprenticeship as described in Lave and Wenger in which apprentices learn more from journeymen and other apprentices than the master, who as with Albert sees little or no need to provide direct instruction and is comfortable teaching by example. The disinclination to direct teaching and actively sharing all aspects of the work is further complicated by the transitory nature of the participation of some technicians. For instance, the ones with whom Albert was working on the walkway were not regulars and it is entirely possible that they would never participate in a work session again, thus ranking the ability to use a Skilsaw somewhere between esoteric and pointless for the students and taking time to teach it somewhere between disruptive and pointless for Albert as lead technician. In this regard his participation is unlike mine or Linus’s in that while we (almost) always are considering technical theater as a hybrid theater production and teaching and learning environment, for Albert it is (almost) only a theater production environment, albeit a fun and relaxed one with fairly low stakes and lots of room for improvisation.

Viewed in a different light, Albert is clearly different from the other techies. Students enjoy Albert on a personal level. He is a talented photographer and frequently
documents tech work days and rehearsals with photographs that he posts to Facebook where many students and former students are “friends” of his. Albert also takes head shots of actors in plays that are used in display cases around school and in the play program. He does additional photography for other performing arts programs at Lincoln, judges speech competitions, and volunteers in other capacities at the school. Students are familiar with him, talk and joke with him easily, and even inquire as to his whereabouts when he is not at a work session. Student technicians also seem to like to work with him. Although I did not make any deliberate inquiries in this regard, I never heard a student ask not to work with him or complain about the things Albert asked him or her to do, nor did I see a student leave from a group Albert was leading or otherwise try to avoid him.

In regard to his role in the community, there are parallels between Albert and Bob. Although Bob, as an assistant director and employee of the school district, has a particular de facto standing, he as well as Albert operates among the student technicians but is not entirely one of them and is also not a teacher or full-time member of the Lincoln staff. This points to a particular difficulty in the Lave and Wenger concept of the community of practice alluded to above. Empirical studies, and indeed Wenger’s (1998) theoretical account, typically take the notion of a community of practice to be rather too unproblematic. In particular, there seems to be a tendency to consider them as unified, cohesive, wholes with sole occupancy of the terrain in which they practice. This makes for difficulties in cases where multiple communities overlap, and / or where individuals have memberships with or affinities to multiple communities, especially if the communities are simultaneously working towards the same goal. As mentioned in the case of Bob above, such circumstances point to the need to consider broader contexts for more satisfactory analyses.
An Activity Theoretic Account of Teaching and Learning
to use the Skilsaw

In this section I make continued use of activity theory as a tool for understanding technical theater. As mentioned in the introduction to AT in this chapter, my use of terminology differs slightly from Engeström’s (e.g. Engeström, 2001). I am making a rather deliberate conflation of his (related) “object” and “outcome” categories. While there may be some sense in which this reduces the theoretical complexity of the system, it is certainly warranted in this instance for a number of reasons, not the least of which being that the concept of “object” is not itself a theoretical simple. Moreover, while the concept of an object is itself complex, it is seldom the case, at least in technical theater, that there is an identifiable single object that is being worked upon. Admitting for instance that there is a conceptual difference between an activity system including a saw as a “tool” and lumber as an “object”, and an activity system including power tools and tool skills as the system’s “tools” and a combined saw and lumber system as the “object,” in practice this seems to make very little difference and such difference as it may make can easily be reflected in a diagram categorizing the relevant elements of the system.

I typically reduce the object~outcome dyad in Engeström to the term “object” in an effort to not deviate from the traditional terminology, but with the understanding that I intend an additional meaning more akin to “objective.” I believe this further emphasizes the nature of activity systems used to describe goal directed activities. In constructing my analyses I have not encountered a situation in which more traditional objects would not fit with the analysis as a preliminary step leading to outcomes, but again I am not convinced that the analysis is enhanced thereby. In any event, the possible ways a technician can use his or her skills and the range of tools available to act upon an object are vast, and keeping a reminder of the objective of the activity graphically represented in diagrams of the activity systems seems helpful.
An activity theoretic analysis of Albert’s typical participation is represented in the diagram below. Many elements of this and the following diagrams overlap and will not require repeated explanation. Many instruments are common to all the situations discussed and are listed in abbreviated form. A number of other elements are particular to Albert’s activity system. For “rule” I intend to stress that as mentioned above, in one sense Albert sees himself as in a kind of work situation where he is in charge and the goal is to work as efficiently as possible towards the current goal, in this case taking few overt opportunities to encourage the student technicians to develop their proficiency with many of the tools present. This is also reflected in the “division of labor” and the “object,” which for Albert seems to be primarily building the set. I have included drama students in the “community” to reflect that in the moment described above Albert was working with two part-time technicians who were in the play and who had at the beginning of the

Figure 4-9 A typical activity system involving Albert.
project relatively limited skills as compared to many of the regularly participating student technicians.

In considering this activity system for Albert, it should be pointed out that what I have called co-worker relations and maximizing efficiency are concepts the locus of which can be found outside of the technical theater community and school in general, but the object is taken to be local, concerning only the completion of the set itself. A number of changes are evident when we consider a typical activity system from Linus’s point of view. Of particular import is the inclusion of a teaching philosophy (to be discussed more fully in Chapter Six) as an “instrument” for Linus, along with tools and other technical theater paraphernalia. This philosophy can be understood as motivating differences in other areas of the system as well. This philosophy is reflected in the “division of labor” which for typical Linus interaction involves him explaining to students what needs to be done and giving them space to do it. For “rules” the addition of the teaching philosophy leads to a change from the idea of co-workers, which I suggested limited student participation although it was an egalitarian point of view on Albert’s part, to that of apprenticeship and community membership. The student–teacher relationship is left there as a reminder that while Lincoln’s technical theater community deviates from the norm in this relationship, it does not ever seem to disappear entirely, from the minds of the students or Linus.

Additionally, Linus’s consideration of community is expanded to include the entire drama department and high school. By this I mean to show that he has numerous considerations, not only with developing student technicians as individuals and maintaining a viable technical theater community, but obligations to the rest of the drama department and expectations about the performance of the drama depart from the school and school administration. His “object” therefore is not only the building of the set, but
Figure 4-10  A typical activity system involving Linus.

doing so in a way that gives students opportunities to learn, participate, and take ownership of it. The situation with Phil and the table saw brings some of these issues to the forefront. Linus’s willingness to reduce efficiency coupled with his belief that students should have opportunities to participate leads fairly naturally to taking an extended amount of time to allow a student to experience a way to participate that would otherwise be unavailable.

Similar considerations led Linus to allow Greg to use the jigsaw to awkwardly make a cut that would have been better done with the Skilsaw, the useful outcomes of which were mentioned above. Had Linus not been present and engaging Albert in a conversation, I imagine that in keeping with his value of efficiency Albert would simply have picked up the Skilsaw and made the cut before Greg was involved. It is certainly
true that Albert had given a Skilsaw lesson earlier in the day, other reasons for this – he hoped that by using the saw the students would immediately increase efficiency, that there was not much else for the students to do until Albert had made the first cuts – but there was too little follow up on this to indicate a solid teaching objective. The next diagram considers yet another take on the teaching objective in technical theater.

**An Activity Theoretic Analysis of a Table Saw Incident**

As is evident from his unsolicited lesson on using the table saw, Bob believes that teaching is integral to his role as an assistant at Lincoln. Because of this, I have put school first in Bob’s “community” to reflect the importance he gives to teaching. At the same time, I list his primary “rule” as student–teacher to reflect several aspects of the interaction mentioned in the discussion above: that Bob did not consider the relevance of
the lesson before beginning it, the students did not interrupt the lesson to point out its
superfluity, there was no apparent need for the lesson in terms of the girls then actually
using the saw to make something for the set, and so on. As Bob’s participation in this
data is limited to this one incident, the diagram for Bob is more specific the others above
which have tried to show Albert and Linus in their typical interactions. Another such
typical diagram is given in Figure 4–12 to describe the activity system for the typical
regular, old-timer or journeyman or woman student technician.

Again, both apprenticeship and student–teacher relationships from part of the
“rules” for the technicians. The “division of labor” and “object” are in close alignment
with Linus’s activity system. It is easy to tell that there is little overlap with this student
technician system and the system for Bob. Instead, below I provide a redrawing of the
diagram for Erica and Cori in the situation of being instructed on table saw use by Bob.
Note that apprenticeship and community participation are missing from the “rules” vertex. Although the table saw and knowledge of the saw are “instruments” available to them, it is difficult to assign a relevant object, beyond perhaps being polite or acting like good students. The labor is also one-sided both because the girls have nothing to actually learn and because they have nothing to actually do with the saw following the lesson.

Figure 4-13 Veteran technicians Erica and Cori during Bob’s table saw lesson.

One of the advantages of an activity theoretic approach is that it helps to explain the influence of larger contextual factors, such as Linus’s understanding that his job as technical director involves not only teaching student technicians but also satisfying school-wide expectations regarding the quality of theatrical productions. While I have tended to provide more generic diagrams for most of the situations because it is cumbersome to consider all of the factors for each individual learning situation, having done so for Bob and Erica and Cori in the table saw incident allows a further analysis.
along the lines of the third generation of AT (Engeström, 2001). More specifically, it allows for comparison of the outcomes as intersecting ranges of results, showing areas of overlap and areas of disconnect.
Figure 4-14  A combined activity system showing overlap and discrepancy in Bob’s and the student’s understanding of the table saw incident.
CHAPTER V
ART MAKING, EMBODIMENT, AND COLLABORATION IN
TECHNICAL THEATER

In the previous chapter, I shared data and analysis to persuade readers that certain kinds of learning takes place in technical theater. Students learn about materials and tools, collaborate among themselves and with adults, problem solve, and interpret plays through the ways in which they choose to create scenery and props. The walkway moment includes all of these types of learning and is analyzed as an example of text making; other data in Chapter Four focused on the nature of the introductory lessons and how, in the context of technical theater, the lessons are examples of learning taking place in particular ways, e.g. learning through apprenticeship in a community of practice, or as the result of participation in goal directed activity. The last two approaches (apprenticeship and participation) offer a wide-angle lens through which to view these learning activities. That is to say that while they are valuable for putting the learning moments in context and for considering the larger institutional or systematic mechanisms through which learning happens, they are less well suited for looking inside those moments to the experience of individual students and their personal, perhaps idiosyncratic, learning.

In this chapter, I take a different approach. I have mentioned several times that technical theater is a messy, busy, hybrid activity and in this chapter I want to put some of that messiness on display by considering a new range of data. I conceive of these data as being a study in contrasts, both in the content of the data and in how they are presented. They range from a mundane example drawn from the Stagecraft class through a typical, easy-going student collaboration on prop building, to the high energy, high stakes, high pressure crucible of technical rehearsal. These data will implicate the body as a site and tool for learning (see Osmond, 2007; Peters, 2004), and building as a mode of creation that goes beyond text making (e.g. Zurmuehlen, 1990; Eisner, 2002).
so exposes differences from the orchestrated sameness of classroom exercises and focuses attention on the industry and personal exploration of student technicians. Along with embodiment and text making, the concept of collaboration is also explored. In short, these data bring together many of the kinds of learning I have observed from technical theater. They also require further development of the theoretical framework with which I will analyze them.

Below I consider the ways additional data shows the need for adding a new level of complexity to the existing analyses. I consider very briefly the suitability of the previously introduced theories for this data, then discuss additional approaches that function well with the new data to provide a richer understanding of learning in technical theater. While the purpose is to examine a different range of data from new perspectives, nevertheless I want to remain sensitive to the larger context. For instance, most (though not all) of the projects develop in a way that can be thought of as project based and student centered. That is, they begin with a small group of student technicians being given a brief introductory mini-lesson as described above, and these lessons provide the student technicians with two things: basic knowledge of materials and competency with the skills required for the project and a sense of the purpose of the project. From this start, the student technicians work, largely in their original group but also to a lesser extent in collaboration with other students, Linus, or other adult volunteers, to develop the project in such a way that they see it as fitting their interpretation of the technical director’s original explanation of its purpose.

It is important to be able to consider both the ways in which a student technician interprets his or her instructions for the purpose of the project and how he or she learns while working on a project following the initial lesson. At the same time, the project is part of a larger whole and the arrangement of the way projects and working on them derives from a particular teaching and learning philosophy instantiated by the technical director based on numerous concerns. As discussed previously, I adopt a syncretic
approach in which multiple compatible theories are used in a layered process to increase analytic flexibility without instilling a competition among different approaches. In this light, additional theoretic concerns are not to be considered as alternatives to previous theories, but as providing thoughtful options to examine different perspectives on the data.

Vignettes

I share a considerable amount of data in this chapter and I attempt to balance coverage and clarity with brevity and accessibility. This is a difficult balance for any rich corpus of data, and I have chosen to approach sharing the data in multiple ways in an attempt to accentuate the immediacy of my experience as an observer, the insights I developed as a reflective participant, and the lived – or spoken – experience of the technicians themselves.

As a way of introducing these considerations more concretely, consider the following three vignettes. In the first, students are learning to hang lights. Two students stand out: one who later goes on to be a regular student technician, and another who finds it challenging to integrate what she has been taught with what she is experiencing. In the second vignette, two experienced student technicians are taught a mini-lesson of the type described in the previous chapter. The lesson focuses on using a staple gun and chicken wire to build the framework for a major set piece, a magical tree home to a friendly woodland spirit. After the lesson they continue the project and almost immediately begin telling each other stories about the project as it emerges. In the third, two young technicians, novices in the scene shop, are given the project of building a bookstand that belongs to Sister Amnesia, the zany nun in the musical *Nunsense*. As novice technicians, they have to learn how to work with tools, materials, and one another, all of which were unfamiliar, as they interpret their instructions and develop a collaborative composition practice.
Vignette One

Most of the data I discuss throughout this project were collected during afterschool technical theater activities, but the girls learning to hang lights took place in the Stagecraft class. It took place during the fall trimester, just a few weeks into the school year. The class had just been in Linus’s classroom, right next to the Little Theater, listening to school announcements regarding the homecoming football game and related activities. On previous days, these students have been studying lighting instruments, learning the names and uses of different instruments and receiving instructions and demonstrations of how to operate them, including how to hang them up and take them down. As Linus explained, the immediate goal was to have every student remove a light from the batten, and following the removal of all the lights, to have every student re-hang one. Many exercises in Stagecraft are similarly structured so that everyone is allowed a chance to use the equipment and is expected to perform the activity being taught.

The experience of taking part in the practical portions of these lessons is important in multiple ways. A brief example will illustrate one. An adage of using power tools is that the motor should not be overworked. Cutting too fast with a power saw or pushing too hard with an electric drill puts stress on the tool that wears it out and results in worse performance. Almost every student who learns to use the chop saw, as in Chapter Four, initially makes several cuts at the wrong speed, typically much too fast but occasionally with excessively cautious slowness. Until a student uses the saw, feels its resistance to being moved before the cut, feels the resistance added when the blade meets the wood, and hears the reaction of the motor, it is very difficult to realize the simple concept of not moving the blade too fast in actual physical activity. A similar point made by Rose (2004) is discussed later, as is Cori’s assertion that learning by experience is better than learning in the abstract. It is also worth noting that performance using the saw is public, while knowing abstract principles of saw use is not. Using a saw therefore
positions a student differently than merely acquiring the abstract – and not fully realized – knowledge of saw use.

I was reminded of this vignette as I was taking part in the scene described in the introduction in which two students struggled to carry a single sheet of plywood, their highly trained bodies untrained at that task and their highly educated minds so inexperienced that they did not devise a comfortable way to perform a routine task. Perhaps the best way to explain the first vignette is to stay as close to the source as possible. The following account draws directly from my field notes, spell checked, proofread, and edited slightly for clarity and sequencing.

Augmenting the details from my notes are three photographs of equipment typical of those used this day. The photograph in figure 5-1 is of Lincoln high school equipment, and the photos of figures 5-2 and 5-3 were taken in the Lincoln high school auditorium, the location where the following scene took place. The photographs were taken later in my research and are representative only, not the actual configurations present during the observed class period.

What follows is the vignette from Stagecraft class as recorded in my field notes. Note that I did not know the names of any of the students at this point and so relied on admittedly vague descriptions.

The light batten in the auditorium is lowered, lights hung, wrenches out. A line of chairs faces it. The kids start off in the room for homecoming announcements, then file in. Girls all on one side, boys on the other, me pre-set in between (accidently). They maintain this pretty strict gender coding for most of class, including back in the classroom afterwards. The girls aren’t friends, I wouldn’t say. They hang out close to each other and exchange sheepish looks, but aren’t friends. Back in the class they spread out several desks, but stay in one corner of the room away from the boys.
Figure 5-1  A standard clamp for hanging lighting instruments, a specialized lighting wrench typically used on such clamps, and a standard 6-inch adjustable wrench for scale. The diagonal screw on the clamp tightens to hold the batten.
Figure 5-2  Two typical lighting instruments complete with cables, cords, and clamps on a standard batten. Many of the cables were not present in the vignette described below.
Figure 5-3  A view of the "first electric" lighting batten. The rectangular section between the round battens is a raceway for the electric wiring.
Following instructions from Linus, the first 6 or 7 kids get wrenches, take off a light off the batten, and sit back down. Only 1 girl is in the first group – the little blonde girl – who is having problems with the wrench, and keeps looking back to the other girls (amused, ‘oh my god-ish’) for support. Eventually she gets the clamp / light off and exclaims, ‘this one’s heavy!’ (which it might be for her, especially because she is short and can barely reach it). The other girls take off lights. Then, the ‘test’ where everybody puts a light back on. It goes pretty smooth.

Think about the three girls putting on the lights and trying to figure out tighten and loosen, moving to both sides, maneuvering themselves so that they can reach things and so on. Stand on tip-toes to look at things sometimes, other times look away and feel around for parts [of the clamp]. Lots of trial and error, or ‘process improvement’. Feeling things out.

There is discovery and experimentation on the one girl’s face [not the blonde girl] as she moves in circles around the light trying to figure it out. Ducks back and forth underneath batten. She’s having a good time. She’s interested and engaged… maybe because she cares about lighting, maybe because she’s up and doing things instead of sitting, maybe because she’s using her hands, maybe because she’s learning something she knows she can figure out (i.e. that it’s manual physics / bodily geometry – what she needs to learn is (literally – ha!) in her hands.)

She gets the light up and fiddles with it – adjustments – not part of lesson. Then, helps one of her friends [not Blonde girl]. “come over here by me.” [points to something on light] “now, go over there” [points to the optimal position for working on the other girl’s light]”

The other (blonde) girl is having trouble with the wrench. Here is an intersection of experience and knowledge and body. She’s short and she doesn’t know what to do or how it feels. So, she’s having trouble getting the wrench into the correct place to get a good twist on it. Linus keeps saying give it a little turn, and she keeps putting the wrench in a place where she can give it like zero turn (note – square bolt, not hex, so range is different, and she keeps putting it on the same side.) [i.e., because of the narrowness of the space, she can only move the wrench through a few degrees of arc at a time.] She does move the light out of the way [which does allow her] to turn more, but it only gets her a couple of degrees. Something [going on] here is learning about one’s own body by doing things like this. E.g., how much room does my body take up, how can I get parts of my body over there to turn the screw, and so on. (Field notes, Stagecraft class, September 9, 2009)

The following paragraph was taken from a reflective note I made following the class. As Stagecraft met the last period of the day, when students left, I had time to sit
and work in relative peace. My tendency was to write one or more reflections on the notes I had just taken. The following was written in connection to the blonde girl struggling to complete the lesson.

When I think about experience, there is a lot of bodily knowledge going on. Experience is knowing how your body (and mind) work, how they work together, what they can do. Experience is the (expectation of) transference of skills from one situation to another. This happens a lot with physical skills (wrench using) because of the ready extrapolation of circumstances from one situation (wrenching in small space engine compartment) to another (wrenching in small space lighting equipment).

At the time, I had been thinking about experience. I had recently read the Salomon and Perkins (1989) article, “Rocky Roads to Transfer” which examines the transfer, or in some cases non-transfer, of skills or abilities from one context to another. Their idea of “low road” transfer was intriguing. According to these authors, low-road transfer “depends on extensive, varied practice and occurs by the automatic triggering of well-learned behavior in a new context” (p. 113). This was intriguing because it seemed parallel to the concept of experience I was developing that viewed experience as an integration of embodied knowing, bodily skills, and propositional knowledge that could be readily applied to novel situations. Even though I had never worked on lighting, I could have shown the blonde girl why she was having difficulty and helped her complete the lesson. Indeed, I think almost anyone experienced with wrenches in tight spaces – say, anyone who has done a little auto mechanics – could have immediately understood her problem. Ultimately, I found Rose (1999, 2004), discussed in the paragraphs that follow, much more satisfactory than Salomon and Perkins (1989) in no small part due to Salomon and Perkins’s narrow conception of intelligence that, though implicitly embodied due to their evocation of experience, nevertheless fails to ever consider the body or embodiment as an element of experiential learning.

My field notes for that observation continued:

In the middle of this, she complains about her wrench (which she IS having trouble with) and Linus is all like, ‘oh – that’s the bad
The other girl above ‘leaps’ into the fray with her wrench (she had already set it down under her light because she had finished earlier) and gives it to blonde girl.

She [other girl] then works and gets the safety cable out from the middle of the batten clamp (a problem pointed out [by Linus] earlier) and is one of the first done. She is still doing this kind of bodily experimentation, but she is a lot better.

Linus helps Blonde girl put the wrench in the other place [in a position where it can turn further each time], and she’s a lot better. I am NOT sure how well the concept sinks in, though, because at this point she’s nervous / frustrated and has had to ask for help several times. But, maybe.

Blonde girl eventually gets it, and sits back down. Shakes her head. Doesn’t talk to anyone. A little exasperation…

Because the technicians had to share wrenches and take turns, this activity took up most of the class time that was left after the students arrived in the auditorium to work.

After a few brief encouraging remarks to the class and an opportunity to ask questions, Linus let most of the students go back to his classroom, while a few stayed to help move a few lights back to a storage rack. It had been a busy class with lots of movement and activity for the students as well as opportunities to enact physical instructions that they had previously only learned orally and seen demonstrated by someone else.

Vignette Two

Sometimes a lesson preparatory to a project involves the use of new materials, as did this one in which the technicians learned to use chicken wire to complete a large, magical tree in which a friendly spirit resided.

On a Saturday work session preceding Into the Woods Linus set up a project for Heather and Vivien, a sophomore and a junior who I knew to be regulars at work sessions. There were several distinct elements in Linus’s lesson. The first part of the lesson provided context and background information such as the role of the prop and how it fit into the context of the play, important technical aspects of how the prop would be used in the show, information on how the project would eventually be completed, and loose parameters of what the finished project should look like. This was to be the healthy
as opposed to the other, dead, tree used later in the show. The actress playing the role of the enchanted spirit living in the tree would climb into it from behind and be lit with special small battery operated lights to be installed inside the tree later. Someone else had built the base of a rough wooden frame for the tree on a previous occasion and the two technicians were to cover it with chicken wire that would in turn be covered with a kind of fabric based version of paper mâché, then painted brown to look like a tree, leaving a hole in the back through which the actress could enter and exit. As the tree with the friendly spirit in it, it was supposed to be, “the good looking tree,” as the technicians came to call it, an ‘old tree with big roots,’ as Linus described it. In addition to the lower / root section of the tree the technicians were to add more wooden pieces to form smaller branches as they saw fit.

Another portion of the introduction to the project was more immediately practical to their work and involved thorough oral explanations of the materials and tools to be used, followed by demonstrations, followed by hands-on practice with those tools and materials. The chicken wire was to be attached with staples from the staple gun and the extra branches with screws driven in with a cordless drill. Tools and materials were gathered in a central location just out of the flow of traffic through the shop. A considerable amount of factual background information was passed along to the students in a short time, but even added to the hands-on instruction, this entire lesson preparing the students for the job took only a few minutes. I begin here with the start of the hands-on part of the lesson.

Linus Okay. So you two know how to add on branches, right?
Technicians [nod, affirmative sounds]

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1 Although I do not believe the students knew this at the time, there is a potentially interesting distinction to be made here. As props, the two trees were distinct. In the narrative arc of the play, however, they are the same tree, healthy in the first instance but ruined and killed in the second.
Linus [demonstrating adding a branch] So you just need to make sure you get a couple screws in it.

Technicians [nod, more affirmative sounds]

Linus Just be careful. It doesn’t have to hold very much, but you can split the wood really pretty easily…. [finishes demonstration of not over-tightening the screws] Ok, something like that.

As a friend of Linus who is familiar with his expressions and body language, and acting as an observer in this situation, I feel that Linus was not particularly satisfied with the branch he put on, but for whatever reason chose not to make any corrections. Also, although he clearly intended to demonstrate the procedure of attaching a new branch, Linus began by asking an affirming question of the student technicians, whether they knew how to do so. Rather than a contradiction to the intent of the question, the further demonstration pointed out a potentially new difficulty for this project, namely that wood scraps of the appropriate size were prone to splitting, illustrating the point that even familiar materials can have previously unrecognized complexities. In fact, there seems to have been no way that the students could have known exactly how to attach the branches, as they had not built the frame for the tree. I take the question to mean something more like, ‘do you have experience with drills and screws,’ but that while Linus expected the technicians to be able to transfer that experience to this situation, he also recognized the limits of experience when confronted with an unexpected unknown such as the easy splitting of the thin material.

Heather So, just use any… um… [gestures towards some scrap pieces]

Linus Yeah. Any kind of scrap piece is fine. It doesn’t have to be exact, so don’t go grabbing a new twelve-footer or anything.

Vivien [nodding] Yup. No problem. [looks around shop]

Linus Alright. About the chicken wire. Have you ever used this before? And the staple gun?

Techies [shake heads, uncertain noises]

Linus [kneeling on floor, unrolling a couple feet of chicken wire] Now, okay. It’s really pretty simple. The main thing is you don’t want to get poked with it.
Chicken wire, a thin wire mesh woven in a hexagonal pattern, comes in roles 25 or 50 feet long and, in this case, two feet wide. Because it comes tightly rolled, once unrolled it tends to roll back up if not held in place, a difficult task with only two hands. For about 30 seconds at this point while the students watched Linus worked at unrolling a section of wire, placing it on the tree frame, and preparing to cut it.

Linus

It’s not very strong, so you can just cut it with… oops, I've got the wrong ones. Mr. Schott, can you grab a pair of pliers with wire cutters on them?

[joking, to students] Usually it’s better to get the tools before you get down on the floor.

Tool storage was only a few steps away and I returned quickly with the pliers that had the wire cutter built in.

Linus

[proving] You see here, you can just cut the wire like this—it doesn’t have to be exact—it into pretty much the shape you want it.

[demonstrating] Now, watch it because you don’t want to get scratched and as soon as you cut it, it will roll up on you.

I don’t know if you want to wear gloves or not. There are some in with the safety glasses, in that area. You might just get them caught on the wire a lot, get them stuck….

[proving continues]

pause

Vivien We’ll just be careful.

[pause]

[Linus continues working on chicken wire]

Heather Um? Can you just staple it on first [before cutting it] so it stays in place?

Linus [enthusiastic – he may have forgotten to mention / do this himself] You can! Just have to be careful that then you might not be able to cut it where you want. See like this…

[proving tries to cut near where the wire was stapled on]

…I couldn’t get in there and cut that very well.

Linus later agreed that he probably should have stapled the leading edge of the wire to the tree, but that with two of them working on it that might not be necessary. He
continued to demonstrate how the wire could be bent into other shapes before and after being attached to the tree frame. Following this he also showed the students how to reload the staple gun and explained where the extra staples were kept in the tool storage area. As Linus was preparing to leave, Heather, who had been following the instruction on the chicken wire cutting and stapling closely, brought up the larger picture:

Heather: So, what do you want it to actually look like?
Linus: Oh, yeah. Duh. What are we actually making. Just not too (inaudible). It’s got to look like a tree, remember. So give it-
Vivien: Like natural looking.

As mentioned above, Linus had already provided some general guidelines before the hands-on lesson to the effect that this was supposed to be the “good looking tree” and this exchange did little to add to the previous instructions. This marked the end of the instruction for this project, and after watching the technicians get started working on their own, Linus moved on to another project, but I decided to wait and watch as the tree developed. For a few moments the students seemed to think that I was going to participate in the construction of the tree, and were perhaps hesitant to begin work in earnest. Accordingly, I settled down a short distance away and occupied myself with my notes while they began to work. As mentioned in Chapter Three, I interspersed my observations with helping other students work on projects and walks around the work area to observe other activities.

Initially, I was most interested in they way they applied their new knowledge of staple guns and chicken wire as they gained experience and developed skill using them. I found this disappointingly uninteresting. There were developments in their skills with tool or material use, the most prominent being that although they never discussed getting gloves they did learn precautions to avoid being scratched by the wire. Otherwise, the main advances involved coming to understand the amount of force required to adequately
hold the staple gun to the wooden structure to ensure the staple sunk solidly, and different positions or angles in which to hold the staple gun to fit it into tight corners. Much more interesting was the pattern of talk the technicians developed as they worked. My distance from them as they worked and the fact that I was initially concerned with a different aspect of their behavior leaves me with more summaries of their discussion than actual transcripts to draw from in my notes.

Their talk initially concerned the immediate needs of their job: requests for help holding something, to pass a tool, and so on. This talk continued throughout, although it diminished as they began to work more in tune with one another. The girls seemed to be friends, or at least friendly, and exchanged approximately equal amounts of pleasant jibing and compliments about each other’s work. This continued several minutes as they progressed around the bottom of the tree making a bumpy or wavy, roughly tree looking structure, with frequent starts and stops for revision. Then, for whatever reason, Heather made an exceptionally large “bump,” leading to this exchange:

Vivien [astonished / sarcastic] What’s that?
Heather It’s like, when trees grow, you know? Sometimes there’s… this is [where the tree grew over] a rock.
Vivien So, it’s like-
Heather It’s like from when it was still little.

This seems to have led to a particular pattern in both their work and their conversation. The (good-natured) jibing disappeared and the overt compliments seemed to become less frequent. Several more times as they worked their way up from the base of the tree to the trunk and higher branches, they devised explanations for particular features of the tree. There were a few more, but the ones I noted were, ‘Do you suppose

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2 Upon reflection, I am not sure what else I thought they might have to figure out about using a staple gun, but then I had thought that using a wrench was pretty simple as well. Perhaps, as goes the joke about technical theater, an observer only notices it when something goes wrong.
something [a squirrel? a bird?] lived here?’ referring to the intersection of several smaller branches, and ‘This was where a branch got broken off,’ in response to a section of chicken wire that was particularly mangled and defied all attempts by the technicians to repair it, there was also the following speculative exchange,

Heather Why do you suppose the good witch lives here?
Vivien I don’t know. Because this is the good looking tree.

A few things should be pointed out about this moment. First, that moments like these are rare. The only other similar incidence in my data is from “operation backstage,” an activity before children’s theater during which elementary school students come during part of their school day and get to go to different stations set up around the theaters and shop. Each station features a different aspect of technical theater, such as painting, makeup, and costuming. Each station is run by a few student technicians who introduce that part of technical theater to the children. One student who was learning to pound nails into a 2x4 scrap as part of the carpentry station declared himself to be making a spaceship and identified various parts – the engines, the window, the part where people sat – perhaps speaking to me as I watched but perhaps just to himself. I admit to being a novice regarding modern art, and so I am not ashamed to further admit that the boy’s creation was somewhat too abstract for me to have identified it as a spaceship by myself. Still, the example, and the boy’s certainty in his explanation, have stayed with me.

It might also be pointed out that the conversation between the technicians making the tree may have served multiple functions. On one hand, by providing an alternative conversational structure it moved them conversationally away from the potentially risky ground of teasing each other. Similarly, creation of a back-story could be used to explain any eccentricities in the piece, such as the damaged chicken wire attributed to a branch breaking. Finally, it served as a method of collaboration, a way for the technicians to
share their understanding of the emerging project in a way that related less to the technical or physical characteristics of what they were doing and more to understanding the piece as a prop with a function to serve in the play from which it would follow that the tree had a specific history that could be discovered if the narrative of the play were extended backwards in time, much as actors create backgrounds for their characters as a way of understanding their motivation.

It is worth reiterating that this project was not demanding either physically or in terms of the materials or tools involved. The work was perhaps tedious, but not otherwise difficult. This allowed them more freedom of both thought and language; they did not have to think especially hard to safely staple chicken wire onto the frame, so they could save thought from the how of doing it and spend thought on the why. Further, after the initial minutes of collaboration as they were establishing their working rhythm, observing what the other did and responding to it in their own work, they did not need to talk much about their work process, freeing up conversational space for story telling.

Finally, I note that I engaged Heather in a conversation following a statement that she made that the first bump, where the tree roots had grown over a rock, “was her favorite bump.” I wondered why this was so. Although she seemed surprised by my interest, she was able to answer. First, she described the work that had gone into the making of the bump and specific physical features of it, but only afterwards mentioned that it existed because of the rock imagined underneath. The stories seemed to be ephemeral, not connected to each other as part of any coherent narrative. The facility with tree building definitely did stick with these technicians. Two weeks later when Linus was proposing the project of building the other, broken, spoiled, bad looking tree, these girls immediately assumed control of the project, and a short while later when they had established an area in which to work and finished gathering materials, I suggested to Heather and Vivien that they were fortunate to have the chance to make their favorite bump again. Neither one immediately knew what I was talking about. Heather
remembered after a moment, but in contrast to her previous enthusiasm regarding the bump and its special properties seemed uninterested to reenact the experience of making it. In fact, neither technician made an attempt to replicate any of the special features they had discussed in the previous build, nor did they engage in similar storytelling.

Vignette Three

In fairly sharp contrast to the lesson introducing Vivien and Isabel to staple guns and chicken wire, this project started anomalously with no instruction on tool or material use whatsoever. I had been on the lookout for small group building projects to observe, and when I noticed this one beginning, I situated myself to observe them, not a difficult task as they worked in about the middle of the scene shop floor and sitting on some seldom used steps I had a good view of them and at least half of the shop.

This project took place in the middle stages of the set building for the show *Nunsense*, a farcical musical comedy featuring several Catholic nuns with wildly divergent personalities who are forced to put on a variety show fundraiser to cover the funeral expenses of two of their order who were recently poisoned by their cook. At one point in the play Sister Amnesia, who not only suffers from amnesia but is also an inveterate flibbertigibbet, proudly produces a bookstand that she has been building, and people are amused to find it a cross between whimsical and dilapidated. Linus tasked two technicians, Autumn and Isabel, to make it. Isabel was a spotlight operator for the show and was more familiar with Sister Amnesia than was Autumn, and Linus directed his remarks mostly to her. As recorded in my field notes, this is the conversation beginning the project:

Linus You know that bookstand that Sister Amnesia makes? You have to make that.

Isabel So, what should it look like?

Linus Ridiculous…. Really crazy. It has to be able to stand up. It shouldn’t fall down, but that’s about it.
The conversation continued in this fashion, with Isabel asking what the bookstand should look like and Linus saying the key features were that it should not fall over but should look crazy. All of Linus’s descriptors of the piece were evaluative or interpretative such as “ridiculous” or “crazy” without ever indicating how the technicians should design it to create that effect. The conversation continued:

Isabel Okay. What should we build it out of?
Linus Just look around. Anything is fine. There’s lots of scrap around here.
Isabel Use anything?
Linus (nodding) Use anything.

Quantification in natural language is almost always contextually restricted (Cresswell, 1997; Bach et. al 1995), and in this regard Linus’s instructions were difficult for these novices in the scene shop who did not understand the context. Clearly, they were not to use just anything, but other than the slight suggest that scrap was abundant – without any indication of what was and was not scrap – they received little guidance for the time being. The shop was (and usually is) chock-a-block with lumber of many sorts, tools and equipment, hardware, pipe, plastic, parts of machinery, wire, and so on. Choosing from among it without a plan or concept of what one was building would be a daunting task.

I wrote in my notes that I thought the students wanted to ask more questions, but were not sure what questions to ask. In any event, they did not ask any, Linus left them to their work, and they stood looking around for a moment. In my notes I described the technicians, charitably I hope, as behaving like kittens in a new environment: they moved apart, first looking closely at things, then touching them, and occasionally looking back to where they started as though the place were some sort of visual anchor. They started picking things up, turning them over, looking at them from multiple angles and exploring them tactilely. The students gathered a number of pieces of lumber and other items at
their work space. After a while, Isabel flagged down Linus as he went by and initiated this conversation:

Isabel: Can we use this? [a square metal tube] How about these…? [12 inch tall gold painted plywood “X” shapes]

Linus: You can use all of those, [the golden wooded X-shaped pieces].

Now, that. That’s actually part of [some piece of equipment]. But, I tell you what, if you need something like that, look at those pieces over in that bin. Those are all leftovers and you can use any of that.

Thus, it became clear that the students were not supposed to use just “anything,” they found – some things were off-limits parts to equipment – but the technicians were not yet equipped with sufficient background information on material use in the shop to know exactly what “anything” meant. Other similar conversations occurred between Linus and the technicians as they gathered other materials, but the girls talked very little to each other. Nor did they initially make any indication of how they intended to actually build the bookstand. Rather, they gathered materials into a growing pile without consulting each other or beginning to assemble anything. After approximately ten minutes they had a round dowel (I had never seen a dowel in the shop before), some plywood squares, and some 2x4 chunks. At this point they sat down, fiddled with the things they gathered, and began to hold parts together, arranging them in different combinations and configurations. One would hold a piece in a position and consider it, and sometimes the other will hold a piece next to it, or on top of it, or in some relation to the original and both students would consider them together.

Mostly, however, the technicians worked independently of one another. For instance, at one point they moved a few feet apart and sat or kneeled facing each other, only occasionally looking at each other, and worked stacking pieces together, each creating a prototype of a central column for the bookstand.
The golden plywood crosses interested them most. These were made of hardboard, or Masonite\(^3\), a kind of pliable, thin plywood made of compressed sawdust. They were shaped something like an iron-, or German, cross, an interesting shape that seemed to promise possibilities of interlocking with itself and other pieces. They were also abundant; a whole stack had been taking up space for longer than I could remember. The girls manipulated them for quite a while, sometimes discussing designs in single short sentences but mostly quietly. They tried to fit them together balanced and supporting each other like a house of cards, and in an interlocking column, but the crosses did not lock together securely and the technicians did not have a way to keep the pieces stuck together. After further experimentation, they decided to use the dowel as a central support for the piece and clad it with the golden crosses. Isabel held the dowel upright and Autumn arranged the crosses around it, but they still did not have a method of sticking the crosses together or of making the dowel stand up without Isabel holding it.

Then Autumn got out a drill and some screws. She left the area I could observe to get them so I cannot comment on how she got them, i.e. if she asked someone for one, looked until found one on her own, already knew where they were kept, and so on. Nor do I know if either had experience using the drill, but certainly as there almost always is, there were plenty of drills being used in the shop at the time. Neither seemed to have experience screwing this kind of plywood together; because of its composition screws pull out easily and can accidently be driven completely through the material.

Autumn made several unsuccessful attempts to screw crosses together. Following this, Isabel and Autumn shared the drill, one of them using it while the other held the pieces together. These attempts were also unsuccessful. They did successfully screw the

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\(^3\) Masonite was invented by William H. Mason, founder of the Masonite company. Although the Masonite company now primarily manufactures doors, the term “Masonite” is in my experience the universal term for hardboard panels manufactured by other companies. See www.Masonite.com for information.
dowel rod into a piece of thick plywood they had chosen for the base of the bookstand, but were dissatisfied with how wobbly it was and correctly surmised that it would break off easily. It seemed to me that the technicians were beginning to get frustrated with this lack of success. Previously, they had seemed to enjoy what was in fact a very large and nebulous task: choose from all of the things in the shop ones to make a prop that has almost no parameters for what it should look like. Further, while there were known unknowns for this project, i.e. things they knew they did not know but had to figure out like how to get the pieces to stay together, there were also unknown unknowns. That is, there were things that they did not know but also did not know they needed to know, like the fact that working with their materials had special requirements unlike those of all the other materials they saw being used around them.

I feared that they might become entirely frustrated and lose interest in the project. I also considered their difficulties to be more technical than creative. Clearly, some knowledge of tools and materials is required for building even simple things, or as Zurmuehlen (1990) put it in her discussion of experiential teaching in the context of art making, “Techniques and process are vital in realizing our ideas,” (p. 31). I do not mean to suggest a strict exclusion between technical and creative aspects of the project; as discussed below my technical expertise might in fact have inhibited my creativity. Rather, I mean that they seemed to not have a plan exactly, but a strategy for approaching the construction of the project – attach the plywood crosses to the central column in emergent configurations – but aspects of their materials were preventing their plan’s execution. So, at this point I decided to provide some technical assistance. After I asked some polite questions about what they were building, I provided some tips on using Masonite with screws and suggested some ways to more solidly attach the dowel they were using as the central column to a base. My input did not cause an immediate dramatic improvement in their ability to get the crosses attached to each other. They were able to get some pieces put together, but not others. Eventually they abandoned the
concept of using the crosses to surround a central column, instead using multiple columns cross-braced to each other and the base, and repurposing the crosses for shelves the book sat on atop the columns.

**Analysis of Vignettes**

These seem like fairly disparate examples, and this serves to point out the difficulties of interpreting and understanding an activity as messy as technical theater. In Chapter Four, I discussed theories that deserve a moment’s consideration here in relation to these vignettes. The first vignette seems to have little to do with designed text making, therefore a multiliteracy account seems out of place. The second and third vignettes have more to do with text making, although they seem to have little to do with the design component of multiliteracy theory. I do not look at these technicians and at first blush conclude they are designing a text. Instead, aspects that seem most salient include the ongoing interactions among the technicians, their ability to use available tools and materials, and their ability to communicate their incipient understanding with what they are trying to create as it emerges from the crux of these considerations.

Any of these vignettes can be embedded in a context such that they shed light on learning in technical theater as a function of apprentices learning from a master or the activity of technical theater as a social practice embedded in a particular socio-historical context. However, it also seems to point to limitations of these theories that arise at a certain level of granularity of data or specificity of focus of observation.

To be sure, in all of these vignettes the action takes place within a context, but the events themselves, once set in motion, are largely isolated from that context as they develop. The blonde girl at first seems interested in her peers who are watching her, but later comes to focus exclusively on the lighting instrument she is working on. The girls building the bookstand explore the scene shop and ask questions of Linus, but beyond that talk almost exclusively to each other. While I pestered the girls whose job it was to
make the tree, they were mostly left alone as they work. Further, the story they come up
with to explain their creation of the tree is meaningful only to them; they do not even
share it with others. Their story explains the tree to themselves but has only the vaguest
connection to the ostensible goal directed purpose of their activity, i.e. building a prop for
the play. No elements of their story have any basis in the text or plot of the play. The
story they tell has no connection whatsoever to their instructions; Linus did not ask them
to create a story of the history of the tree or even to explain why they gave it the features
they did. At the very least, the actions within the vignettes deserve consideration in their
own right. In short, the earlier theories I described miss too much by taking too broad a
focus, and what is needed is a look inside these moments in order to examine and
understand their complexities.

Learning, Technical Theater, and the Body

More specifically, what could be said about the girls with the wrenches, removing
and reinstalling lighting instruments? As mentioned above, although hanging and
adjusting lights is integral to lighting the stage for a play, as this is an exercise for class, it
is difficult to view them as involved in text making at the moment. Further, although
there is a certain amount of collaboration, notably the student who masters the task most
readily helping others, it is difficult to consider these girls as performing some sort of
apprenticeship role. Overall, instruction in this scene is best characterized by teacher –
student interactions due to the classroom setting, the degree of direct instruction.
Because the lesson is an isolated exercise unrelated to the larger enterprise of technical
theater it also does not reflect the situated nature of authentic apprenticeship, i.e. the
students are performing an isolated activity for class not working on producing a play.

This activity is full of movements both gross and precise. One girl circles her
light, ducks back and forth under the batten, stands on her toes and looks down, ducks
down and looks up, and re-arranges the configuration of light and bracket and safety
cable to try the job in different ways. The other girl’s movements are more constrained. She wiggles her hand and wrench mostly inside the fixed confines formed by the lighting instrument’s hanging bracket and clamp (for a view of the bracket and clamp, see Figure 5-3). She struggles to get the wrench placed on the head of the bolt, and when she does she cannot turn it far. She keeps trying, reaching in from a slightly different angle, switching hands, trying to make sense of the oral instructions and the encouragement Linus has offered her. To me, her actions seemed pointed, directed, and intentional: She knew where she wanted her hand and the wrench to be, and what she wanted them to do once there, but she could not get them to the correct location.4

One might conclude a number of things about this lesson. For instance, both girls eventually learned the ‘how to hang a light’ lesson. One girl learned ‘it’ more quickly than the other girl. Perhaps she was a more independent learner, and maybe she had more “kinesthetic intelligence” and is a smarter kinesthetic problem solver (Gardner, 2004, 2006; see also Bowman (2004) who expresses some reservations). Although they both may have learned the lesson, the more successful girl learned more (and may well be a better student) because she was able to articulate what she had learned in order to help others. Such suppositions, however, would betray an overly simplistic approach to

4 I suspect that what might have happened to the blonde girl is that the bolt she was trying to tighten was backed out further than is typical, probably by the previous student loosening it more than necessary before noticing the clamp could be removed from the batten. This meant it required far more turns to re-secure it; further, it was difficult to position the wrench and each time she did position it she was able to complete only a partial turn. Her lack of experience had many facets: she did not know if she was doing it right or if she might be damaging the apparatus. Neither did she know how many turns were usually required to tighten the bolt, nor how little she was actually moving the bolt at a time, nor how tight the bolt should feel upon completion. I suspect that the girl, being inexperienced with this sort of clamp was thinking I keep turning it and nothing happens – have I broken it or am I just doing it wrong? Whereas if the bolt had been reasonably snug beforehand, she would have successfully tightened it earlier. She might have been left feeling more satisfied (or less frustrated) had that been the case, but she would have missed out on the opportunity for a lot of bodily experimentation that seemed clearly novel to her. Had she been more familiar with bolt tightening in general, she might have quickly snugged it up by hand, then she could use the wrench for final tightening.
learning and the nature of lessons as well as an unfocused examination of the roles of these students’ bodies.

One might say the blond girl is having difficulty hanging the light. One might also say she is deeply engrossed in learning. This begs the question of what she is learning. She succeeds at hanging the light, but while this is the ostensible reason for the activity, there is a far more intimate hidden curriculum (Jackson, 1968; Apple, 1971; Giroux & Penna, 1979).

This lesson is, for a change, teaching the whole child, to wit this girl is learning about her own body. Analyzed based upon the girls’ actions during the lesson, it is clear that they did not learn the same things. If, as I speculate (in footnote 4) the bolt on the blond girl’s clamp was overly loose, she may have developed some understanding of this difficulty and developed insights as to how to overcome it, especially once Linus helped her arrange her body so that she could use the wrench efficiently. Most of the blonde girl’s efforts were directed towards manipulating her body to fit her hands and arms into a tight space where they were unfamiliar visitors and uncertain how to behave. The other girl, who avoided the situation of having overly limited workspace and who was not presented with an overly loosened bolt did not learn those things. While also practicing with the wrench, she learned more about the ways the lighting instrument could be positioned, the interactions of the various pieces of hardware involved in light hanging, and – being taller and circling the light more – about the spatial intersections of these pieces of hardware and what they looked like from the front, back, and side. While both students removed and hung lights, hanging a light is not an irreducible simple, but a cover term for a complex set of interactions between hardware and technician. They did not hang the same light, they did not have the same experiences, and they did not learn the same things.

A fascinating aspect of this lesson exists in the translation from verbal and visual instruction to bodily implementation. I know all of the students had received instructions
from Linus on removing and hanging the lights, as well as on the different types of lighting instruments available and the names of the parts common across lights. Linus had also provided a demonstration of the removal and re-hanging process. As is typical in visual demonstrations, the lighting instrument he used for demonstration was arranged to facilitate the parts of the demonstration he felt were most relevant to the task, specifically accessing the bolt and how to adjust the wrench to fit it. The most salient aspect of the re-hanging demonstration was how to position the clamp on the batten so that the clamp bolt intersected the batten correctly for proper tightening – an important and easily overlooked part of light hanging that is frequently done wrong, requiring adjustment later.

Again, without any direct evidence of this I am happy to speculate that both of the students in the vignette above could have both easily removed and reinstalled a lighting instrument that started in the same configuration as Linus’s demonstration piece, and given a coherent oral explanation of the whole removing and re-hanging procedure, which can be stated fairly simply for the situation which Linus presented. Other students were able to repeat parts of the oral instructions when they were having difficulties and Linus helped talk them through it. Despite being a fairly simple procedure, for many it seemed easier initially to state the steps of the procedure while away from the light than to work through them while touching the light.

As discussed in previous chapters, one of my interests in technical theater involves the role of the body in teaching, learning, and thinking. Although a range of perspectives and theorists have been mentioned, the situation of this lesson in lights seems particularly apt to the arguments made by Rose in a number of publications (1999, 2004, 2008) as well as by Crawford (2009). Among the aspects of their work that distinguish it from others is their consideration of the role of the body outside of rarefied experiences readily taken to focus on the body, e.g. dance (Bresler, 2004b; Stinson, 2004; Dils, 2007; Noland, 2009b) and physical education (Markula, 2004).

Instead, Rose and
Crawford consider the role of the body in regular working environments or in educational environments as does Rose, in which the body is rarely considered.

Rose (2004) considers a range of occupations that include a robust physical component, including waitressing, plumbing and carpentry, brain surgery and physical therapy, and teaching. One thing that becomes clear throughout these accounts is the hybridity of thought, the inextricable integration of perception and cognition simultaneously with representation, experience, and knowledge. Hairdressers (Rose, 2004, p. 31 ff.) for instance look at their client’s hair as well as feel it as they style it, and their decisions on how they style it are impacted numerous factors including pictures or descriptions the client has provided to describe the style they want, the stylist’s knowledge of the behaviors of client’s hair based on training and experience, the stylist’s knowledge of his or her tools, and the professional skills the stylist has developed and his or her beliefs about what results are possible through the application of those skills. Considered in this manner, cognition becomes a hybrid experience integrating multiple senses, the brain and body. The light hanging lesson can be reevaluated in this light as well. While the two girls did not have the same experience, there were elements of their experiences that were similar: feeling the heft of the wrench and how it feels properly placed on the bolt, the weight of the lights, the force required to turn the bolt and moreover the feeling of when it is adequately tight as it becomes resistant to movement as the bolt is tightened. All of these integrate background knowledge, physical skills, and the senses into cognition.

Rose (1999) makes a similar argument in his description of a physical therapy class. The class had a practical, i.e. hands-on, component as well as standard classroom elements. Students in the class needed to master multiple kinds of information in order to successfully work with patients. Some of this information could be expressed or learned as abstract concepts, for instance the names of injuries or particular muscle groups, and students used textbooks as part of their learning process. More immediately relevant to
an examination of the role of the body in technical theater is the conduct of the practical portions of class. Students experimented on each other to educate their bodies and learn the responses of other bodies. For instance, in addition to studying techniques from their textbook regarding how to stretch a patient’s hamstrings, they applied these techniques to each other to learn both how another’s body responded to applying the appropriate amount of pressure and what it felt like to the practitioner to apply that amount of force. Students’ physical interactions with each other were of course crucial to their development of the tactile skills or “embodied understanding of the concept of resistance” (Rose, 1999, p. 156). Teachers in the class augmented the hands-on experience by providing visual information such as anatomical diagrams and mini-lectures on salient topics arising from students’ questions as they worked on each other. As Rose argues, the only way to learn many of these things is to remove them from the realm of the abstract through direct bodily experience of them. The body, the experience of one’s own body as it completes a particular task, becomes the most important aspect of the lesson and one of the key components of proficiently practicing as a physical therapist.

The situation of the girls learning to hang lights seems directly analogous. Although there is preliminary verbal explanation and visual demonstration, the crucial element of the exercise is found only in the actual completion of physical removing and rehanging the lights, which is undertaken with further oral and visual instruction. The divergent experiences of the two girls illustrate at least two important points. The first is the difficulty the inexperienced have in translating knowledge from the more abstract hands-off instruction into the concrete hands-on ability to perform the task. The second is the complex nature of physical operations that can be covered by a simple term like “hang a light” and the expectation amongst those experienced with such matters that the requisite skills of the operation can be communicated orally via a fairly short procedural
The complexity of these operations entails a complexity to the learning taking place.

It is worth mentioning some of the elements contained in the larger lighting instrument removal and installation lesson. What I have been calling the translation of the instructions received through oral explanation and visual demonstration has several parts. Discussion of vocabulary learning frequently entertains the concept of growing the meanings of words, as with graphic organizers that collect and relate multiple meanings (Allen, 1999) or strategies such as “contextual redefinition” or “semantic mapping” (Allen, 2007) as people encounter a word used in a new place or in a new way. While the activities Allen suggests presuppose an abstract, non-experiential understanding of words, the deepening of understanding of words and concepts is one aspect of the translation: students gain an understanding of the parts they have heard named (yoke, bolt, batten, clamp, etc.) that clarifies and reifies those parts in a way that only tactile experience can.

As discussed in Rose (1999), tactile experience also helps develop understanding of the physical forces involved in the procedure as well as a discriminating appreciation of those concepts in practice, such as the amount of pressure required to make the light secure and the effect of the leverage produced by the wrench and screw threads on the tightening of the light to the batten. The procedure of moving the lights takes on new importance and objective nature as students discover that while it would be possible to speak the procedure in an incorrect order, it is typically impossible to carry out the procedure in an incorrect order. Additionally, they are engaged in problem solving as

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5 To be clear, Linus did not make such an assumption. As I will discuss in the following chapter, he anticipated the majority of the difficulties the students encountered. His method of introducing the light hanging exercise derives from a teaching philosophy which in comparing the value of more extended preliminary instruction to the value of getting tools in students’ hands, routinely favors providing the students the embodied, hands-on approach to clarification of concepts and trouble shooting problems.
they encounter lights that differ in style or configuration from the modeled example, and this problem solving incorporates their tactile experiences working on the lights with both their background knowledge of the parts of the lights and their function and their understanding of the use of their tools. Along the way, they become better able to articulate what they were doing, perhaps through better understanding of the parts they can talk about but also through use of other strategies for communicating their embodied experience, such as the mini-demonstration used by one of the students. None of this is to diminish the importance of the fact mentioned earlier that the students, typified by the blonde girl experimenting with how to get her hand with the wrench on the bolt, are learning about their own bodies in ways which although frequently devalued seem in light of the learning potential this scene reveals to nevertheless be important (Shusterman, 2006).

Production Work as Art Making

The technicians working with the chicken wire to build the good-looking tree present a different range of considerations. While I was initially interested in how they developed an embodied understanding of their tools and materials, in the moment this experience provided little to provoke further discussion as the task seems to have required little skill and the technicians gained proficiency quickly. They certainly appeared to be at ease with the tools, materials, and process almost immediately following Linus’s introduction. More interesting was their approach to the project and collaborative interactions as they worked. In particular, I understand these two technicians to be more contemplative or reflective about the nature and role of their project than is typical of other technicians on other projects. In many ways, these technicians were making art.

Art making is of course a widely theorized activity, both in- and outside of education. Aesthetics and the philosophy of art (Beardsley, 1966; Margolis, 1987),
fabrication processes (Moore, 1967; Shahn, 1957), creative processes (John-Steiner, 1997; Hagood, 2007; Wiggins, 2007), the nature of creativity and aesthetic experience (Dewey 1934; Gadamer, 1986), the urge to make art (Hickman, 2005; Sullivan, 2005, 2007), the particular ontology of works of art (Goodman, 1987; Margolis 1987), and the role of art making and the arts in school and society (MacLeish, 1954; Dewey 1954; Greene, 1978; Eisner 1982, 1994, 1987; Davidson, 2007; Bresler, 2004a, 2007) have long been topics of interest.

By no means am I suggesting that all, or even most, activities in technical theater should be considered art. One of the most interesting aspects of technical theater is the way it crosses disciplinary boundaries, incorporating construction, art, literacy, and so on in one hybrid activity that includes highly creative elements like the tree building along with routine production elements, such as hanging lights. In fact, during a conversation I had with Heather as she was building the good-looking tree, she drew a distinction between creating and making. ‘I just build stuff,’ she said. When I asked her specifically if the good-looking tree wasn’t art she replied, ‘Well, it’s creative. But it’s not artistic.’ I am suggesting two things: many technical theater activities do have aspects that are similar to art making, and that ways in which art and art making can be understood can be useful for understanding technical theater. To what degree the distinctions such as they exist between art making, creative non-art making, and as it were, un-creative making are important will develop along with the analysis below. Although I allude to other theories, for this analysis, I consider a particular approach to art with its origins in the work of Beittel (1972, 1973) and as continued in the work of Zurmuehlen (1990) and McGuire (1992, 1997).

I begin with the assertion that the construction of the tree and bookstand can be best understood as the creation of non-discursive symbols (Langer 1951a, 1951b; Eisner,
1983; Shahn, 1957). Put simply, natural language and invented languages such as math or symbolic logic are discursive, whereas images, non-linguistic sounds, movement and other communicative modes typically associated with the arts are considered non-discursive or *expressive* in Langer’s terminology. The essential difference is that discursive systems communicate through a “vocabulary of symbols that can be combined [systematically] to present a coherent structure” (Langer, 1951, p. 173). Nondiscursive symbols such as images on the other hand are apprehended all at once or as a gestalt and only afterwards are their compositional elements distinguished. Similar views of immediate apprehension of visual or plastic arts are held in many theories art experience (e.g., in Margolis, 1987; Shusterman, 2006).

Beittel’s work on art originates in a massive ethnographic study of students making serial drawings and was designed primarily as a means of developing a new form of participant observation as part of a qualitative methodology for studying art. In this method the researcher’s role is to, “move as closely as possible to the creating stream of consciousness,” in order to have, “indirect access to the artist’s creating experience.” This approach, watching student artists create a series of drawings over a period of weeks, focuses attention on both the creative process and the creators, is reflected in Beittel’s approach to understanding art. Rather than focus on the ontology of completed art works, Beittel’s attention is drawn to the nature of the creation process. For Beittel, making art – arting – is seen as an inner psychological process of the art maker that occurs when three particular conditions are met.

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6 Although generally sympathetic to Langer’s work (e.g. McGuire 1994), McGuire (1993) suggests that the distinction between discursive and non-discursive symbol making is not as clean-cut as Langer would have it, at least in the context of art production. As McGuire puts it, “There appears in the everyday use of story and image production a joining that contradicts the more formal separation of what Langer termed discursive and non-discursive symbol making” (p 25). I would agree.
Beittel begins by introducing three conditions for the making of art, qualifying his discussion by admitting, “Lacking terms to refer to what I feel are the basic conditions for making art, I have coined three. This threesome should not be unduly hypostatized” (Beittel, 1972, p. 2). His conditions are idiosyncratic meaning, intentional symbolization, and artistic causality.

Intentional symbolization occurs through the transformation of materials into non-discursive or expressive symbols that represent an artist’s idiosyncratic meaning. This urge to commit ideas to materials is fundamental to the plastic arts. For intentional symbolization to occur does not require the creation of art per se. Recall Heather’s assertion that she was being creative, but not artistic. Hickman (2005) would agree with such a sentiment when he defends a universal human need for the creation of, “aesthetic significance,” or expressive artifacts made with care and personal satisfaction. In the framework established by Beittel, the artist’s approach is more important than the final product.

Focusing on art creation for the moment, the idiosyncratic meaning an artist creates is foremost personal and subjective, rooted in the particulars of his or her artistic engagement. The artist constructs idiosyncratic meaning as a reflection of his or her personal experiences, and the meaning is therefore unique to each artist and each situation. However, as is especially relevant in technical theater, Beittel is clear that other people, the context of the arting, the artist’s technical skill and knowledge of technique, and so on are constituents of the artist’s idiosyncrasy. Further, the collective nature of the technical theater enterprise does not impede a technician’s idiosyncrasies. Zumuehlen puts it quite clearly, “The idiosyncratic meaning necessary for making art is possible to construct in group situations as well” (1990, p. 26). The idiosyncratic nature of the meaning does not imply in any way that the artist does not exert control over the product, that the pieces cannot be made within parameters, that it cannot mesh with other artists’ products, and so on.
Also relevant to the process of art making is what Steve McGuire (e.g. McGuire 1998) borrowing from Ricoeur (1984) terms, “ontological pertinence,” a feature of art and art making that can arise given the satisfaction of the three essential conditions and the artist’s willingness to engage critically with the piece at the moment of creation. Something is ontologically pertinent if it has the capacity to bring about change in being. Ontological pertinence in art is understood to be that through the creation of art an artist has the opportunity both to learn about and change who he or she is. For McGuire, the stories we tell are not only about the emerging art work, but who we are in relation to it. As McGuire explains the value of narrative, “…we become more when we tell stories because meanings of events and experiences become evident to us as we unfold our stories” (McGuire 1998, p. 25).

That learning or creating has the capacity to impact identity has been examined at length (e.g., Greene, 1978; Buckingham & Sefton-Green; 1994, Gee, 2000; Buckingham, 2003, 2007; Buckingham, 2008; Burn, 2009; Wortham, 2004). Of interest at the moment is the explanation of the mechanism of ontological pertinence. For McGuire (1997), ontological pertinence is particularly tied to narrative, and as Zurmuehlen puts it, “Art work is made, brought into being, through an expressive act” which, quoting Beittel (1973, p. 25) she identifies as, “where the conversion from unreflective to reflective thought comes about.”

What is of paramount importance is the attitude taken by the artist in interacting with his or her work, the conversion from unreflective to reflective thought. That interpretation of artwork is an active process is an attested, if not universally accepted, belief in aesthetics. Discussing this interaction of audience and text Nelson Goodman alludes to both sides of the debate:

A persistent tradition pictures the aesthetic attitude as passive contemplation of the immediately given, direct apprehension of what is presented, uncontaminated by any conceptualization, isolated from all echoes of the past and from all threats and promises of the future…. I maintain, on the contrary, that we have
to read the painting as well as the poem, and that aesthetic experience is dynamic rather than static…. Much of our experience and many of our skills are brought to bear and may be transformed by the encounter. The aesthetic “attitude” is restless, searching, testing – it is less attitude than action: creation and recreation.” (Goodman 1967)

Further, the concept of active meaning making through an audience’s interaction with an artwork is found in traditions outside of the analytic philosophy represented by Goodman. According to Gadamer (1987), “…all art of whatever kind, whether the art of substantial tradition… or the contemporary art that has no tradition, always demands constructive activity on our part” (p. 37).

If interpreting artworks is an interactive process between art and audience, it is easy to understand the creation of art as an interactive process between art and art maker. Greene, writes of interpreting art that, “… all art forms must be encountered as achievements that can only be brought to significant life when human beings engage with them imaginatively” (Greene, 1973, p. 163). She likens the creation of art to the work of historian Hallett Carr’s (1967) description of the discipline of history. Green describes Carr’s process as “… provisional interpretations of provisionally selected facts about the subtle changes that take place through the ‘reciprocal action’ of interpretation and ordering of those facts,” noting the similarity between history and art in “…the emphasis on selecting, shaping, and interpreting, the ordering of raw materials…” (p. 163-4). This is in keeping with the line of thought begun in Beittel (1973) and extended in Zurmuehlen and McGuire, as well as in the written work of artists.

Reminiscent of Moore’s (1967) respect for his materials, Zurmuehlen posits, “The concrete physicality of a medium, is a basis for reciprocity between makers and their materials, a grounding for reflective attention” (1990, p. 4). This is an example of, “…the rapidly repeated cycle of intending, acting, realizing, and re-intending…” (Zurmuehlen, 1990, p. 2) that is crucial to art making and ontological pertinence. For Zurmuehlen, “Creation exists as the praxis, or the dialectic between critical reflection and
action” (p. 9). The critical reflection comes as the artist, or the artist’s “inner critic,” (Shahn, 1957, p. 34) reacts to the artwork, interpreting it and suggesting new meanings.

This unfolding of new meanings may have been most explored in language use, especially language in the forms of narrative (Ricoeur, 1984; Dowling, 2011) and metaphor (Ricoeur, 1978, 1987). Summarizing the phenomenological philosophical tradition on metaphor, Lossi (2010) puts it, “the creation of new metaphors opens new possibilities for the formation of meaning, it discloses new rules in linguistic behavior, rules related to the symbolic sphere” (2010, p. 211). Beyond their use in language, McGuire (1998) applies Ricoeur’s theories of metaphor and narrative to art making. For McGuire, the process of consultation with one’s inner critic involves the creation of narrative, the telling of stories to one’s self that interpret the art work at the point of creation. The relation is particularly intimate, the narrative and the artwork inseparable, or in McGuire’s words, “…as an artist, I do not know where creation of an image ends and interpreting through stories begins. We can never know. The relationship remains a constantly generative one” (1988, p. 26).

One corollary of Beittel’s framework is that attention is dislocated from art as product and put instead in the dialectic process of arting. This is especially useful in technical theater, and perhaps among novice artists as well, in that what is made need not be something that would traditionally be regarded as (fine) art to be considered in this framework. The work of the artist, or theater technician cum artist, is therefore making choices among the possibilities that emerge as meaning emerges from the materials he or she shapes. Distinctions can be made along a continuum from the choice-laden acts involved in art making, what Beittel calls “arting” or “creating” to less reflective acts of mere “doing,” perhaps taking into consideration the way and degree to which each of the essential conditions apply. Certainly some activities in technical theater feel more to me like doing than creating or arting. Some of these are repetitive production tasks like hanging lights or running cables, and others involve the monotonous use of tools and
materials, such as painting the whole floor a solid color or building platforms. The process of critical reflection implied by artistic causality seems key to the process of moving beyond doing to creation.

Zurmuehlen (1990) describes a young child painting a sheet of paper orange. She analyzes the child as at first merely doing, as a child enjoying the process of putting orange on something. The child makes a switch from unreflective to reflective thought when, as compelled by his mother, he tells what he is making a painting of: an orange wall. At that point, the child began telling a story about the creation. He also became intimately involved with the conditions of making art. That his meaning is idiosyncratic, as well as influenced by his techniques and available materials, seems clear on its surface. By naming the creation, identifying it as a wall, it becomes a wall through the child’s intentional symbolization. Artistic causality and ontological pertinence are evident as the child continued to paint and he had the opportunity to critically reflect on how the emerging piece of art satisfied his emerging concept of the orange wall, changing both during the course of the process. This process, first the making and then the naming, also seems evident in the work of the girls building the good-looking tree.

In some frameworks (e.g. Kindler, 2007) there could be resistance to analyzing the technicians making the bookstand and the technicians making the tree as examples of art making because the finished products do not meet the traditional standards of artwork. By Heather’s own admission, the tree is not a piece of art. However, given the framework introduced above that describes art making as a critically reflective organization of materials to purposefully symbolize an idiosyncratic intention of the art maker, these technicians can be examined as art makers. A number of points might interfere with a direct analysis. In both projects, the efforts were collaborative, a point I address below. Vivien and Heather had difficulty envisioning what the tree would look like once the chicken wire was covered, while Isabel and Autumn were faced with numerous challenges related to tool and materials use.
Heather and Isabel fit all of the conditions of making art set forth in Beittel (1972). Their actions, even their instructions, hold that they are to make the prop in the idiosyncratic way that they want, in a way that has meaning to them. Their actions are clearly purposeful and goal directed, causing the prop to take a specific form, and they are clearly creating an artistic symbol to be recognized by the audience, a symbol having certain recognizable properties as being good looking. What is most striking is that all of this coalesces in the story they tell each other as they make the tree. First, Heather makes the bump, then seeing it, tells the story of how it came to be: “first the making, then the naming,” as Zurmuehlen (1990) succinctly puts it. Later still it becomes her favorite bump through the process of further reflection and consultation with her inner critic.

Heather and Isabel enact the three essential conditions of art making in this project. Beittel’s disposition to move the locus of art study from the product to the process, or to the makers in process, suggests that arting is a largely internal, personal endeavor. However, it should also be noted that for any of this to occur, requires a context in which the conditions for art making are likely to be met. In the case of Heather and Isabel, Linus has established such a context, in part by assuring the technicians’ familiarity with tools and materials and in part by providing loose parameters that encourage them to explore their tree building through giving voice to their inner critics and discovering their own stories about the tree as it emerges. The story accounted for successes, like the favorite bump, speculation, as in questioning whether an animal lived in the branches, and initial failures, as the mangled chicken wire reconceived as where a branch had been broken, but eventually healed. It is difficult for me to comment too deeply on the ontological pertinence of the works of art made in technical theater. My methodology has led me to observe a large number of student technicians. Most were observed during only one or two projects, whereas much of McGuire’s and Beittel’s work focused on serial projects, McGuire’s on children making
art books and Beittel’s on students drawing over a ten week period. I set this concern aside for a moment to consider the third vignette.

The differences in their approaches begs the question of whether Autumn and Isabel making the bookstand are making art in the same way as Heather and Isabel making the tree. Their lack of knowledge of the media with which they are working makes their work progress by what seems to be trial and error, and the revisions or adjustments they make in their process seem to be largely guided the errors of material handling rather than by errors of artistic vision. Beittel (1972) addresses this point as well as its relation to the conditions of art making:

> Whatever is in mental life becomes the raw material for fusion with artistic causality, idiosyncratic meaning, and intentional symbolization. More than that, it interfuses with tool, medium and image directly. Yet I acknowledge the limit suggested by Malraux when he said that the artist may say what he pleases, but in practice he will paint only what he can.”7 (p. 99)

So, the girls are satisfying the conditions for arting, even within the limitations of their acolyte knowledge of materials.

These students are engaged in an interesting sort of collaboration. Among my first thoughts regarding a theoretical account of their collaboration was that they were engaged in something similar to a mature version of a Piagetian collective monologue (Piaget, 1959; Woolfolk, 1998), with each technician working on her own project mostly independently of the other and only incidentally proximate to each other. Nominally they were engaged in the same project, but as much as it was unclear that either had a concept for the piece that they could articulate or instantiate in material form, it was further unclear if they were in fact making, or trying to make, the same thing. Reflecting on the nature of my own expectations in this regard, it seems to me that my idea of collaboration had been influenced by a theoretical construct similar to the multimodal literacy concept

of design. That is, I expected that collaboration required specific articulation of ideas that would be jointly evaluated then accepted or rejected. My idea of collaboration did not account for the sort of experimental collaboration seen here where both technicians try new things and allow for the possibility of the other to observe, reject, or build upon those as they emerge. Although one of my concerns in this dissertation is to argue for the importance of embodied or experiential, hands-on learning by doing, the idea of learning or collaborating by proximity was slow to come to me.

Further, there seems to be more that can be considered within these technicians' experience. When I think of Autumn and Isabel making the bookstand, I am taken back to my thoughts on experience. Their lack of experience is particularly relevant to their inability to make the bookstand in the way they originally conceived, as an interconnected mass of plywood crosses, but is also relevant to their initiative in attempting it. In this regard Shahn (1957) presages Beittel’s thoughts above,

> But idea itself must always bow to the needs to the materials in which it is to be cast. The painter who stands before an empty canvas must think in terms of paint. If he is just beginning in the ways of paint the way may be extremely difficult for him because he may not yet have established a complete rapport with his medium.” (p. 49)

Having experience with these materials, I fully expected that what they were attempting would not work; I knew this so well, I would never have attempted it. They did not begin, as I would have, knowing that it would be extremely difficult to screw the plywood crosses together, and therefore they explored using them in their creation instead of disregarding them as I would have. Indeed, the “way [was] extremely difficult” for them because they had not yet “established complete rapport” with the materials, but that path also led to the possibility of envisioning, at least attempting, a novel design with the materials, an option foreclosed by my experience. A little reflection, however, suggests the way in which my thinking was overly determined by the tools I am inclined to use, particularly the cordless drill which I have mentioned is in
constant deployment at both Lincoln and Revere. Two things are worth noting: first, although it would have required an inordinate amount of work, the pieces could have been screwed together and second, there are other ways of connecting parts – hot melt glue comes to mind.\(^8\)

Considered together, these vignettes tell us a number of things about learning in technical theater. In the previous chapter, the ways in which learning projects fit into contexts of apprenticeship, learning by doing, and group activity were explored giving a somewhat wide-angled look at technical theater. In these three vignettes, the examination has been more directed to the technicians’ work at a personal level. All of the vignettes implicate the robust use of the technician’s bodies in the work as doers and problem solvers, as well as their histories and experience. Indeed, in technical theater it is difficult to avoid concerns such as these.

It is worth re-stating that the more personal focus here does not preclude an examination that includes a broader context. I will trust that a formal analysis in terms of, e.g. activity theory, will not be necessary to suggest the validity of the following observation regarding the second and third vignette: in these situations the technicians were encouraged to explore in what I think of as a relaxed context: a drop-by Saturday morning work session fairly early in the build, with very few restrictions on what they were to build, encouragement to be creative, and working at their own pace in a small collaborative group – in short, excellent conditions for making art. While the atmosphere at any work session is in part determined by the how much progress has been made in relation to the point in the production cycle, and is subject to the influence of incalculable

\(^8\) I do not exactly rue my intervention, although I am curious about how Isabel and Autumn would have got on without me. For instance I wonder whether they would have thought of hot glue. Given that the hot glue is kept stored out of sight, I do not think they would have discovered hot glue on their own, although Linus might have suggested it to them had they explained their situation to him. This of course would not have prevented them from developing an attachment procedure I haven’t thought of. See chapter six for discussion of student techies devising their own methods that are superior to adult technicians’.
factors, and is never in any event homogenous across time or projects, situations such as described above I take as broadly representative of technical theater work at Lincoln. I turn now to another context, also common, in which all of these conditions are reversed: technical rehearsal, after school beginning late in the afternoon late in the production cycle, with rigid parameters, an emphasis on the exact following of directions, and work at as accelerated a pace as possible while the whole cast and crew waits – sometimes impatiently – for the work to be completed.

Technical Rehearsal

The data in remainder of this chapter is drawn from technical rehearsal, described below, and relies heavily on transcribed audio recordings. Considerable effort has been taken to ensure the accuracy of the transcriptions, although as mentioned in chapter two, audio recording was difficult due to the general amount of sound and its widely varying volumes, from lightboard operators whispering to Linus yelling to someone on stage. At places the recording is obscured when outside voices intrude. When I have been able to assure myself I am transcribing fairly, I have done so. At other times when the recording is inaudible I have noted this in the transcription.

The transcripts tell an interesting tale; however, they only document what is said, and not the actions that accompany the talk. Whereas some research that makes use of audio recordings and their transcripts occurs in controlled situations, such as the interviews in chapter six below, the speech reported here is only one part of collaborative enterprise in which all parties, especially the lightboard operators, are busy at work. With this in mind, the transcripts read something like a play themselves, recording dialogue but leaving the reader to imagine the accompanying action, with me as playwright providing stage directions where needed. To help readers imagine the activity of programing the lightboard, I provide a detailed description of the rehearsal below.
Background of Technical Rehearsal

One interesting facet of the collaborative nature of theatrical productions is the division of labor between theater technicians and actors (discussed further by Cori, Jonas, and Erica and Grace in Chapter Six). There is some natural and some coerced overlap in the personnel as some actors, e.g. Jake in Chapter Four, enjoy helping with technical preparations, and sometimes the acting troupe is required to attend at least one work session. However, the overlap is not extensive and the jobs of acting and building are generally clearly distinct. As a complement to the bifurcation of roles and people into acting jobs and actors on one hand and technician jobs and technicians on the other, a further interesting facet of collaboration relates to the range of different rehearsals involved in the lead-up to the play.

As a practical matter, having cast members (or anyone else) present on the set who are not part of what is being rehearsed tends not to improve efficiency. To keep the number of students on hand manageable, and reduce the amount of time students, who have other academic obligations, spend on set unnecessarily, rehearsals are divided into different kinds and scheduled accordingly. For a musical, rehearsals for the chorus are separate from those for the primary actors, with rehearsals for the primary actors further divided to include only actors involved in particular scenes or acts of the play, only people involved in a particular dance number, or only people belonging to certain groups of characters in the play (i.e. one rehearsal for only the cops and another for the robbers). In addition there will be rehearsals that focus on singing, others on dancing and choreography9, and others on acting. The band usually does not join in these practices,

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9 At both Lincoln and Revere a choreographer from outside the school district is typically hired to plan the dance numbers and teach them to the students. Hiring an outside expert tends to be expensive so these rehearsals / workshops are typically few in number and fast moving, high energy affairs that almost all the cast attend, waiting to participate in the parts relevant to their roles, in contrast to the prevailing tendency to schedule rehearsals to minimize the number of cast members present.
but instead does its own rehearsals in a different practice space. As I explored in the last chapter, however, interesting situations develop at times when acting rehearsals overlap with technical preparations.

One such time of overlap is called “technical rehearsal.” Technical rehearsal is, as its name suggests, the time that numerous technical aspects of the play are resolved by the technical director and technicians and subsequently taught to the actors. There are a number of important things to understand about technical rehearsal that I will take up in turn. Technical rehearsal happens close to the end of preparation for the play, usually just a few school days before dress rehearsal, which happens a day or two before the opening of the show. Generally, there is one more Saturday work session following technical rehearsal, but during technical rehearsal nothing is finished. Primary construction on major set pieces will be to the point that they are usable, but not complete; most, but not all, important props will have been made; lights are hung, but may not be properly aimed or focused and may be malfunctioning; numerous items still need to be painted. The actors are in a similar state: they are capable of running through the entire play, and may have already, but performances are still being refined and songs mastered, and as evident from the transcripts below, cues are missed and blocking – where the actors move on stage – is yet to be finalized.

To set the tone for technical rehearsal, it seems customary at this point for there to be an atmosphere of worry. I have never heard a director or actor claim before or during a technical rehearsal that preparations were going well; quite the contrary, in every production I have been part of, almost all directors and many actors express explicit

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10 Typically, dress rehearsal would be the evening before the show opens. At both Lincoln and Revere, however, a sort of matinee show is generally performed the day between dress rehearsal and opening night. This performance caters exclusively to the elderly residents of near-by assisted living facilities, thereby giving the actors an additional opportunity to perform the entire play to what has traditionally been a supportive audience before the formal opening night.
reservations about the quality of the show. Because the time till opening night is short, all the directors – other than the technical director – would much rather spend the time working with their students on their areas of concern. Students and teachers both have been putting in long hours on the play, frequently causing tensions between time spent on the play as opposed to on studying or completing other professional duties. Many people present are feeling stressed and tempers tend to be running short. This is compounded by the fact that all the actors and technicians in the show, and in some cases the orchestra as well, take part in this combined rehearsal\footnote{For reasons I never learned, two actors were absent from part of the first day of technical rehearsal. This may have contributed to a blocking issue for some songs. I do not specifically discuss his absence in the data below, but Erica notices the incorrect blocking.}. At the same time, there is considerable excitement. The massive collaborative project is coming close to fruition, and everyone is eager to do those last things to make it ready for public performance.

For most people present, I dare say technical rehearsal does little to satisfy that urge, or relive anxieties, or increase expectations of a quality performance. Technical rehearsal is long, tedious, and frequently grumpy. It goes late. The ones I observed were scheduled from 6:00 to 10:00 on a school night. Each tech rehearsal that I observed ran long, and most of the students involved, including all of the theater technicians, were present well in advance of the start of the technical rehearsal proper. For many of the students – and directors – this means working the approximate equivalent of a full work day, from 3:00, slightly after school lets out, to 11:00 at night, with a break to get something to eat before beginning the actual rehearsal.

During the actual rehearsal, some extended portions of the show may be performed. This may be at the request of the drama director or musical director for instance, if the performers were having difficulty with a song and dance routine, it might be performed whole to give them a chance to practice it and the director a chance to make corrections. It is more common, however, to run the show from “cue to cue,” meaning
that the actors perform a small part of the play surrounding a technical cue while the
technicians work out the specifics of the cue. When done, the actors are told to skip
ahead to the next point in the play at which there is a technical cue. For instance, if the
stage crew is supposed to bring on props or scenery in the middle of a scene or between
scenes, the actors will be instructed to perform beginning from a point just prior to the
scenery coming on, then the technicians will practice bringing the scenery on stage, and
when the task has been completed the technical director will call for a cut in the action
and direct the actors on what to do next, either repeat the part they just performed or skip
ahead to the next cue. Along with this, actors will receive instructions on their blocking,
how to interact with the prop or scenery, and get a chance to explore how they want to
interact with that technical aspect in their performance.
Most of the technical cues are lighting cues, changes made to the lighting on stage performed by a technician running the lightboard. The lightboard is discussed at some length below and shown in photographs in Figures 5-4 through 5-6. In brief, the lightboard is a hybrid apparatus combing specialized software run on a standard Microsoft Windows based computer interfaced with pieces of dedicated hardware, the lightboard proper, that controls the lighting shown on stage. Technicians direct the lightboard to perform functions such as turning on and off individual lights or groups of lights, as well as determining the power level or brightness at which lights operate and the amount of time it takes them to move from one state to another, for instance slowly fading to dark at the end of a scene or becoming instantly bright at a shocking moment. During performances the lightboard is situated in the lighting booth at the rear of the theater, but because it is more practical during technical rehearsal it is set up towards the rear of the center section of the theater, where an audience will later sit. At Lincoln, one or two students are in charge of programming the lightboard according to Linus’s instructions. Linus himself stays nearby, sitting in the row of seats behind the students programing the board, or walking around in the aisles between seats.

“Lightboard Operator” is one of a few named positions on the technical crew, along with “stage manager” (Kelly, 2009) and “properties (props) manager” (Mussman, 2008). Before production work begins, students are able to sign up for these roles, and Linus, as technical director, makes ‘casting’ decisions among the applicants to assign students to these roles. The positions are fixed, and do not change over the course of the production and are in this sense similar to the casting of the leading acting roles in the play. Like lead actors, there are lightboard operators. Early in the production there are few if any special requirements for these positions, although the students cast in them are likely to be experienced and reliable technicians who are further enthusiastic about their role and participate regularly throughout the build. Closer to the opening of the play, these roles take on special significance. The stage manager is in charge of the
Figure 5-5  First lightboard monitor, showing a typical programming screen. Note cue 7.5 on the left side of the screen. Erica offers to add a cue 122.5 to correct a problem in the sequencing of cues 122 and 123.

running crew, the techies working back stage during the show. The props manager is in charge of making sure all the props for the show are built, bought, or borrowed and ready to be used by the actors at show time. The lightboard operator(s) run the lightboard during the show, after they have programed it during technical rehearsal.

For Into the Woods, the musical from which the data below are taken, there were in excess of 170 lighting cues, or a rough average of one per minute. Each cue must be programmed individually and is saved on the computer for later retrieval. Procedurally, at the beginning of each performance the lightboard operator(s) activates cue number 1 and the lighting on stage takes on a certain character. The character of the light derives
from the particular configuration of which lighting instruments are turned off, which are
turned on, and at what intensity. After the lightboard operator triggers cue 1, action on
stage begins and at the appropriate moment the operator will trigger cue 2 and the lights
take on that pre-programmed configuration, and so on sequentially throughout the play.
Determining this configuration and then recording it in the lighting software is the
essence of “programming the lightboard,” and is the largest tangible component of the
work in technical rehearsal.

During technical rehearsal, not every cue requires stopping the action on stage to
program, but many do. Some lighting cues are for elements like spotlights, such as
lighting that might turn on during a solo vocal number. Technical rehearsal allows the
technical director along with the actor and technician running the spotlight to coordinate
their actions, for instance where the light will be aimed initially and the range of locations
on stage through which the light can follow the actor. In these cases action onstage will
have to stop as the details of the cue are worked out. Other instances of programming
occur without significant actor participation.

In the decades since Appia’s revolutionary work (Appia, 1932, 1960) many plays,
and especially Lincoln’s production of Into the Woods, use lighting symbolically. For
instance, a number of lighting instruments arranged to cover most areas of the stage were
outfitted with red filters, called “gels” because historically they were made of gelatin.
Various of these lights were brought up to indicate danger or evil was afoot while lights
with neutral colored gels were used on other occasions. In these situations the technical
director and the lightboard operators make decisions mostly without consulting anyone
else. Unlike spotlight cues, cues that involve prop or scenery changes, and other clear
visual or audio cues, such as a character entering or a sound effect playing, actors do not
always know when a light cue changes or what is being adjusted. This is in part because
they have numerous other things to occupy their attention, but also because it can just be
more difficult to see differences in lighting from their vantage point on the stage versus
An upshot of these considerations is that there is a wide range of actor participation that may have been involved in the programming of any individual cue, from the actors repeating their performance several times as the cue is refined to not knowing the cue was programmed. Even when working from cue-to-cue, actors may have opportunities to perform for an extended period as the technicians work. If the actors start on a long song, the technical director could just let them continue, essentially ignoring them while he and the technicians worked out the best lighting options, trying several options, changing on
the fly until they were satisfied with the results. On the opposite extreme, actors may be asked to repeat a section of their performance multiple times while the Linus tries different options as he works out what he wants to do, even if the actor is unaware of what the differences are.

As the work of programming the lightboard continues, certain rhythms to the work and patterns to the lighting emerge. Approximately 125 lighting instruments were used in this production if *Into the Woods*, but not all of them needed to be programmed for each cue. Rather, as is typical, the lightboard operators, following the technical director’s instructions, are able to program lights to behave as groups, called sub-masters, based on their position, function, or color. So, for instance, the lightboard operators could program a number of lighting instruments all focused on center stage to behave as a single group, and similarly a number of red lights could be grouped together. In addition, some cues are repeats or near repeats of earlier cues or modifications of earlier cues and as such require relatively less programming. Accordingly, as the number of existing cues grows, the chances for being able to repeat an earlier cues grows. As the technical director and lightboard operators become familiar with the programmed cues and instrument groupings, the work of developing new cues frequently takes the form of activating familiar cues or lighting groups, modifying them to suit plan for a new situation, saving the new configuration to the computer as a new cue, and repeating the process for the next cue.

Whereas providing a description of the nature of a technical rehearsal is challenging due to the complexities of the event, the specific data I wish to examine from this event can be presented more readily. I want to do two things. First, to clarify the preceding description I present specific examples of programming the lightboard, drawn from audio recordings of the technical rehearsal and chosen to be illustrative of the process. Second, I discuss selected summaries of the learning that takes places, further illustrated with another example.
The Experience of Technical Rehearsal

One of the things that draws me to this particular data is its contrast in character with the data presented earlier. Earlier I described those examples as student centered and project based, characterized by a brief introduction to the project followed by significant amounts of hands-on work by the students. I also characterized these projects as an example of the sort of apprenticeship discussed by Lave and Wenger (1991) which involved little explicit instruction from the master, contrasting it with some of the experiences typical in the technical theater program across town at Revere high school in which student technicians were merely helpers, following specific immediate instructions indicative of a narrow construal of their capabilities. Lightboard programming at Lincoln is entirely unlike other projects. It does in fact involve the student in the role of assistant, following precisely the instructions given by the technical director. Put succinctly, Linus makes decisions about the lighting and tells the lightboard operators what to program, which they do and then await instructions for the next cue. At least this is true at the beginning of the process; the data also show the ways in which the technicians gain proficiency and contribute to the overall process of the programming.

It is for the most part difficult to extract a key moment that is any more interesting or significant than the others. As mentioned, on the whole the operation falls into almost rhythmic patterns with Linus calling out instructions and the lightboard technicians programming them into the computer and displaying the results on the stage, while stage crew technicians take part in their performance. As programming was taking place, a number of other techies were busy with related work not essential to the action on stage at the moment. During Into the Woods a number of other technicians undertook projects backstage or in the loft.

I was somewhat shocked upon reviewing these transcripts. To me, they seem like a poor reflection of the event in that they do not reflect the high levels of energy and excitement of the students at technical rehearsal. I said above that the transcripts read
like plays, but that they mostly record conversations, and lopsided conversations at that. The lopsidedness of the conversations disguises the fact that there is an immense amount of activity going on during the conversation. Further, as conversations tend to do, there are numerous false starts and unexpected stops and occasionally the work being done and the instructions being given do not correspond. Readers should keep in mind that every instruction given by Linus is followed up with actions by the lightboard operators. Frequently, they do not respond aloud, but since their efforts are immediately visible on stage, they can instead focus on getting the programming done so rehearsal can move on.

At points I make a special note of what the technicians do, but in general in the transcripts, I indicate the many points in which the technicians are working by continuing Linus’s instructions on the next line. So, in the transcript just below, Linus says, “And then you hit the page up key.” This is followed by a line break in the transcript, indicating that the lightboard operators are doing as Linus asked, and although the work is not always acknowledged, in this case it is confirmed in Linus’s following statement, “There you go.”

The transcription below, from early on the first day of technical rehearsal, typifies the lightboard programming process in the beginning. Grace and Erica are the lightboard operators, and neither have ever had this job before. Programming is slow and considerable time was spent with Linus giving practical instruction on the details of how to program and save cues. Linus and the lightboard operators have copies of the script to which they refer and in which they take notes about the cues as they program them.

Linus (loud voice – addressing actors on stage) Okay, stop.

Alright. So lights this is where you’re going to take the house out… er, ah take the house down.
And then we’re going to program our first cue. And you’ve got these programmed on the sliders\(^\text{12}\), so let’s go ahead and bring up… ah, what we have up now is basically only area “B” so let’s bring up 1 through 12 at 60 percent.

You can just kind of click and drag the mouse… oops (chuckle)… there you go. And then you can hit the “page up” key.

There you go.

Until it says… it goes up by 10… so…

Grace Where...

Linus 60.

Okay. Sixty. Okay, good.

And then, ahh, we’re going to need, ahh… ummm… pretty much the first electric\(^\text{13}\). So that’s going to be… 15 through… 22. And let’s knock that up to fifty for now. And we don’t have those gelled yet, so we’re just going to be kinda, we’ll adjust those levels as we go along.

Grace What level?

Linus 50.

(soft) And we’ll just see kinda what those…. [trails off]

[pause]

Erica [inaudible] some of them are [inaudible]

Linus Yeah, uh, just uh, yeah (stutters). Just hit, just hit, ahh. If you right-click those, just ah, go ahead and put the cursor, right click those.

And then at level 50, they should all go to 50. There you go.

Okay…. Alright.

And then, umm, I can’t remember what the band one is at.

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\(^{12}\) Sliders are mechanical controls on the lightboard hardware. As opposed to a knob that rotates, sliders slide left to right or up or down to increase or decrease what they are controlling. The control surface on the right of figure 5-4 shows these.

\(^{13}\) “First electric” is the name of the first batten that is wired for electricity, as opposed to being used for hanging props or backdrops. Lincoln’s first electric is shown in in figure 5-3.
No, no. That’s – they are all at 60. They should be good.

Grace This?

Linus 3 and 4 should be at 60. Yep.

There you go. Good. Okay. Then go ahead and hit the “record” button.

And that should be cue 2.

Here followed several moments in which Linus and the technicians are uncertain of the numbering of several individual lights, so Linus asks the lightboard operators to bring up individual lights one at a time so they can discriminate among them.

Programming resumes after this.

Linus Okay, so go ahead and bring that up to full. And go ahead and hit record.

[aside to people on stage] Guys, we will get a little more light up there for you. We just haven’t had time to circuit it today.

Okay. Now what we’re going to do is we’re going to hit the time, so we’re going to change the time, so if you hit the little time bar there, there, times… you can type in a label there if you want… you can just put introduction.

And that’s cue three. [not a question]

Grace Yeah.

Linus Okay. And then let’s put the time, the fade-up time, to 1.5 on that. So if you just, just type in, just use the number pad 1.5.

Okay. And then click okay.

As is clear, there is a lot of instruction given here on how to use the lightboard.

As the session continued, the operation became somewhat smoother as is shown in the following brief exchange that took place during a run through of several cues that had just been programmed.

Linus So, as soon as you hear that… she says

Grace Where?

Linus no, you hear,,,,

[pause]
There. Go. [lightboard operator triggers cue]

[pause]

Let’s change the fade time to 5 on that. [lightboard operator adjusts fade time]

So, 49 will be a blackout.

And, that’s a… I think I’ve got that… okay, I gotta-

[lightboard operator accidentally triggers next cue]

Oops!

[lightboard operator corrects mistake]

There you go.

Yeah. Don’t get a heavy finger. Best thing is, when you know you’re not even close to a cue, keep your hand far away from it. Okay? Even kind of rest your hand in front, don’t put your finger on there. That space bar has kind of a hair trigger on it, so….

Two things strike me from the data so far. One is just how complex an affair programming the lightboard is, with Linus and the technicians needing to keep track of numerous lights in various colors, what intensities of light look good and are consistent with earlier cues, and what lights may not be properly installed at the time. Along with this, the technicians also have to master a new software program and the hardware of the lightboard itself, not to mention the jargon and community norms for the rehearsal. The second thing to note is that compared to the initial portion of the transcript, the lightboard operators have already gained proficiency. While Linus advises them about not accidentally triggering cues, the lopsidedness of the conversation that I mentioned above is apparent. This indicates that the technicians are following Linus’s instructions in a timely fashion and he is not required to assist as they program each cue.

The following excerpts are from the second day of programming and both Erica and Grace are again at the lightboard. Linus is alternately walking in the auditorium aisles and sitting a row or two behind the lightboard, and Caitlyn Potter, the drama director, is several rows closer to the stage. Other techies come and go occasionally, as
do some actors. The previous day there had been a lot of frenetic preparation among technicians and actors alike. On this day, after a smoother version of preparations, the rehearsal began and has been going on for approximately fifteen minutes when this scene happens.

Grace And what's the timing on this?
Linus Let’s go ahead and make that a two count
Grace Is this what you want?
Linus And this will happen on page 62
Erica During the fanfare?
Linus Actually before the fanfare [sic]. Bar- um, Baker goes, ummm… says “Go” at the top of page 62 [in the script] –
Grace -yeah-
Linus And they exit, so that’s where cue 65 goes.

And then there’ll be two fanfares. They come out; they strike a pose… okay. And then, um, what we’ll do is we’ll go ahead and bring up the rest of the cue, and that will be cue 66. And what we’ll do is let’s bring up the other three sub-masters, ah 2, 3, and 4 to match what we have 1 and 5 at.

[pause]
Grace I think they’re ready.
Linus Okay. Have you got 65 recorded?

Or, um, did you record 65?
Grace Yup.
Linus Okay. Good.

Alright. Then let’s go ahead and bring up, ahh, sub-master 21 at about half.

[slight pause as this is done]
Grace O...kaaaay.

[school bell rings, indistinguishable talk in background]
Figure 5-7  Three views of Grace and Erica at the lightboard. Linus is seen holding a script in the top right photograph.
Erica [during bell] Do they get up on the pit\(^\text{14}\)?

Linus I don't know. (spoken slowly and inflected, perhaps surprised or perhaps distracted by the question)

Erica During “Stay?” [“Stay” is the title of a song]

Miss Potter?

Caitlyn Sorry?

Erica Do they go up on the pit?

Caitlyn Wendell and Mitchel?

Erica Yeah.

Linus Well, we can bring that light up, okay. We’ll get there.

Erica No. I was just wondering.

Caitlyn They don’t really go to the top of the circle. They just…. [inaudible on recording as Linus starts talking]

Linus Let’s go ahead and um…. [pause] You know what? Let’s, let’s bring 21 all the way up.

And let’s bring sub 22 up to about 30.

And Cyc 3 is at what\(^\text{15}\)?

Grace 50

Linus Yeah. Okay. That’s good. Let’s go ahead and record this as 66.

So this probably going to be more of a, um, a visual cue. So…. [never finishes thought]

[piano starts playing in background]

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\(^\text{14}\) “Pit,” being short for orchestra pit. “Up on the pit,” here refers to the roughly semi-circular walkway that extended from the stage towards the audience around the outside of the orchestra pit. Although this feature – constructed specifically for this play – created a significant amount of extra stage space and allowed for actors to perform dramatically close to the audience, due to it’s location and the configuration of the spaces above the stage, it was devilishly difficult to light properly, a concern Erica explores as work continues.

\(^\text{15}\) “Cyc,” here is an abbreviation for “cyclorama,” a neutral colored unpainted curtain or backdrop close to the back wall of a theater. As they are smooth and essentially colorless, they take on the character of whatever light is shown on them, making them useful for creating a particular feeling or mood on stage without changing the lighting on individuals or set pieces.
(loud voice) Okay. Let’s –

(soft voice to lightboard operators) You got it?

Grace What’s the time
Linus Ahhh, cue… let’s see… so time… a 3 count should be good.

(loud voice) Let’s back it up. Back it up on stage. Baker, Baker’s Wife on stage, right before Prince’s entrance.

Programming has become much smoother and more efficient, while at the same time it has become more interactive. Erica and Grace are both asking questions of Linus, and in one instance of the drama director as well. Linus is in a difficult situation here when Erica asks her question about the actors going on the pit walkway. As he notes, they will get to the point where they program the cues for when the actors are on the walkway, and he clearly is not interested in exploring that at the moment Erica is. He is polite in putting her off, but at the same time Erica may have been disappointed that her concern was not given more attention.

Shortly after this, there was a ten-minute break in the rehearsal, and the next section of transcripts is from shortly after rehearsal recommences. During break, Linus has been having the lightboard operators pre-program a number of cues. The thinking behind this is that with the lightboard operators becoming more proficient at programming, the cues can just be adjusted and reprogrammed on the fly while the actors are on stage and the technicians are better able to see the lighting in action. This is complicated for the technicians to do because they need to keep somewhat in step with the continuing action on stage, but it does provide an opportunity for the actors to perform an extended portion of the play. Also, because they have programmed ahead, it allows the lightboard operators to practice the routine they will follow after the intermission in the actual performance of the play. Here, Linus coaches them through the steps they will take. Cues similar to those discussed in the first lines of the following section are shown on the lightboard screen in Figure 5–5.

Linus Let’s bring the house to half and hold please.
Grace (sing-song voice) House is at half.
Linus Okay. Take the house out.
Grace (sing-song voice) House is out.
Linus No, the house isn’t out yet.
Grace Sorry.
House is now out.
Linus There you go. Now take the warm out.

Albert steps out.
[Albert, in his role in the play, steps onto the stage from the wings.]
And spotlight, he’s on the other side now.
[Presumably, the spotlights were pointed towards the wrong side.]
[pause during action on stage]
As soon as you see that curtain, you can go.
[pause during action on stage]
Beware of the [inaudible] here. (chuckles)
Erica Is the spotlights still supposed to be on there?
Linus Ahhh… I guess we take the spotlight out there.
Erica Should I put it in like an (inaudible) sub-cue?
Linus Yeah. Just go ahead and take the spotlight out for now.
Erica I can re-program, I mean do you want me to record this as 122.5

Background music and conversations obscure the recording for quite a while at this point. While the transcript shows that there are still glitches, the technicians are also becoming steadily more comfortable and competent with their work. Although she gets the cue wrong, Grace’s use of a sing-song voice demonstrates the degree to which she has become comfortable with her job. On the other hand, Erica is actively suggesting solutions – programing a new cue in between two existing cues – to problems that are arising during the performance.
The transcript picks up below a few minutes later, towards the end of the musical number the actors had been performing. Notice that while the operation is still being directed by Linus, the technicians are continuing to contribute more to the process. All of the creative decisions seem still to be in Linus’s hands, but the lightboard operators are able to diagnose and fix some of their own mistakes and frequently supply information about the lights, cue numbers, and so on. At the same time there are more opportunities for humor as the rapport between Linus and the technicians becomes more at ease.

Linus (loud voice) Okay. Stop

So now what we need to do let’s take out… take out, ahh, what do we got up? 71, 72, 79, and 80. Take those out. And let’s drop… um… take out 9.

Sorry. 9 at 30 percent.

And take out 10. Oooh, no. What was 10 at?

Erica I have no idea.

Linus Bring it up like 25 percent.

I like that greenish hue there. It makes it kind of… makes it kind of creepy.

Erica Yeah, I like it to.

Linus Let’s bring it up to 50.

Erica It looks good in the background.

Linus Yeah, let’s, um, let’s also bring up…

Erica 2 and 6?

Linus 2, 6, 14, 17, and 30 as well. Along with the spots.

Erica 10 is at 50?

Linus Is what?

Erica 10 is at 50?

Linus Yeah.

Erica And you want those at 30?
Linus 30, right. 10 is a different color, so….

Then the spots need to come up.

And let’s go ahead and make that a 2 count.

And that will be cue 127. Okay.

Then, I want you to take out the spots. We’re going to do 128 here. So take spots out. And let’s bring up sub-master “Jack”.

(joking) I love that we can name our sub-masters now. We’re just going to have “Pete,” “Bob” and –

Erica Uh-oh.

Linus It should be on the –

Erica Oh. I forgot one [to take out one sub-master]. Ha-ha.

Linus (funny voice) Ha-ha.

There you go. And let’s make that, yeah I think that’s probably, is that full?

Erica Yup.

Linus Slide it down to 80. It’s a little bit bright. I know we’re going to be painting stuff again, but I think that’s probably… 80 should be good.

And that will be 128.

And that all happens on [page] 118, Grace.

Grace Before the knock on the door?

[long pause]

Linus Ahhh. I don’t know. Let’s try it with –

Grace – before

Linus – the knock, then bring the light up.

(loud voice, to Music Director and Drama Director) Is jack doing the knock live, or is it coming from the pit?

Caitlyn I wasn’t sure.

MD [inaudible]

Linus Alright, so yes. It’ll come from the pit.

And let’s make that a 1.5 count on 128 if we haven’t already.
Grace So, 128’s after the knock.
Linus Yes.
Erica Did you say 125?
Linus So you hear it from the pit, and that will be the knock, then 128.
Grace Right.

Shortly after this exchange the rehearsal ended. At the end of this long night of work, the technicians were taking further responsibility for the lightboard programming. In the following brief exchange the technicians are talking to each other and Linus, adding a cue on their own, and getting ready to put up the equipment for the night as the drama director, Mrs. Potter is giving instructions to the cast.

Grace So, 137 is the same as 1?
Erica Yeah, we need to program it.
Grace Wanna do that right now?
Erica Yeah. Um. Got it.

[background conversations and noise]

Linus Alright now, before you leave, be sure you save.
Erica Already did.
Linus Thanks, guys. You really did, like, a huge amount of work keeping up. That was some, that was some difficult programming there, so you guys –

[interrupted by Bob, the assistant technical director]

Me (in shock) Are you not saving every few minutes anyway?
Erica No!
Linus It has a kind of internal back-up any way, but it’s just a lot better to save where you end. So..
Erica (sarcastic) Oh, whatever. That’s just silly talk.

While these changes the techies are making in this excerpt do little to alter the overall flow of technical rehearsal, they show remarkable growth in technical ability and
their confidence or willingness to assert themselves as lightboard operators. This exchange is followed by Linus giving instructions to all the technicians about when they should arrive for rehearsal the next day. Erica volunteers to come in early to help program cues in advance, and this is followed by a chorus of other technicians volunteering to come early to, some even suggesting they should be let out of school early to do so. Times are arranged, and the next day preparations go smoother still in advance of rehearsal proper.

As the lightboard operators have gotten better at programming and everyone has developed a better sense of the overall lighting scheme and the numbering of the various lights, programming becomes smoother, and there are opportunities for relaxation and levity. The action reported below takes place on the next day of rehearsal. This night began with a fairly long period of review of the previous night’s programming during which the lightboard operators reprogrammed some cues on the fly as the actors performed largely uninterrupted and Linus moved around backstage and around the auditorium. While he was not remaining by the lightboard, he talked over a two-way radio headset, depicted in figure 3-2, that connected him to a number of student technicians who also have headsets and who are stationed in various parts of the auditorium, including backstage, in the loft above the audience where the spotlights are, and at the lightboard. On this occasion I was able to make a recording of talk relayed over the headset.

Linus: Tell Sasha she can’t scratch her butt when she’s supposed to be frozen.

[general technician laughter]

No! (chuckles) Don’t tell her that. Potter should tell her that.

[long pause as actors sing on stage]

Erica: [Mr.] McClimmon? Are the spots [spotlights] supposed to be out?

Linus: Say again?

Erica: Supposed to be – are the spots supposed to be out?
Linus: Umm. I think we’re leaving them up.
I think we were trying to figure that out.

What, what cue number is this?

Erica: 128

Linus: Ohhh, 128. (sigh) Maybe add 128.5 spotlight out.
Nope, see he comes in and out, so I think we’re just going to leave it up.

Caitlyn, have Albert just stay in that spotlight. That way we don’t have to add another cue.

Erica: So…?

Linus: Yeah. Just scratch that last one.

After the initial humorous moment, the most interesting element of this section comes from Erica, who continues to be concerned about the ways in which the spotlights are used. She brings a problem to Linus’s attention of which he seems to be unaware, and the two engage in a sort of joint problem solving effort, culminating in the expedient change in Albert’s blocking. This was a fairly trivial part of the show – in fact, Albert may have been wandering around stage without deliberately intending to do so – but requesting him not to do so may have been an option not available to Erica, it being out of her purview or comfort zone to suggest blocking changes to the drama director. A short time after this, Erica and Linus entered into a detailed discussion about the lighting on the walkway around the orchestra pit. Recall that Erica had asked about this the previous day. This transcript begins with Linus thinking that the lightboard operators had missed a spot where they were supposed to trigger a cue.

Linus: That should be a light cue.

Erica: (exasperated) They’re not supposed to be on the pit yet.

Linus: Oh. Okay.

(to actor) Wendell – are you supposed to be on the pit at this point?

Wendell: Yes. It’s different from the first one.

Linus: Where, where do we have that cue put in?
[The next four lines are written in the order in which they begin to be spoken, but they largely overlap each other.]

Wendell Um. We have that, we have the cue when we (inaudible) at the beginning of the song.

Grace The one with the pit is 122.

Caitlyn [to lightboard operators] I think this was from when they were both gone during yesterday, girls.

Erica And we don’t have the pit on at all.

Linus Yeah…. So…. Let’s bring up the pit and we’ll add it to this [cue]. Bring it up to about… oh, that’s a little too bright. Um, knock it down to, to… what’s it at now?

Grace Right now it’s at 80.

Linus Okay. Bring it down another 10 percent. Bring it to 70. There you go. Go ahead and record that into this cue.

We’ll probably have to pull it out of the next cue. But we can do that when we, when we get there.

Okay. Which means our next cue, if it’s spots, we probably won’t need. But we’ll, we’ll go ahead.

Let’s back up one cue.

(loud) Thank you, Wendell.

Wendell Yup.

Linus Yup.

Caitlyn [to music director] Can we start with the fanfare, George?

Grace Love to.

Linus Alright.

Caitlyn Thank you so much.

[pause – acting on stage]

At this point, the issue of the spotlights and the pit lighting has become a nagging problem. The actors are unaware of how the lighting is supposed to be and perhaps somewhat confused about their blocking while the technicians are trying to adjust their lighting cues to the actors. Linus, the lightboard operators and the actors all seem to have
different expectations moving forward and the issue is slow to resolve. It is further compounded by various technical difficulties lighting the pit walkway in general and an ongoing tendency of the actors not to perform in the spaces lighted for them. These issues continue in the following excerpt that occurred shortly after the previous one, as the actors again perform parts of the troublesome song.

Linus  Okay. So lights, we’ll, ah, we’ll go ahead and take the spots out of this cue. So, spots, you won’t, you won’t have to worry about this.

[acting on stage]

Linus  Oops. A little early there. [i.e. a cue was triggered early]

(mild exasperation) Go back one cue, lights.

And now [the cue] goes after they leave.

Oh! That’s, that’s r-, okay. And that was, okay, so go ahead, yeah you’re right, you’re right.

Okay, now we need to take the, we need to take the pit out. So go ahead and highlight those and take them out. That’s because we had them in, um….

[Lightboard operators adjust cue. Linus never finishes his thought.]

Okay, just go ahead and record this. Don’t worry about the next cue. Okay. And then when you get it recorded go to the next cue.

There you go. Okay.

[pause]

Yeah, I’m sorry. That’s when we had them with, in spots. So….

[pause]

Erica  So, keep it like this?

Linus  Yeah. Don’t, don’t, yeah don’t change anything. It’ll be fine. It’ll be fine.

While these data are presented in chronological order, the selection process was intended to show a general progression of the lightboard operators, and Linus as well, as they get better at the programming process and better at working together. As I have presented the data, it points out that the kinks from early in the process have largely been
worked out by the middle, and almost completely by the end. There were certainly more examples of glitches and problems from the beginning as well as towards the end, but I think that the data presented provides an accurate representation of the progression. One part of this progress is that as the programming process begins to run smoothly, without long hesitations or need for Linus to remind the technicians how to do things with the software or the lightboard itself, the role of the lightboard operators expands. They take on more responsibility for the programming and for keeping Linus informed. They propose suggestions on points such as to what level to bring a light up or which sub-masters Linus wanted included in a particular cue, as well as filling in gaps in Linus’s instructions, reminding him what cue they were working on, what lights were already turned on, and so on.

I suggested above that one of the reasons these data are interesting is that when considered as a project it differs considerably from other projects such as the tree building. I suggested that other projects were more student centered and allowed students more chance to explore their own ideas due to the way the projects were set up and implemented. While I think it is clear from the transcribed data that learning is taking place, some natural questions arise from the differences in the lightboard programming project and the other projects I presented. These questions include whether this programming fits with the sort of apprentice model presented in Lave and Wenger (1991), whether if as a goal directed activity the students’ objectives align with Linus’s or the school’s objectives, and whether lightboard programming is conceived as in students’ benefit at all, it being a rather esoteric activity instrumental to the play but less clearly relevant outside of technical rehearsal. Further, if there is value to the learning in the other projects based on student creativity, critical thinking and problem solving as they work through the challenges of the project, it is worth asking whether similar sorts of learning happen during technical rehearsal, or whether because the lightboard project is
Figure 5-8  A view of the lightboard from the booth, behind and above the audience. The lightboard operators perform the show from here.

dominated by Linus the students’ learning is more technical or practical in nature, similar to learning by rote as they program in his instructions.

As I address these questions, I present the conversation that took place during a run through of the show following the technical rehearsals that I have described. The lightboard was in the light booth and although Linus and several technicians were again in communication via their two-way headset radios, lightboard programming was essentially done and the play was running mostly without interruption. During an intermission, Erica came down from the light booth to talk to Linus, and I documented this conversation in my field notes as it took place. Despite writing it as it happened, some degree of detail was lost and the report makes it seem smoother than it was as in the
moment. When I asked her about this exchange in our interview, Erica said that she and Grace had been keeping a list of things that went wrong during the show, so the conversation below must be assumed to have derived from some combination of their collaborative work and discussion.

The fact that Erica and Grace had kept a list may help explain the nature of this exchange: It is very busy and on Erica’s part to the point. In an effort to help illuminate the technician’s thinking, and with apologies for the added length, I reproduce the conversation twice, first as it occurred, and second in an annotated version used to highlight the salient points Erica raises.

**Erica** Do we have some lights burned out?

**Linus** Um…-

**Erica** Or that we need to focus?

**Linus** Um, why’s that?

**Erica** ‘Cause it’s like sometimes, they’re….

[pause; re-start]

**Erica** During [the song] “Agony,” Mitchel is on the stage but Wendell is on the pit, so I…

**Linus** There’s nothing we can really do about that. It’s kind of strange, but that’s the way we’ve got it blocked. He’s not singing while he’s still back there, so it still pretty much works.

**Erica** Yeah. I wanted to say that there were some spots where they weren’t going –

**Linus** That’s part of my general notes for [Mrs.] Potter. Everybody needs to –

**Erica** I was going to tell Jonas that he just steps into no lights.

**Linus** I tell you what, I’ve got a lot of notes here for Potter. I’ve been getting all that stuff down for her.

**Erica** I was just going to tell Jonas because I don’t think he knows there is no light between the stage and the pit.

**Linus** Yeah, well here’s the thing -

**Erica** I was just curious about what was-
Linus  Yeah… that’s a problem-

Erica  I don’t think that there is any lights missing in that cue, it’s just that he needed to –

Linus  Part of that’s an actor thing, that’s not really a problem we can solve.

Erica  Okay. Just checking. I was just curious.

[Erica exits.]

Recall that Erica had been concerned about the spotlights and lighting on the orchestra pit walkway for some time, and moreover that it had been an ongoing source of difficulties for everyone involved. In this data, when those difficulties are supposed to have been remedied, Erica seems to remain unsatisfied. During the course of the run-through so far, in addition to running the lightboard, she and Grace have identified five potential problems: a broken light, bad acting, bad blocking, an incorrectly programmed cue, and issues with the spotlights. In addition, they have also identified a number of solutions to these problems, some of which Grace is ready to implement on her own, and others of which she wants to discuss with Linus. Many of the solutions are implicit in the statement of the problem, but to list them they include: fixing the light if it is broken, telling the actors where to go, getting Linus to get Mrs. Potter to fix the blocking, reprogramming the cue if it is incorrect, and reconsidering the use of spotlights.\(^{16}\)

Following is the repeated version of this conversation with my annotations reflecting the problems and solutions suggested by Erica.

Erica  Do we have some lights burned out?

[problem: broken light, poorly lighted areas of stage]

Linus  Um… –

Erica  Or that we need to focus?

[same problem: poorly lighted areas of stage]

\(^{16}\) It may be worth noting that, rightly so, neither her problems nor her solutions involved errors by the lightboard operators.
[implicit solution: repair / replace / refocus lights]

Linus  Um, why’s that?

Erica ‘Cause it’s like sometimes, they’re….

[pause]

Erica -during “Agony,” Mitchel is on the stage but Wendell is on the pit, so I…

[problem: blocking – actors performing together not in same lighting]

[implicit solution: get Mrs. Potter to fix blocking]

Linus There’s nothing we can really do about that. It’s kind of strange, but that’s the way we’ve got it blocked. He’s not singing while he’s still back there, so it still pretty much works.

[Linus’s solution: leave cue and blocking less than ideal and move on – it is a directing problem, not a technical directing problem]

Erica Yeah. I wanted to say that there were some spots where they weren’t going –

[problem: acting – Mitchel and Wendell avoiding well lighted areas]

Linus That’s part of my general notes for [Mrs.] Potter. Everybody needs to –

[Linus’s solution: ask director to work on actors moving correctly]

Erica I was going to tell Jonas that he just steps into no lights.

[problem: bad acting – Jonas moving into unlighted area]

[Erica’s solution: explain lighting to Jonas]

Linus I tell you what, I’ve got a lot of notes here for Potter. I’ve been getting all that stuff down for her.

[Linus’s solution: again, ask director to work on actors moving correctly]

Erica I was just going to tell Jonas because I don’t think he knows there is no light between the stage and the pit.

[reiterating same problem and solution]

Linus Yeah, well here’s the thing -

Erica I was just curious about what was-

Linus Yeah… that’s a problem-

Erica I don’t think that there is any lights missing in that cue, it’s just that he needed to –
[potential problem: mis-programmed light cue]
[Erica’s solution: nothing required as cue is probably correct]

Linus  Part of that’s an actor thing, that’s not really a problem we can solve
Erica  Okay. Just checking. I was just curious.

[Erica exits.]

I was excited to hear this conversation, apparently more so than Linus who, to be fair, was tired and in the middle of numerous other tasks and conversations. Reflecting on the conversation now it seems to answer some of the questions posed above concerning what type of learning is possible in this sort of apprentice–student situation. Although most of the work that Grace and Erica had done did not require very much decision making or analysis from them, as Linus was making all of the crucial decisions, still in the matter of a couple (long) days of programming they were able to develop an amount of analytic skill that they were able to apply to a problem that had been nagging at Erica from the beginning. Although Linus did not encourage her to expound on her conclusions or encourage her to go implement them, he did seem to agree that most of them were problems that he had already been thinking about and devising his own solutions. As a teacher and observer, I wished that Linus had engaged her more in a discussion of these problems. It is understandable that he did not, given the long days and press for time. Also, doing so might have been more overtly pedagogical than is typical at technical rehearsal; a more appropriate response might have been to tell Erica to go fix the problems herself. Regardless of Linus’s response, this demonstrates remarkable growth for Erica, not only in the technical aspects of lightboard programming but in her ability to think critically about the whole complex lighting and acting system. In our interview, Erica and Grace told me that they had in fact taken it upon themselves to remedy at least some of these problems.

I turn now to some further consideration of all of the data in this chapter. I also return to a reconsideration of the walkway moment from the previous chapter.
Analysis of Embodiment, Art Making, and Collaboration

Looking across the data and analyses in this and the previous chapter, three themes stand out to which I wish to direct my attention. First I explore a growing uneasiness about the adequacy of a multimodal literacy approach to understanding text making, especially in a physically robust environment like technical theater. I offered a fairly extensive analysis of the walkway moment in terms of multimodal literacy text making and similar accounts could be developed for the two of the vignettes in this chapter as well as for the lightboard programming. While I noted some concern regarding some of the formal aspects of multimodal literacy theory such as the concept of design, here I reconsider the walkway data from a perspective that privileges the role of the body. Continuing this line of thought into the second theme, I examine the relations between art making and the body. This exploration begins more directly concerned with the analyses suggested so far in this chapter, which have focused on learning about and through the body as well as composition processes in art making. In light of the first theme, which also involves text making, some comparisons between the art making and multimodal literacy accounts are in order. Finally, I address the topic of collaboration in somewhat more thorough fashion than above. In particular, in light of the data, I attempt to add a degree of complexity to the idea of collaboration by examining the diversity of kinds of collaboration that take place in technical theater at Lincoln.

Multimodal Literacy

As I discussed earlier, collaboration and design are both problematic for an account employing multiliteracy theory. A further consideration, evident especially with the students building the bookstand and with Albert and his student crew building the walkway is that all of these technicians are learning as they work, through their work. Multiliteracy theory typically assumes, or subsumes under the rubric of design, that text makers begin the text making process with the ability to instantiate their design and that
initial conceptions of the texts are static once conceived. Even the texts themselves are static, not adaptive, not emergent, and not subject to critique in the fabrication process.

Two distinct analyses of text making have been given for the data above, one using a multimodal literacy account based on the work of the New London Group (1996) and another using a framework from art composition derived from the work of Beittel, among others. The fact that these analyses are distinct should not be taken to mean that they do not overlap or cannot share similarities. As a way of making a comparison to illustrate the I consider two well-developed accounts of the creation of children’s art books. Steve McGuire (1992) in his account of Louis, a budding field biologist, and Jason Ranker’s (2007) in his account of John, a boy whose books incorporated elements of popular culture present accounts of text making that are theoretically distinct yet analogous in many ways. I am drawn to these two articles as examples both because of the similarity of the products the young boys made and because of the different theoretical accounts given to them despite their similarity.

In McGuire (1992) Louis is fascinated with animals and insects. Over the course of the semester Luis was observed, he created dozens of pages in his book, mostly combining drawings of bugs or animals with written text augmenting the visual information, sometimes arranging the text and drawings in coordinated frames. John’s book described in Ranker (2007) is similar in that it extended for many pages written over the course of the entire school year. John’s book also was composed of drawings and text arranged in panels and derived from his interest in several adventure video games and action cartoons17.

McGuire’s analysis of Louis follows the lines of art analysis described above. The presence of the essential conditions for art making are described and McGuire demonstrates how the student’s life history was revealed in the art project and how the art

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17 There were also differences in the texts, most notably that John’s was narrative.
project led him to deeper understanding of the meanings he was trying to articulate in his materials.

Ranker’s analysis follows the agenda of multiliteracies pedagogy and focuses on the formal aspects of the theory such as the semiotic resources and design elements John employs creating his book. John is using multimodal composing processes as he combines the visual mode of image, the linguistic mode of written text and spatial the mode as he arranges image and text on the page. Moreover, his images, characters, plots, and layout selectively borrow available design elements from popular culture. For instance, John appropriated “health points,” a video game convention; The Grim Reaper, a character from television; and the frame by frame layout of comic books. Importantly, he put the appropriated elements together in a new way; he redesigned them, creating a new available design he could re-use later.

Examining similar artistic products in different ways leads these researchers to arrive at appropriately different results. At the same time there is considerable overlap in the two analyses. McGuire writes, “Louis did look at biology books and apply their approach. There is his drawing, ‘Body of a duck.’ In it a duck is laid flat, dissected; looking at this drawing I knew Louis read biology books” (McGuire, 1992, p. 57).

Ranker is keen to understand John’s interests in popular culture and the article features several conversations between the John and the author which reveal John’s interest in the games and programs he borrows from, interests as deep as Louis’s interest in insects. In fact, the redesigned characters and stories John creates can easily be understood as intentionally symbolic, idiosyncratic, and artistically causal as they result from John’s consideration of the existing designs and his recasting them to fit his purposes.

While there are these areas of overlap, the articles’ different theoretical approach to analysis lead to a palpable difference in tone. McGuire’s piece focuses largely on Luis, how he was using his art book to tell the story of his life, and what it revealed about him. I am appreciative of Ranker’s use of ethnographic data collected over a
considerable length of time in his work, a feature not always present in the multimodal literacy literature. However, what is still missing within this highly formalized account is any consideration of the text along with the student as text maker in the moment of creation, that point where a mere doer has the chance to critically reflect, enter a dialogue between him- or her- self and the artwork, relating the emerging text to his or her experience and create the opportunity to make the work ontologically pertinent. McGuire underscores this difference in focus when he discusses Louis:

By the time Louis had completed his book, I came to see that his book actually transmits a particular sensibility, one that he had developed as he worked. We do not know where an artistic serial ends and the ontological project of interpreting ways of being in the world begins. (McGuire, 1992, p. 58)

The Body and Text Making

Other researchers have provided critiques of multimodal literacy theory based on observations of people in the process of text making. Leander and Boldt (2012) discuss the experience of an adolescent boy named Lee who engages in multiple literacy practices over the course of a day at home, joined by his friend Hunter in the afternoon and his father in the evening. These literacy practices include reading from a series of manga graphic novels, watching related programs on television, searching the web for other books in the series, drawing versions of scenes from the books, and discussing the differences between the book and television versions. While Lee and Hunter moved seamlessly through these activities, they also collected toys and accessories based on the books, at first to have present during reading and later to play with – sword fight – as the day went on. They wore costumes from the book as they read, spontaneously struck poses from the book using the costumes and accessories, and so on.

Leander and Boldt, “take issue with the New London Group’s disciplined rationalization of youth engagement in literacies” (p. 22). Instead of seeing the boys (and the father) in this scenario as primarily concerned with the production and consumption
of texts in a premeditated, rule governed fashion, they note that, “[the boys’] bodies [are] in persistent and largely unpremeditated motion,” (p 28) and that in their research they, “work to reassert the sensations and movements of the body in the moment-by-moment unfolding or emergence of activity” (p 34). At least three things seem immediately relevant in their analysis: first, that in its spontaneous unpredictability the body is also a (source of) affect. Second, following Deleuze and Guattari (1987), that the body is never just the body but an “assemblage” that includes, loosely, everything present with the body. In Lee’s case this includes fake swords and costumes as well as more environmental elements, such as a comfy chair and television, stand out. Third, following the unpredictability of the spontaneous body assemblage, is the unlikelihood of the texts being generated (if, indeed, one is actually attempting primarily to create a text) through a predictable, discovery free instantiation of a premeditated design. Instead, meanings, and suppositions regarding what meanings were intended, are likely to arise upon reflection. As Leander and Boldt put it, “It is only post hoc that we can press ambivalence, unawareness, randomness, spontaneity, improvisation, and contradiction out of practice; we rationalize practice and create intentions by working backward from our determined end points, including privileged textual outcomes” (p. 29). A sentiment that seems congruent with Zurmeuhlen’s, “first the making, then the naming.”

Before exploring the relevance of these ideas to technical theater, I note that Leander and Boldt’s concern with the body is slightly different than my own. Noland points to a growing body of what she calls “affect studies” that focus critical attention on “emotive affects” but that pay less attention to what she calls “somatic affects” (Noland, 2009, pp. 3-5). It is also worth noting that Leander and Boldt are analyzing a moment in which the two boys are actively using their bodies but not specifically attempting to train them. That is, they are not practicing sword fighting, say as part of a martial arts lesson, but playing a sword fighting game for the fun of it, as a way of extending their enjoyment of the text.
In a vein different than Leander and Boldt, a number of educational researchers have suggested that greater attention should be given to educating the body. That is, both about educating bodies to do a greater number of things better, and helping students learn more about their bodies, what they can do, and how to use them. Some of these are motivated by a privileging of a special kind of aesthetic experience and the concomitant belief that such aesthetic experience can be enhanced through training the body to perceive or take in art in its “sensuous immediacy” and as a “sensuous whole” (D. Madenfort, 1973 and W. Madenfort, 1972). Specifically useful to theater education and applicable to Albert’s predicament acting on the walkway, Madenfort (1973) applies this idea to apprehending the act of speaking:

We rarely experience our common everyday speaking as a live bodily event occurring within a specific context of bodily feelings of motion. The words and the conceptual meaning occupy our attention as we speak rather than the bodily activity involved. Thus the rhythmically, spatial, kinesthetic flow-patterns of speaking go by unnoticed and un-attended because they function auto-magically and we are able to speak without thinking about them. (p. 8)

These unknown rhythmic, spatial, kinesthetic flow patterns are precisely what Albert was having difficulty coordinating with other aspects of his bodily performance, the kinesthetics of which he seemed also to be unsure.

More recently, Shusterman (e.g. 2006, 2008) has continued this line of thinking in his programme of somaesthetics:

Somaesthetics, roughly defined, concerns the body as a locus of sensory-aesthetic appreciation (aisthesis) and creative self-fashioning. As an ameliorative discipline of both theory and practice, it aims to enrich not only our abstract, discursive knowledge of the body but also our lived somatic experience and performance….” (Shusterman 2006, p. 2)

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18 As mentioned above, Johnson (2006) points out a trap that is difficult not to fall into, as I have done here. He suggests that one reason for the pervasive and durable belief in something like Cartesian dualism is the difficulty of not talking about body and mind as different things, including dualism’s explanation of freedom and morality and the experience of seeming to have mental control of our bodies, as in directed physical actions.
While all of these approaches respect the influence of linguistic and cultural factors on a person’s experience of his or her body, they recognize, and seek to enhance, a more intimate familiarity with and attentiveness towards the body which is best brought out through certain types of training. In a different vein, Noland (2009) also explores the discursively constructed body, specifically examining gesture as a source of resistance due to the potential of interoceptive awareness, or kinesthesia, to challenge the bodily habitus established by gestural routines. Without having to accept any of these theories in their entirety, the larger point that awareness to the body can be trained and that the body is a site of learning as well as acting can be appreciated.

While theorizing the body and embodied knowing seems to be a rare sentiment in literacy study, it is less uncommon elsewhere, such as in physical education and, when the arts in particular are considered, several robustly embodied fields including dance and music education. Markula (2004) for instance applies a Foucaultian approach to discourses and the body to explore the relationships between various fitness regimes and how they fit into various discourses on the body and physical fitness, and whether they lead to objectifying disciplinary routines or can contribute to an “embodied subjectivity.” While I am doubtful of the existence of a rich discourse on technical theater, Markula’s work does suggest that discourses on vocational education (Lewis, 2005) and hands-on labor (Rose, 2004, 2008; Crawford, 2009) can have an influence on learning in technical theater. Although beyond the scope of the current work, it is worth keeping in mind that the generally devalued kinds of hands-on, physically engaged learning and work that students do in technical theater may be regarded differently than the physically engaged learning in athletics and the arts.

Introducing the topic of the relation of the body to art, Parsons (2007) explains:

On the one hand, art making and responding is often thought of as guided by bodily experience: Musicians feel the music in their body, dancers and other performers dance with their whole body (actors with their voice as well), and for painters the brush becomes an extension of the arm and hand. As Collingwood
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(1938) said, all the arts are a specialization of the body\textsuperscript{19}.
(Parsons, 2007, p. 534)

Others have expanded on the idea that dance education and related music
education have naturally been a locus for the study of the body (e.g. Green, 2007; Powell,
2004; Bowman & Powell, 2007; Snowber, 2012) and in particular the body in motion.
Common to many such approaches is the concept of kinesthesis, or kinetic awareness, or
“how to ‘feel from the inside’” as well as how to “feel from the other side” (Stinson,
2004, p. 163). Developing kinesthetic awareness is similar to the above mentioned
development of an aesthetic awareness but whereas that aesthetic awareness is in some
sense directed outward, towards the apprehension of an external aesthetic object, the goal
of developing kinesthetic awareness is helping the body to become more aware of itself.
Shusterman (2004) states decisively that, “If self-knowledge is a central aim of
philosophy, then knowledge of one’s bodily dimension must not be ignored” (p. 52). The
point holds equally well in education.

While some work has been done using a multimodal literacy approach to
incorporating dance into curriculum development (Hong, 2000, 2002) this work fails to
take into account the concerns highlighted here, that kinesthetic awareness of the body is
crucial to understanding and developing performance and a design based multimodal
literacy account leave no room for developing a text in response to kinesthesia or affect.
For this reason, it suffers the same difficulties I described above and Leander and Boldt
describe with respect to undervaluing the role of the body in text creation and
overvaluing design.

As a way of returning to technical theater, I wish to point to some parallels
between this research on affect and kinesthesia and the earlier discussion of art creation
by researchers and artists. The key similarity is that in all of these accounts, meaning is

Press.
an emergent element of the process of creation. In discussing their composition processes, many artists refer to this emergence at the point of creation. Such accounts are given in Moore (1967), Zurmühlen (1990), McKean (2007), Hagood and Kahlich (2007) and Wiggins (2007), among others. However, Shahn puts the dialectic between painter and painting eloquently enough to quote at some length:

From the moment at which a painter begins to strike figures of color upon a surface he must become acutely sensitive to the feel, the textures, the light, the relationships that arise before him. At one point he will mold the material according to an intention. At another he may yield intention – perhaps his whole concept – to emerging forms, to new implications within the painted surface. Idea itself – ideas, many ideas move back and forth across his mind as a constant traffic… idea rises to the surface, grows, changes as a painting grows and develops. So one must say that painting is both creative and responsive. It is an intimately communicative affair between the painter and his painting, a conversation back and forth, the painting telling the painter even as it receives its shape and form (Shahn, 1957, p. 49)

Accepting a degree of general agreement among artists and arts educators, as well as the critique of multimodal literacy given in Leander and Boldt, that in as much as people set out to create texts the meaning of the text emerges in part through the process of creating the text as the author engages it in dialogue, responds kinesthetically or affectively to it, develops a greater understanding of the text, revises the text accordingly, and reiterates the process, returning to the example from walkway chapter is in order.

I mentioned above that Jake and Albert were learning as they built the walkway. Moreover, they were learning about their bodily dimensions (Shusterman, 2004), the rhythms and timing of speaking and moving (Madenfort, 1973; Appia, 1932), and the difficult task of integrating these diverse knowledges and modalities (Rose, 2004). Until the technicians, and Albert in particular, had walked the walkway space as they performed their lines they did not know the relations among the language of the text, the speed of their delivery, and their bodies’ movements, and could not have designed a text based on those relations. There is an essentially different kind of knowing, specific and personal, arising from the body and running lines while walking through a performance
space and, e.g. reading or hearing a blocking instruction. In this moment Jake and Albert are employing their body across all three of the distinctions presented in Osmond (2007): body as knower, doer, and medium for aesthetic expression. First, the actors draw upon their knowledge of their bodies from their lived experience, then add to it as they discover more of themselves through practice before doing that performance as a way of creating the art of theater.

Examining Collaboration in Technical Theater

As noted in many places in this work, and by other researchers (e.g. McKeen, 2007; Wiggins, 2007; Kempe, 2000; Margetts, 2000; Gonzalez, 2006; Kohl, 1988) arts composition is frequently collaborative. While “collaborative learning” has achieved the status of buzz-word it is not immediately clear that the concept of collaboration has been adequately theorized. Although it is possible to imagine many different forms that collaboration might take, all too frequently the range explored in the literature on student learning is considered fairly narrow. For instance, collaboration could be synchronous or asynchronous. That is, people could be working on the same project at the same time – or the same project at a different time. Consider singing a duet for a live audience as compared to coauthoring an academic paper by sending successive drafts and revisions by email. Further, while collaboration seems to imply that the collaborators are engaged in similar work, this also deserves consideration. A different property of collaboration is whether the collaborators are engaged in roughly similar or dissimilar activities. On a soccer team, a goalie and a forward might be considered to collaborate, but do not have the same job; the case is similarly clear with a baseball pitcher and catcher. In both of these cases, the players perform very different roles that are not interchangeable and do not overlap. On the other hand, while the singers in the duet may perform in different ranges, they might be thought of as doing approximately the same thing.
Kempe’s (2000) analysis of drama making as “devising” stems from his wish to distinguish a particular type of drama making in which individual contributions are untraceable from other types of collaborative composition with more clearly defined roles. Bowman and Powell make similar comments about jazz musical performances. Drawing on the work of Schutz (1971), they conclude:

…musical listeners and performers cocreate intersubjective experience through the face-to-face interactions of human bodies. Schutz portrays music as an active, communicative process, rooted in bodily actions. It is decidedly not a process restricted to those with exceptional minds or executive abilities. (p. 1096)

Without commenting on the minds or abilities of theater technicians, or suggesting that working together on a technical theater project is the same as playing music together, I find this argument appealing, especially in the examples of the tree and bookstand building. During the building of the bookstand, Autumn and Isabel seldom spoke, and building the tree Erica and Vivien told stories about the tree but did not discuss plans for working on their project together. And, returning to the realm of sports, Cheville (2001) writes at length on the way a similar process happens among elite basketball players.

I do not want to push too hard to define parameters for whether members of a collaborative group engaging in similar or dissimilar activities. At the same time, the rough concept of the ‘same project’ deserves a modicum of attention. It is possible to make distinctions among elements of a project that are more or less similar. For instance, many forms of collaboration begin with the premise that there will be a division of labor. For instance, the plan for many literature circles or collaborative reading groups starts with the assignment of different roles to all the members of the group – a vocabulary master, a question asker, and so on (Daniels, 2002; Harvey & Daniels, 2009). Similarly, in a project with multiple parts, students frequently divide their shared responsibility along the lines of expected products, with each student producing one element of the final project by him- or her-self (Smagorinsky & O’Donnell-Allen, 2000), perhaps working on their parts alone at home. In other examples of collaboration, for instance group media
production, collaboration is more similar in that some parts of the work, e.g. filming, involve participants working at the same time in naturally divided roles, e.g. cameraperson and actor, while other parts of the project such as editing will take place at different times, perhaps with different people.

Of course, and somewhat reductively, the entire enterprise of technical theater is a large collaboration on the production of the play; activity theory and situated learning assume a fundamental degree of collaboration. Limiting consideration in technical theater to more manageable sized projects and incidents shows that the work technicians do covers a wide range of styles of collaboration. All of these data, in this and the previous chapter (along with the example of Lee and Hunter in Leander and Boldt (2012)), suggest a need for a more developed understanding of collaboration.

This is important for several reasons, one of which involves embodiment. I have argued that embodiment needs to be better understood. In the cases of athletics (Cheville, 2001) and music or dance (Bowman & Powell, 2007; Bowman, 2004) this style of collaboration has been attested. However, these are collaborations that, like technical theater, do not take place in typical classrooms. However, there is no reason to suspect that learning by observation or collaboration arising from proximity to others is limited to these special cases. Embodiment is a feature of all classrooms, so embodied collaboration may be as well. Another reason that further theorizing of collaboration is important involves a developed understanding participation. I have already discussed legitimate peripheral participation at length. I also mentioned above that Gee’s concept of the “affinity space” (Gee, 2005, 2005) was similar to community of practice theories, but had a particular emphasis on virtual spaces such as on–line video games. This represents forms of collaboration that are clearly important but that do not take place in the same physical space and that might not take place at similar times.

In the table below I recall the moments from the data and provide brief comments on the nature of the collaboration. Without having too much at stake in the precise
formulation of these comments, I want to suggest the range of collaborations possible. Clearly, these suggestions on classification are at the beginning of an analysis of collaboration. The scope of the present work precludes an in-depth consideration of these concepts here, although a few suggestions are in order. At the beginning of this chapter I noted that while I wanted to keep the theoretical frameworks from the previous chapter in mind, I intended not to draw explicitly on them here. However, it may be that they provide a set of analytic tools for the study of collaboration. In essence, the community of practice and apprenticeship models presented in Lave and Wenger and the activity theoretic framework are ways of describing particular forms of collaboration. It should be possible, for instance, to define a multi-part activity system for particular collaborations that takes into account the actions, objectives, and outcomes from a variety of participants.

Although I do not pursue it at any length here, it is worthwhile to recall that social learning theories in general understand learning as emerging from social interactions or participation in social groups or communities. Lave and Wenger (1991) and Wenger (1998) explicitly argue that all learning takes place through legitimate peripheral participation, although in a classroom situation what a student learns may not be well aligned with what a teacher intends to teach (Lave & Wenger, 1991, p. 31 ff.). If this is the case then the importance of understanding collaborative interactions in more detail becomes clear. Different forms of collaboration may lead to different kinds learning, for instance. As is clear from Gee’s example, greater varieties of interaction and therefore collaboration are facilitated by technological advances, further arguing for a more discriminating understanding of the possibilities of collaboration.
<table>
<thead>
<tr>
<th>Data Moment</th>
<th>Style of Collaboration / Teaching</th>
<th>Description of Collaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walkway building</td>
<td>Co-workers: Albert leads the group as a job foreman might, sharing work but completing most in-depth or challenging parts himself in order to work efficiently</td>
<td>Synchronous, similar, directed: the technicians share most of work and types of work, at the same time, on the same project, and they approach it deliberatively, discussing plans, assigning jobs, requesting help, and so on.</td>
</tr>
<tr>
<td>Chop saw lesson</td>
<td>Various: frequently taught in a mini-lesson by an adult to a student, occasionally from an experienced to novice student, and sometimes acquired by observation without a more formal lesson.</td>
<td>Asynchronous, dissimilar, directed: one person directly teaches, the other learns, taking turns running the saw.</td>
</tr>
<tr>
<td>Skilsaw incident</td>
<td>Teacher–Student: in contrast to the goal of efficiency in most of the walkway build, Linus allows the student technician to use the worse tool (jigsaw rather than skilsaw) to make a cut, allowing the student to learn from the mistake.</td>
<td>Asynchronous and similar: the student is using the same tools and doing a job Albert typically reserved for himself while Linus and Albert visit.</td>
</tr>
<tr>
<td>Table saw incidents</td>
<td>Student teachers: Cori and Erica, as experienced teachers, alternately assist Linus and teach other students about the saw with which they have a great deal of experience.</td>
<td>Asynchronous and dissimilar: several people teach, while another learns. This lesson is complicated by the fact that Linus leads the teaching, but other students collaborate with him on that, contributing something dissimilar to the lesson.</td>
</tr>
<tr>
<td>Wrenching / Light hanging</td>
<td>Ad-hoc student collaboration: one student helps others after she masters the task in quick, spontaneous instructions or suggestions.</td>
<td>Asynchronous and dissimilar: one technician demonstrates, and others then attempt to follow those instructions.</td>
</tr>
<tr>
<td>Tree building Bookstand building</td>
<td>Student–Student: in both of these situations the students have ongoing artistic collaborations in which both participants have approximately equal skills and make equivalent contributions. The methods of collaboration have differences, e.g. the tree building technicians joining in a joint storytelling project to explain their work to each other and the bookstand building technicians mostly working without talking.</td>
<td>Synchronous, similar, proximate: in each case the technicians work on the same project at the same time with little overt discussion of the collaboration (excepting the joint narrative Heather and Vivien tell about the history of the tree). Much of this collaboration is subtle, under the surface, involving people working in the same time and place, riffing off each other’s work.</td>
</tr>
</tbody>
</table>
Table 5–1 Continued.

| Lightboard / Technical Rehearsal | Master–Apprentice: Linus directs the vast majority of the lightboard programming, the technicians working to implement his instructions. | Synchronous and dissimilar: the technical director and lightboard operators work very differently on the same project at the same time. |
CHAPTER VI
LEARNING, ACTIVITY, AND COLLABORATION REVISITED

I approach this chapter by revisiting some of the prominent themes from the previous chapters from the perspectives of the directors and student technicians who work at Lincoln. While I hope to have presented intriguing data and made a compelling argument for my particular analyses, reviewing those analyses alongside the words of the participants in this work will serve not only to reinforce my analyses, but also to both expand them and introduce heretofore unconsidered tensions. The goal of this exploration is to develop a more complete understanding of technical theater inclusive of all the data sources available to me, to let the technicians speak in their own words, and return more specifically to issues of teaching and learning in technical theater.

Accordingly, this chapter features a number of extended transcriptions from directors Linus and his wife, June, as well as a number of student technicians.

The Leaf Incident: A Failed Project

The data I have presented so far has, with few exceptions, been gathered from highly successful projects structured in a thoughtful way that appeared to lead to rich student learning. It may in fact appear that I have a romantic view of technical theater. Such appearances would not be deceiving: as a theater technician I enjoy the work on several levels – physically, creatively, as a member of a community – and as a teacher I appreciate the power of the learning I observe in students and the uniqueness of the pedagogy and the context of that learning. As a palliative measure, and by way of introducing one of the tensions mentioned above, I turn now to an incident that by most any standards was a failure.
Explaining Failures

During the course of the *Into the Woods* build, there was a Wednesday afternoon work session, during which Linus asked a group of about five students, including veteran technicians Erica and Cori, to work on a project. The job was to make leaves by using scissors to cut leaf shapes out of green fabric. I had come Lincoln to talk to Linus, but as he was busy with other things I decided to observe the leaf making group. Linus showed them the cloth, told them that they would have to find scissors, indicated with his hands how big the leaves should be and said that a picture of what the leaves should look like was ‘around somewhere.’ With that, Linus left and the technicians got to work. For various reasons scissors are typically hard to find, and the cloth was somewhat musty and of uncertain origins uncertain, although it seems clear it had been used in at least one previous show before being stored. Variously the technicians found enough scissors and spread cloth out in an open space in the little theater. Someone found the picture – a small downloaded image printed on plain paper – and some of the technicians found things to sit on as they sat naturally in a rough circle, facing inward to allow talking.

Almost immediately they seemed to me to be losing interest in the project. The consistency and quality of their leaves, as measured by similarity to the picture and size Linus had indicated, grew steadily worse while the ratio of time spent cutting out leaves compared to just visiting with their friends favored visiting more and more. Talk around the circle ranged from school gossip to bodily functions to lighthearted critiques of each other’s leaves. Most of the technicians seemed unwilling to quit altogether but instead left repeatedly or talked to friends near enough to the leaf making area that they could return quickly. Although two did claim they had another project to work on and left altogether, ostensibly to work on it instead, the others kept on, cutting out leaves and occasionally hurling them into the center of their ring where something like a pile of leaves formed.
Linus had told them to make a lot of leaves, and in due course conversation turned to speculation on whether they had made enough. When Linus, still busy, passed through the scene shop nearby they asked him how many they should make and his terse reply was, “as many as you can.” This did little to improve the dispositions of the technicians and later Cori went to find Linus and returned to tell the others – who had not been working at all – that indeed they were to keep going and make as many as they could. At this point they demanded that I help them and someone asked me if I knew what the leaves were for. I joined them and said I did not know what the leaves were for; someone said they were for the good-looking tree, but others convincingly – and correctly – argued they were for the beanstalk. This renewed the technicians’ critiques of each other’s leaves and the discussion of how many were needed. I had made fewer than half a dozen leaves when, like the students, I stopped altogether and just sat and talked. This involved a calculation on my part about my role as a researcher and community member. I was concerned with how my participation was affecting the rest of the group. Students of course knew I was a teacher and friend of Linus, but I had been careful to position myself as an expert technician and not an authority figure. I did not want to lead the group in any direction, so although I considered continuing to work and encouraging the others, I chose not to, feeling that would be an uncharacteristic intervention.

It is easy to brainstorm a respectable list of possible reasons for, or factors contributing to this failure: The project seemed to the techies like busy work; there was no supervision of the work; Linus was busy, did not seem especially invested in the project, and did not seem especially interested in the quality of the work; not knowing the quality required, i.e. if the audience would see individual leaves, the students decided a low quality was acceptable; the technicians did not know what the leaves were for and that made the project vague and pointless; the unspecified quantity of leaves required made the goal of the project yet more vague; there was very little in the interaction of tools, materials and parameters for the project that could lend itself to meaningful self
expression; the project presented no significant learning challenges or production intricacies; it was not exciting, glamorous, or dangerous.

Cori addressed these last three points, when I asked her what she liked about being a technician. After mentioning making friends, entertaining people, and the pleasure of watching a set come together, she continued,

And the hands-on. Building things. Power tools are very fun to use. [laugh, pause] You get to go high places. Like in the gymnasium. [laughs] Well, and in here. Up in the loft, and in the catwalk. [pause] As long as you’re not afraid of heights that is.”
(Interview, April 12, 2010.)

This was followed by a discussion of an injury – a cracked thumbnail – that she insisted was healing nicely. Clearly, cutting out leaves was a down to earth project, as it were, but to someone interested in working some 40 feet in the air or using power tools, its placid nature could have been demotivational.

Among the other possible complaints I brainstormed above, the idea of busy work stands out. In the sense that the leaf making project kept a large number of students (somewhat) working with minimal supervision, it was busy work. On the other hand I presume that Linus saw this as an opportunity to get a necessary project completed while he was otherwise occupied. The key difference lies in his understanding of the complaints students may have had that led to the failed project: Linus knew the leaves were for the key beanstalk prop, that the audience would not see it up close and the quality did not matter much. However he also knew the rope that comprised the center of the beanstalk was very long and would require a great many leaves to adequately conceal it. That leaf making was never, in any event, going to be exciting or glamorous also framed Linus’s thinking on the project.

Even this deliberately atheoretic look at the project suggests that differences between the technical director on the one hand and the student technicians on the other regarding both the perceived value of the project and the amount of background information available, contributed to their different perspectives on the project. In what
follows I use the term ‘motivation’ as a rough descriptor for what the students seemed to lack (and that Linus failed to provide) that contributed to the failure of the project. I settle on motivation as the problem given that materials, tools, required skills, and people to work on the project were abundant. The explanation for the failure then revolves around an understanding of motivation that explains why it was so conspicuously absent here yet present in other projects like the tree making.

Theorizing Failures and Motivation

Although not incompatible, I have presented two distinct explanations of motivated participation in technical theater, neither necessary but either sufficient to engage a student in a technical theater activity. The first, deriving from, broadly speaking, the situated learning theories presented in Chapter Four holds that participation in technical theater as a socio-historically situated activity is motivated by commitment to the activity, developing an identity as a participant in the technician community, and the learning that is coextensive with that participation. Engeström (2001) puts it particularly succinctly, “For situated learning theory (Lave & Wenger, 1991), motivation to learn stems from participation in culturally valued collaborative practices in which something useful is produced” (p. 142). Although the situation is complicated somewhat by the presence of students with marginal commitments to technical theater itself, e.g. cast members who are required to work a few hours on the set, their participation can still be understood by considering it in the broader context of the entire play or the drama department as a whole. In such a view a technician would typically be drawn to technical theater and once meaningfully involved, i.e. through legitimate peripheral participation, be encouraged to stay and learn whether through some form or combination of apprenticeship, observation, collaboration, and experience. Doing so, the technician would enjoy the social satisfaction of becoming a valued member of the community and
being seen as knowledgeable and capable, as well as able to learn and do new and potentially interesting things.

The second view, deriving broadly from the consideration of technical theater projects as opportunities to make art, suggests that the allure comes from the opportunity to work on projects that are or can become meaningful to the technician(s) working on them. That is, through a process of critical reflection on the expression of ideas in materials, students have the opportunity to develop pieces of art that are ontologically pertinent. In popular terminology, one might say they get to express oneself through art. As mentioned, these explanations are not necessarily exclusive; a technician could be valued for his or her artistic abilities that allowed for multiple contributions to a production and just as many opportunities to make personally meaningful work. But neither would a student’s reasons for participating always be the same; a technician could have extensive commitments to the theater community and perform a lot of routine work but on occasion have opportunity to work on a personally significant project.

In the case of the leaf making, I have already stated that there was little chance for meaningful personal expression. This seems to rule out the possibility of ontological pertinence, and while I will return to this concept in discussing the next project, there is no need to pursue it further here. What remains is fortunately rather straightforward explanation of why the students did not take to this project, why Linus may have thought they would, and what the students did not know about the project based on Linus’s introduction to it. Put in Lave and Wenger’s (1991) terminology, Linus, knowing the purpose of the project, understood them to be engaged in legitimate peripheral participation, but the students lacking a clear understanding of the project were willing to stick with it for only a while, and when its import did not become clear, they lost interest. Although they were in fact doing important work, they did not know it, and surely legitimate peripheral participation is not achieved merely through engaging in a
meaningful goal directed activity; one must also know the goals and how his or her actions lead to achieving them.

Even though the students eventually determined that the leaves were for the beanstalk, they did not know anything else about that prop and the additional vagueness of the instructions, the lack of quality required for the project, and the lack of instruction and modeling from Linus all contributed to their lack of interest. To achieve legitimate peripheral participation, participants need to feel that their work is meaningful and relevant to the larger activity and in this case they clearly did not. This should be considered as distinct from the earlier concern that the work was not fun or exciting; certainly not all of the work needs to be fun to engage the technicians’ interest. In fact motivations may be influenced by personal preferences as well as by position or responsibilities in the community.

**Personal Props, Motivation, and Tensions**

Jonas, a senior at Lincoln who was a standout actor who frequently participated in set building, illustrated the potential differences in motivation in an interview. Although he was primarily an actor, I asked him to participate in an interview when I learned that he was the student director for that year’s children theater production of *Go, Dog. Go!*\(^1\). As he was entering the world of directing, I was curious to learn how he understood the value of technical theater. As transcribed below, his perspective is relevant to the question of engagement, in this case speaking primarily of the build for *Into the Woods*.

Me         How do you keep yourself interested in doing something like that? Oh, great, I’ve got to build four platforms?

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\(^1\) There is never a student technical director. However, the official technician position of “stage manager” carries considerable responsibilities regarding the set as well as actors and other technicians; in this sense there is no analogue in the acting cast. Cori was the stage manager for the *Go, Dog. Go!* production and Linus had her take on a number of extra responsibilities.
Jonas: Um. I don't know. I, I um. I don't know. I guess that part of it was like knowing what an integral part that was going to be. Part of it was like wanting to see it and use it, and like have that [use of the platform] as an ability. But, yeah, I see what you mean. People have more fun with certain things.

(soft) How do I stay interested?

I don't know. I guess like when I, you know, go to a tech day I, I was thinking about keeping interested, but I was also just thinking about like getting as much productivity done, like getting as far on the set as we could. Um, and I mean I just I feel good getting, you know, getting a platform done, I like drilling into things and it's like a complete thing, you know, someone's going to be able to going to stand on that. Umm. I guess the idea, the fact that I'm completing something and building something, that's what's interesting to me.

(Interview, April 28, 2010.)

While admitting that some things – including the robustly embodied work of drilling and building – are more interesting, he rather stresses other things, including overall productivity, contributing to it by completing things, and perhaps most importantly understanding how the work fits into the production as a whole are more important. Jonas’s attitude, valuing productivity for the good of the show with little regard to the specifics of the project, was not shared by the technicians as they made leaves. However, neither was Jonas part of the leaf making crew; motivations are complex and vary by project and exist on a spectrum. Cori, for instance, I believe would be in general agree that overall productivity is an important goal and that while not all projects would be as fun or rewarding in and of themselves they nevertheless were rewarding and worth doing because of their value in the show as a whole.

In an interview she actually expressed tolerance for actors who show up for only one day and want to do all the fun parts of a project. Nevertheless, the particulars of the leaf project superseded her usual willingness to work for the good of the whole. It is particularly interesting to consider motivation in the context of actors making personal props that they will use in a show. Actors do not always make their own props; sometimes, as was the case with Sister Amnesia’s bookstand, technicians make the prop and the actor uses it without there being any collaboration or communication between the
two\textsuperscript{2}. The next two examples come from situations in which the actors did make their own props.

The Lollipop Affair

Jonas’s attitude towards motivation and participating is important to keep in mind when considering another situation, this time from when he was directing \textit{Go, Dog. Go!}. As I was interested in how he thought of technical aspects of theater as a young director, I had been pursuing a line of questioning about how he would determine how much time he would like to see allocated to various props. In his response, he mentioned a cast member, a familiar face in Lincoln plays who worked on sets the required once per show but not much more, who I had also noticed on the same day:

I think if, you know, if someone was, you know… I can actually think of a particular example from I’ll just say it, from \textit{Go, Dog. Go!} Amelia Boyer spent \textit{all} day on her lollipop. Like I was, I would work on the banjo for ten minutes, you know, then go do something else, then come back and like paint a coat, and every time I was there she was always working on that lollipop, and I was just thinking there’s so much she could, like that someone else could have been doing instead of working on one prop all Saturday. Especially if there was a limited group of people there. (Interview, April 28, 2010)

To be fair to Amelia, it was a comically oversized lollipop that she painted in multiple colors, it did require a lot of work, and it would have taken anyone a fair amount of time to complete. While striking in the dismay Jonas expresses regarding the lollipop project, his position seems entirely consistent with his previous statement about what engaged him in technical theater, including an emphasis on productivity and efficiency.

\textsuperscript{2} The reasons for this are complicated and perhaps not especially interesting. In some cases the explanation for actors making their own props seems to be organizational: with many, many projects to keep track of, the director or technical director may announce to the whole cast that every actor is responsible for helping make sure their character has whatever props they need. Such an announcement was the genesis of the slotted spoon project discussed below; hearing it the actor approached Linus and told him she needed a slotted spoon, and he asked me to help her.
In light of this emphasis on productivity, I directed the interview toward a discussion of creativity.

Me: Are you creative like that? If someone asked you to go paint this, go paint like some flowers on the backdrop or something, would that be fun for you?

Jonas: I’d be more concerned about my quality of work. And like what I could put out. If they were willing to take the time to show me exactly what they were thinking, I could try. I like it better when I get like, take this big piece and attach it to this big piece.

[later]

If it’s like, if it was a solid color, you know, with maybe like a stripe, I could do that.

[later]

I would probably much rather paint the floor black than paint some… intricate thing…. Can’t really mess it up too bad.

(Interview, April 28, 2010.)

In this selection he remains consistent, concerned about quality and willing to do jobs that might be considered dull, but adds to this, his own lack of creativity and the understanding that creativity and building are at least potentially separate. This was reminiscent of a position advanced by June Mcclimon that separated the world of technicians into two (non-exclusive) groups, the technical people and the creative people.

In a roundabout way I suggested to Jonas that some people might look at prop making as a chance for creativity and self-expression, prompting this exchange:

Me Why do you think Emily was like that with her lollipop [spending all day working on it]?”

Jonas I think in this instance it was more like, it’s her prop, for her scene and she wanted to make it as good as she wanted it to be, for her thing. Um….

[pause]
Figure 6-1  The lollipop and the slotted spoon, two personal props made by the actors who used them.

Lollipop photo created by Albert and used with permission.
Jonas    Yeah.

And I think she was not looking at it, the show as like a whole, and how much the whole show means, as part of [indistinct].

Me      Do you think she was proud if it?

Jonas    Yeah. I mean, it looked cool. (Interview, April 28, 2010.)

While his assessment of Amelia was not particularly kind in any case, it attributes to her a sensibility quite different from his own. Whereas he thought universally in terms of the whole show, she was interested only in her part and while she created a nifty prop, for herself, she did so at the expense of making the rest of the show better\(^3\). Clearly, there is a more charitable way to understand Amelia and explore the tension between the way she behaved and the way that Jonas thought was more appropriate. The charitable interpretation would understand her on the one hand to be being creative, perhaps engaging in the sort of critical reflection required of art making. As is common for me having studied technical theater with the methods I have, I am not familiar enough with Amelia to venture any comment on how her work on the lollipop may have been ontologically pertinent to her. However, Jonas’s initial response to my question is striking: Amelia was making her own prop and wanted it to be as good as she wanted it to be. In his point of view, Amelia was aggrandizing herself and not being a team player, but if his point is credited at all then Amelia can be seen as making something personally important, if not necessarily ontologically pertinent.

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\(^3\) I feel that I should mention that *Go, Dog. Go!* was universally reviled by the technicians, including me, and that I overheard many of the actors complain about it as well. The dismal quality of the show was attributed to the script, not the cast or crew. Judging by ticket sales, the production was a popular, if not critical, success.
Figure 6-2 illustrates an activity theory analysis of the lollipop incident from the perspectives I am attributing to Jonas and Amelia. It is worth noting that the overlap in outcomes indicates that the show overall went on as scheduled, and the differences represent personal preferences. That is, the most expansive of the goal directed activities in this context, putting on a play, was achieved and the areas that do not overlap represent individual sub-goals within the overarching one. I suspect that an analogous diagram could be made for many instances of collaboration. In this regard, I think it is worthwhile to provide a rather lengthy excerpt from an interview with Linus in which we discussed another personal prop, this one from Into the Woods, that I had, at points, helped the actor, who had very limited technical theater skills, build. The student and I used a number of different tools and techniques on the project. Tools included a jigsaw – the same one mentioned in the previous chapter – a power sander, and a cordless drill. In addition, I asked the student to go into the audience section of the auditorium and consider the size of items on stage to determine the appropriate scale for the spoon, draw the shape that she envisioned for the spoon on our stock lumber, and try various wood shaping techniques to make the spoon look rustic.

This was also an instance of building a personal prop that a student spent almost an entire Saturday working on, somewhat more than strictly speaking was necessary, thus accounting for the humor Linus finds in the first lines of the transcript.

Me How much did you follow the slotted spoon…

Linus [immediately laughs] … oh, you know, I love the slotted spoon. [laughs] It was cool….

Me [laugh] But that’s a serious question. Like, did you see her make it…or, I mean I was working on it, so-

Linus I think the day that you guys were working on that, was one of those days, I was running around like crazy.
Figure 6-2  Diagram representing an activity theoretic account detailing the sparse overlap in the outcomes of the lollipop project as understood from the perspectives of two subjects and suggested as an explanation of the tension between the student director and cast member.
Me Did you see her take a hankering to it?
Linus Yes. Oh, yes
Me Can you talk about that?
[exchanges clarification of question]
Linus Oh, yeah. It was, it was, it was hers. Yeah, that was, you
know, she pretty much had all but one [only one] prop. You
know, when you think about it that was the only prop that she
really had, was, was the spoon. And, you know, the fact that
it’s, it’s a line, you know, one of the lyrics that she sang, (half
singing) ‘slotted spoons hold no soup. A slotted spoon can
catch a potato.’ You know, that’s, that’s, you know….

And I think also you have to think about the fact, and this is,
this is kinda getting away from the technical theater end, but,
ahh, she’s kinda been waiting for a, a decent part in a musical.
She has a beautiful voice, and her acting skills have never been
up to par with the other people in the group. I’m not saying
she was, she was a bad actor, there were just so many other
people who were so good that she was always kind of
competing for roles with. And this one just, I mean she came
into auditions, she sang and read so well for it. And I think she
was just so happy that she had the role. And then it was like,
‘Okay, what do I need to make this, this… I know! A slotted
spoon! That will make me complete.’ You know, that kind of
thing. (Interview, December 3, 2009.)

It need not be surprising that Linus, as an experienced technical director and
teacher, takes a somewhat broader view of the personal significance of the prop to the
actor. In this case, he respects the actor’s motivation to make something that recognizes
the importance of the prop’s personal significance to the actor, and is familiar enough
with her personal history to understand why the prop might be significant. In the
following sections I return to the topics of how Linus initiates projects and conducts
lessons in the normal course of production work, exploring how opportunities for
individual investment in a project coexist with the need to complete considerable work on
a short deadline.
Approaches to Teaching and Learning in Technical Theater

As a technical director, Linus clearly understands the necessity of everybody pitching in to get all the required parts of the show completed in time, yet he also shows a particular sensitivity to the possibility that students work on projects for personal reasons that are not necessarily reflected in the final production but that are nevertheless important to the student and to the technical theater process as well.

Linus does not typically talk about having a teaching philosophy, and while this in no way implies that he does not have one, it is worth considering that technical theater, perhaps more so than traditional or conventional classes, can have a large number of uncontrolled variables that affect the entire production. For instance, if too many or too few students are present on a work day plans need to be adjusted, or if the design for a major set piece needs substantial revision that commands Linus’s personal attention for an extended period of time, not only can the entire production can get behind schedule, but Linus’s ability to work with individual students on other projects can be hampered. Linus reflected during an interview on how it could happen that instead of being able to explain something to a student so that they understood it, sometimes he would have to “just show” them instead:

A lot of the times when, you know, you’ve got a punch list you know on the whiteboard in the shop, and you’re looking at a lot of stuff that hasn’t been started, all you’re doing is like, ‘this is how it needs to be done, this is how it needs to be done, okay?’ and the only time I’m cognizant that I’m teaching stuff is when a kid says, ‘I’m not sure how to do this.’ Let me show you. You know, and that, even that, you know is one of those times where you kind of go, ‘well, this might not be the best way to educate a person’ but I’m, it’s… you’ve got a lot of things going on. (Interview, December 3, 2009.)

Fortunately, in light of the fact that most productions end up running behind schedule, Linus’s philosophy is largely built in to the typical procedures in the scene shop. For instance, above I discussed the failure of the leaf making project, but it stands in sharp contrast to the ways in which most other projects, e.g. the bookstand and the tree
making projects, were initiated. So, although the philosophy can be overridden by exigent circumstances, the intention is revealed in the overall conduct within the technical theater community.

Lesson set up and lessons

As I have presented the situation, much of the teaching and some of the learning takes place during short lessons, such as the semi-formalized chop saw and table saw lessons, or the less formal practical lessons that initiate projects such as the tree building. Also, as the data reveals, projects and lessons are not all conceived or executed in the same manner: the goals of the bookstand project were explained at some length, but the methods were not; both goals and methods were well explained, with questions, answers, modeling, and guided practice, in the tree building project; and neither goals nor methods were well explained in the leaf making project. It is worth pursuing Linus’s thinking behind this, which captures some of the essence of the ideal lesson setup, but which also reflects some of the intrusion of practical concerns evident in the previous quote.

Linus

Sometimes it’s, you know sometimes there’s that kind of creative force going on where just you just kind of tell a kid, ‘listen, we need something that looks like this.’ And if it’s a harp, we say, ‘okay. Go in the orchestra [room] and look at a harp and draw it out, and then I’ll show you what materials and what kind of techniques,’ and things like that.

And sometimes it’s like, ‘here’s the drawing, here’s what we want it to look like, there are all the measurements for you, there’s the pile of lumber, there’s the tape measure, and we need it to be reasonably exact.’ Um, and those are kind of the two opposites and then everything else just kind of happened in the middle.

Me

Would you say that, at both extremes, and then places in the middle, would you say that there’s, umm, is there learning going on at both poles-?

Linus

Yes! Yes. I think so. Um, if… sometimes you might have someone who’s not quite sure how to read a tape measurement accurately, so there’s a learning opportunity. You’ve got a kid who knows how to run a saw but doesn’t know how to run a drill, there’s an opportunity. Sometimes you’ve got a kid who knows all of the construction techniques ever, but realizes that
this is something that is not going to be permanent so has to be built in a way that taken apart easily, there’s a learning moment. Umm, you know, there’s. there’s a kid who, [small laugh] you know… ‘how do I cut something in a straight line?’ ‘We’ve got a paper cutter.’ ‘I’ve never used one of those before.’ There’s a learning moment.

Sometimes it’s very subtle and sometimes it’s you get them together and say listen to me, this is how I want it done, and see if you can do it on your own. If you have a question come back and ask. (Interview, December 3, 2009.)

It is worth quoting Linus here at considerable length, not only because he is speaking explicitly about the ways he sets up lessons and projects, but because of two things that stand out in addition. First, because it is his most straightforward expression of teaching and learning in technical theater. Second, a point I return to below, is the list of learning moments he describes. With the exception of the student who already knows many construction techniques, the examples of learning here seem like straightforward, basic skills in using tools.

Keeping in mind Linus’s description of how lessons are initiated, another example of how to set up a lesson becomes relevant. During an interview I had the opportunity to ask Cori about an event that happened during Go, Dog. Go! production work, on the previous Saturday work session, which I had not attended. Linus had put Cori in charge, telling other students to ask her which projects they should work on and to seek help working on them. Go, Dog. Go! featured at least one scene in which the characters, who are dogs, used handheld construction tools. Instead of using real tools, which would not have fit the aesthetic of the set and in any case would have been too small to be seen by the audience, a number of prop tools were. Cori, when I asked her about being put in charge, related helping one actor with the project of making a prop drill.

Cori

It was interesting. It was weird having people come to me and going ‘what should we do now’, ‘how should this be done.’ And of course, I would give them my opinion. Like with the screwdriver, that was – or the drill – that was pretty easy: we’ll just make this out of styrofoam, because that’s really the only thing you can make a fake drill out of. [laugh] Not really going to try that with wood.
And so, I mean I basically told Craig, I basically told Craig, well okay, this is what you have, you have this – I showed him how to use the styrofoam cutter, of course – and then I was like, ‘so here’s your [real] drill. You want to make this [prop drill] a bit bigger.’ And then kind of let him do it on his own. It’s a bit smaller than I would have preferred, but it’s okay. It’s just a bit small compared to the rest of the tools, which were all larger.

Me  Ummm. And you didn’t feel like telling him, ‘fix it’ or do it over.

Cori  [laugh] Well, he kind of left before I had a chance to look back on it. But it’s okay. It’s a fairly good drill. (Interview, April 12, 2010.)

It seems clear that this is a close analogue of one of Linus’s project setups: she introduced the actor to the materials, taught him how to use the tool he would need for the project, provided him with a model and loose parameters for the finished project. While the parameters may have been somewhat too loose or poorly explained, the finished product was acceptable and completed by the actor with little, if any, further intervention from Cori. While of course *Go, Dog. Go!* was children’s theater, which is typically considered more experimental and open to personal creativity than more formal productions, it still is rare for even an experienced technician like Cori to be put in charge. The concept of students teaching other students is however an entrenched part of the practices at Lincoln, as seen above in the table saw incident. In the following excerpt from my interview with the artistic director Mrs. McClimon we had been generally discussing *Into the Woods*, which featured three cottages painted to look like they were made of stone, and I had asked her if she would be upset if the painted stones differed from one cottage to the next.

Actually, no, because you could use different stones in two buildings next to each other. But, the thing that was so amazing to me in this particular show was that those kids that did all of this taught each other. I didn’t have time. There were so many kids working on that set. And I didn’t have time to show every single kid how to do what I wanted them to do. So I would have, I had like one person in charge of each cottage. And they showed the other kids that came to help how to do what I taught them to do. So, amazingly, it turned out being pretty much uniform, in that it didn’t look like 40 different kids worked on it. It looked like it
was a team of experienced people. I was very happy with the results of it. They did an amazing job.

And they did exactly what I told them to, I mean, you know, they mixed the paint the right way, they did almost everything. I basically supervised most of that set. I didn’t paint really paint much of it at all. And that’s when you know that it’s successful. Because that’s what, that’s what we’ve been striving for for 20 years. Is to get to that point where you can say, ‘you do this, you do this, you do this,’ and let them go and do it. (Interview September 18, 2009)

Not only does she reflect the typical initiation of a project as teaching students a skill and letting them use it to create the set, but also the further goal of students teaching each other. Mrs. McClimon was particularly impressed by how well the student technicians performed in this project, a degree of success perhaps as rare as Cori being put in charge. Nevertheless, the presumption that students should be teaching each other remains in other situations that may be less striking but which are valuable and happen with a great degree of regularity.

The excepts from Cori and Mrs. McClimon reveal striking similarity both in their initial approach to teaching and in their expectation that students will learn through various collaborative means\(^4\). In Chapter Four, situated learning approaches such as communities of practice, apprenticeship, and activity theory were considered as tools to explain learning and behaviors in particular projects and instances of teaching and learning. I have also argued that much of the teaching and learning that takes place during technical theater activities at Lincoln is built in, as it were, to the practices that Linus established and that were adopted by the community, for instance the configuration of lessons, the delegating of authority and responsibility, and the ubiquitous collaboration. Any of the theoretical frameworks discussed can be equally applicable here. For example, regardless of whether we think of Cori as having learned the rules of

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\(^4\) Although not a technical theater project per se, Jonas being made student director is another clear example of this sort of student leadership and collaboration in the drama department as a whole.
the communities of practice through her prolonged membership and progression from the periphery to the center of the community, or whether we think of her as a sort of apprentice to Linus who has learned not only what he is teaching but how he is teaching it, there can be no doubt but that she has.

Linus’s Teaching Objectives

Among the first questions I asked Linus in our interview were about his teaching and learning goals for technical theater. Although what Linus is trying to teach seems like an obvious starting point, not only for this chapter but for this entire research, I have deliberately put off addressing it directly till now in order to first begin exploring some of the ways in which teaching and learning are taking place that Linus does not explicitly bring up when asked about his intentions. In fact, when asked about his teaching intentions Linus’s goals seem particularly modest, as reflected in his answer to just that question:

We’ve just tried to develop a corps of kids who understand just a lot more about technical theater than the average person. In terms of, you know if we’re talking about set construction there’s some construction skills going on there. If we’re talking about lighting, there is some basic electricity things that they get out of it, just some simple wiring things. We don’t turn them into electricians, nor do we want to.

But if it’s sound things, that’s a skill that’s a little more specific to the theater. So, it’s what do you do if you get a lot of feedback from the sound system. Things like that. (Interview, December 3, 2009.)

He did however continue without prompting to include a consideration reminiscent of Mrs. McClimon’s stated goal of student independence to work on their own:

The kind of offshoot of that, or I guess maybe the payoff of that, is we’ve got a group of kids who if I say, ‘I need you to come in and help for concert’ can come in and say ‘yeah, that’s fine I can sit at the light board,’ or, ‘I can set up the microphone.’ Or, if a kid wants to come in and learn how to do that stuff, it’s a great opportunity for them to learn that. (Interview, December 3, 2009.)
There is a considerable difference between these two assertions. In the first of these statements, much like in the second half of the extended quote above, the teaching and learning is confined to fairly simple skills with tools and equipment and the vague objective of a greater knowledge of technical theater. In the statement directly above, however, these basic skills have expanded to students coming after school to, “sit at the lightboard,” which, although there would not be more than one or two cues for an assembly, has been shown to be an incredibly complex activity in the previous chapter. I asked Linus to expand on what he thought students learned in an extended complex project, and he chose the building of the walkway around the orchestra pit that was used in Into the Woods, became a focus of Erica’s attention because of the difficulty lighting it, and was also mentioned by Jonas as a project he found rewarding. Again, Linus’s impression of what was being taught revolved around fairly simple skills:

We started making just the regular square platforms in Stagecraft class. And that was a good object lesson for them because it was, you know, learning how to use the saws, learning how to use the drills, learning how to cut and measure accurately. Ummm, we had quite a few that needed to be re-done….

[long description of the platform]

[the project] involved using the miter saws, the power drill, and a cordless screwdriver. Or a cordless drill with a screwdriver bit. (Interview, December 3, 2009.)

If it seems like I am belaboring this point, I am at least doing so for the reason of providing a contrast to what he thinks student technicians learn. For Linus, there seems to be a disconnect between what he thinks he teaches and is learned through participation in technical theater and the learning he actually observes. The way to understand this more fully is to look not at teaching objectives, but at learning processes in an effort to determine their outcomes.
Learning Processes

As mentioned elsewhere, the sorts of situated learning theories entertained in this work provide a sort of overarching explanation of learning, e.g. as becoming able to act in a way that is recognized as meaningful by a community in a certain context. Further consideration has been given to somewhat more specific instantiations of these theories, such as learning by observation or as an apprentice. As I argued at the beginning of Chapter Five however, these explanations seem to have a rather broad focus for examining how a student learns to use her body and a wrench to move a light. Similarly, in the context of an examination of pedagogical choices or instructional strategies, situated learning theory more resembles a meta-theoretic approach than a practical approach to learning. Both Wenger (1998) and Lave and Wenger (1991) specifically indicate that legitimate peripheral participation theory is not pedagogy, but a way to understand learning and knowledge that supersedes any particular pedagogical approach.

While I have argued for a broader acceptance of the value of embodied learning from the perspectives of learning about one’s own body and from a broader conception of cognition that extends into and even beyond the body, Cori continued her support of hands-on experience introduced in her quote at the beginning of this chapter in a later part of the interview when I asked her to compare learning in technical theater to learning in regular classes:

Tech is more of a hands-on, definitely. [laugh] I mean, you can read about stuff all you want, but you won’t really know about it until you actually try and attempt it. I mean, I’m sure the same thing is with learning in classes, too. You don’t really know it until you’ve experienced it.

I don’t know how you’re going to do that with history, but that will be interesting [laugh]

But, you know, the more you do something the more easier it gets. The more [laugh] you feel comfortable telling other people what to do. (Interview, April 12, 2010.)
The fact that Cori was not only a dedicated veteran technician, but also a gifted student in her academic classes makes this statement particular striking in its disavowal of, as it were, book learning, as not real without the additional facet of experiencing what is taught in the book. The fact that she recognizes history as a particular challenge for experiential learning, yet does not shy away from her theory, seems to indicate more than a passing commitment to it.

It is also worth noting that she attributes experience doing something with comfort in teaching others. Her assessment particularly stands out in light of the fact mentioned above that she had recently been put in charge of a Saturday work session and therefore in the position of telling numerous other students what to do. There are at least two approaches to understanding this. On the one hand, there is an increased degree of skill that comes from repetition of certain tasks. Linus pointed out that it could be difficult to separate skills from knowledge. “I think there are some skill things that are also knowledge things,” he put it and continued later with the example, “Sometimes it’s the knowledge that a 2x4 is not exactly 2 inches by 4 inches, but an inch and a half by 3 and a half.” This seems to me particularly relevant as an example of abstract knowledge that is both fairly esoteric and, absent any particular application for the knowledge, likely to be readily forgotten. However, as I believe follows from Cori’s theory, upon using 2x4s, perhaps in combination with measuring devices to make a prop of a particular size, the reality and importance of the lumber’s dimensions becomes inescapable.

A further way to understand Cori’s statement can be constructed from Lave and Wenger’s situated learning, in which knowledge is doing something and repeatedly performing a job not only equates to knowing it but also to receiving recognition in the community for knowing it. An implication of this is that it would be easier for Cori to teach other students from her recognized perspective as an expert veteran technician.

So, Cori is seen to advocate learning by experience, which the vast majority of learning in technical theater includes. Linus further recognizes that there is different
learning potential in different methods of instruction. He mentions in a statement above as well as other places, the tension between a method that lets a student to make his or her own discoveries and, as usual, is motivated by practical concerns such as the time remaining in the production cycle and the number of students who want his attention, the more expedient method of just showing or telling a student what to do. The idea of a student discovering answers or methods for him- or herself is well attested in these interviews and interesting to consider from at least two different perspectives. Both Linus and June McClimon mentioned the creative problem solving and innovative abilities of students as positive qualities to make use of in productions. Linus, speaking of the fact that students might always have their own vision of the set that differed from his or June’s, found that situation to be a positive and explained it like this:

That’s kind of the beauty of having lots of kids come in. Umm… and sometimes it’s a pitfall, too, but I think more often than not it works to our advantage.

[pause]

You’ve got that creative base to kind of dip into and put to work.

[pause]

Sometimes we’ll say we kind of want it to look like this, and maybe we’ll teach them a painting technique, and then we just let them do that, and what will come out is their own technique kind of based on what we taught them, and it will look a little different than what we had in mind. But not that it looks bad. (Interview, December 3, 2009.)

June expressed an almost identical sentiment, the only substantial difference being an even greater appreciation of the ability of students to develop their own approaches to solving production problems.

Nine times out of ten you’ll have an idea of how you would go about a task, and you tell a kid, ‘this is what I want’ and they will do it – they will come at it from a completely different angle and sometimes do something better than you even thought of. Or they’ll come up with an idea that’s better than yours. Or it will be terrible, and then you’ll have to kind of redirect them to do it over again or whatever. But I think the kids have come up with way more ideas than we have. (Interview September 18, 2009)
It seems entirely clear that taken together these statements suggest not only a deep appreciation for the creative abilities of students, but the core of a pedagogical philosophy that stresses student independence and discovery. At the same time, transcripts have also shown that both Linus and June recognize as part of the technical theater enterprise a space for personal expression and artistic creation. As always, this opportunity for creativity is mediated by practical concerns of the production cycle and factors particulars to the work session on any particular day.

Sometimes I put it to the kids that building a set is akin making a sculpture. It maybe looks like a building, but I think there is a difference between a permanent structure that will last for 80 or 100 years and something that is taken out of context and put on stage for a short period of time and you’re trying to create something that is either a suggestion or creates an impression or creates an illusion. I’ve always seen sculpture as that kind of thing. You know…. traditional sculpture that people think about, I think that stuff is a little more thought provoking. But at the same time I say, yes it’s a sculpture, but it’s also a big problem solving thing. It’s something that you gotta, you gotta figure out. (Interview, December 3, 2009)

So one way to think about set building is as a massive collaborative problem solving endeavor. Indeed in many places Linus and others mention examples of problems and solutions, ranging from June drawing the entire set design for Lincoln’s production of *Dracula* and giving it to Linus who then had to engineer a way to build it, to Linus discussing the responses to learning that a set piece has been built too tall to fit through the opening to the stage, to Jonas describing the process he used in making his banjo prop.

Others have discussed the concept of problem solving, some (Rose, 2004) in relation to carpentry, others (Crawford, 2009) in relation to mechanics, and others in relation to art (Ecker, 1963). All of these are worth considering briefly in relation to technical theater. Rose for instance provides a breakdown of the component skills and processes of building things with hand and power tools and diagnosing problems, such as an inaccurate size in the finished product. In Rose’s example students are building the
prototype of an “L-shaped secretarial workstation” (p. 84) and have found a gap in the trim pieces, a problem not entirely dissimilar to student technicians building a piece of scenery that will not fit onto the stage. In Rose’s example, students consider a wide range of possible factors that may have led to the inaccuracy, most of which could fit into the categories of inaccurate tools, error by the carpenter using the tool, engineering errors in the original plans, and the somewhat more nebulous possibility of using tools and materials that are simply not well suited to the task. All of these are possible in technical theater, with the final possibility perhaps more likely in theater than in proper carpentry shops. Such a concern is in fact reflected in Cori’s discussion of helping Craig build the prop drill in her immediate dismissal of wood as a material, although it bears noting that between performances of Go, Dog. Go! I talked to a group of somewhat grumpy technicians as they repaired styrofoam props that the actors had damaged during the performance. The technicians were solving these problems with repair rather than redesign solutions and in general were critical of the actors and not their designs, but at the same time had become more familiar with the limitations, as well as the advantages, of building with foam.

Crawford’s approach is particularly practical: as a mechanic diagnosing problems in a motorcycle he needs to balance multiple factors including the likelihood that a symptom is being caused by any one of a number of underlying causes. The time and expense (for both him and the customer) of fixing those underlying problems5, his knowledge of the procedures used to solve those problems, availability of parts, and so on factor in. Although Crawford may be able to envision an ideal approach to solving a particular mechanical problem, i.e. what he would try in what order if he had all the parts,

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5 There is a common approach to this sort of problem that holds that one should begin with the easiest and / or least expensive solutions and move to more complicated and / or expensive solutions should the initial ones prove ineffective. Crawford’s approach suggests a refinement to this rather straightforward approach.
tools, equipment, repair manuals, and mechanical skills he needed, these practical considerations add an extra layer of complexity to the problem solving as an overlay on the ideal approach yields a sort of hybrid balancing the two.

Ecker (1963) follows Dewey (1958, 1979) in his consideration of qualitative thoughts, or “thinking in the particular qualities of the artist’s medium” (p. 284, italics in original). In this context “qualitative” and “qualitative thought” are used as part of a particular philosophical tradition in which qualities of an item might be glossed as readily perceivable properties; in terms familiar to art qualities resemble artistic elements such as line, color, shape, texture, contrast, and so on which Ecker refers to as “qualitative means” by which “artists manipulate, orchestrate, modify, and create in solving their problems” or to achieve “qualitative ends” (p. 285).

An important distinction, from Dewey and discussed in Ecker, is between qualities and qualitative thought and abstract or symbolic thought such as in logic, science, or mathematics. As opposed to the abstract, symbol mediated thinking in those disciplines, qualitative thought is the stuff of art, closer to the physical properties an artist manipulates, and qualitative problem solving is the application of such thinking. Ecker notes that artists do frequently include other sorts of thinking in their processes, such as an artist doing calculations or tests of materials, although his emphasis is clearly focused on the qualitative thinking.

All of these perspectives seem to have something in common with problem solving methodologies in technical theater. Above, Linus described set building as problem solving. Below, he discusses particular methods of problem solving, an essentially experimental method which he came to refer to as “making it up as you go along.” In the first example below, he illuminates the importance of the method in learning by drawing a contrast to a set piece of set construction that, considered as only a finished product, may seem like a success.
I guess maybe taking it from the standpoint of the kid who understands exactly what they are doing, exactly why they are doing it, and exactly how it’s supposed to be done... ummm. Because they are somehow totally into what you’re trying to do and trying to have them do. And that’s, that doesn’t happen as often as you’d like it to. But I guess if you look at it from that standpoint you’d say, ‘wow this is a huge success!’

But maybe that kid saw the play somewhere else, ummm, just happens to be on the same wavelength as you, things like that. Whereas the bookstand, or the tree, or I guess even the mossy knoll, because I think we kind of had an idea of what we wanted to do, not just a real clear idea of what we wanted to do. Umm. And making it up as you go along is a learning process. It may not be the most efficient learning process, but sometimes that’s all you got. (Interview, December 3, 2009)

June made very similar comments in her interview:

I think if people were honest, that 90% of every project is that way. Unless you’re following a set of directions, you kind of have to figure things out as you go. And especially in theater as you’re building things and doing things, that’s the fun of it. It’s a great creative process. (Interview September 18, 2009)

The implication from June is that this process of problem solving is nearly ubiquitous. The clear implication here is that a student who knows exactly what to do can create a good product, possibly learning something in the process and potentially aided by his or her background knowledge, but the learning is different than that of the student who has to work to figure out what to do in the process of doing it. Linus’s concern here was reflected in other parts of our interview in which he mentioned that drawing conclusions about what a student may have learned from only the finished product was unsatisfactory because the product was, “only a small part of the whole.” This strikes me as similar to concerns I raised in Chapter Four regarding a multimodal literacy (e.g. Jewitt et. al 2001) account of learning based in evaluation of completed texts, namely that tracing backwards from the design choices observable in the finished project assumes that the choices not only were in fact choices but also clear, neat, deliberative choices made in advance of production — a situation the existence of which I am skeptical.
Just later in the interview, Linus continued, this time tying the problem solving process to creativity:

So, so, maybe that’s the cosmic answer for that one – that there is a learning process in making it up as you go along. There’s error, mum, that you stop you fix you start over, you throw away. Or whatever. And then there’s, you know, then there’s kind of that creative moment where you go, ‘okay that looks right, I’m not going to mess around with it any more.’ (Interview, December 3, 2009)

This last statement is resonant not only of earlier discussions of critical reflection and the art making process but of Ecker’s description of the work of artists in which he notes, “Critical judgment is not necessarily antecedent, nor totally subsequent, to a creative act, but often occurs during the act” (Ecker 1963, p. 286). So, Linus’s “making it up as you go along” approach can be seen as a cover term for a particular kind of problem solving potentially leading to a particular kind of artistic creation. Of course in theater work there is, as Ecker allows, an increased likelihood of abstract thinking and literacy use in most projects as well.

The problem solving discussed by Rose and Crawford is also relevant. Particularly given the collaborative nature of set building at Lincoln, the range of skills of the technicians working on a project, and the protracted building time of projects that may stretch over weeks that may lead to communication errors and plain forgetfulness, and the types of problem solving mentioned in Rose all can come into play. There are numerous opportunities for user error, poorly engineered initial plans, changing circumstances for how a piece will be used, the possibility of misaligned tools, and so on. Similarly, the problem solving methodology described by Crawford – considering possible alternatives in terms of their practicality, simplicity, and likelihood of success – is relevant in technical theater either at the beginning of a project or in correcting errors that arise later in the process. In technical theater terms, many projects start with considerations that might be schematized as a series of questions such as: how would we like to make this project, do we have the tools and materials to do that, do we have the
time to do that, do we have someone who knows how to do that, can we teach someone how to do that; if not, how else could we do the project, and will it work that way?

There is a further complication to this process of making props and considering the learning as kind of problem solving. This complication arises from the fact that the problem can be poorly defined, or not well understood, or perhaps itself emerging through the interaction of multiple elements only some of which are within the technician’s ability to control. During our interview, Linus and I had an opportunity to visit about the bookstand mentioned first in Chapter Four. The circuitous nature of the first part of that discussion makes quoting it directly undesirable, but the substantive point Linus made was that the girls making the bookstand initially had a difficult time understanding why they were supposed to be making an ugly bookstand. It pointed out the difficulty posed by interpreting a part of the play – in this case the personality of Sister Amnesia – through the creation of another, related, text mentioned in the play. In short, the bookstand makers initially had a difficult time understanding that through what they built they were adding to the meaning of the play and that the parameters included making the piece look like they did a bad job making it.

What did they think when they finally saw that thing [the bookstand] come out in the rehearsal. Did it click then? ‘Oh, I get it.’ Because it’s not so much the thing that they are laughing at, it’s the fact that Sister Amnesia, who is nuttier than a fruitcake, comes out and is so proud of what she had done, and the looks that the other two other sisters are giving her and exchanging and mugging to the audience. And I mean, that’s kind of, I mean, that’s kind of, you know it’s not just the prop, it’s not just the actress, it’s not just the audience. It’s the whole thing in the moment. And that’s, that’s a hard thing to teach in the scene shop two weeks before it happens. (Interview, December 3, 2009)

I suspect that the important distinction here is between what gets taught and what gets learned, coupled with the perspective that Linus sees teaching as manifested only in particular actions or activities directed towards small or immediate goals and not as a natural outcome of participating in a CoP or having the chance to work as his apprentice.
What Students Learn

Having at some length discussed learning as a situated activity and a process of trial and error problem solving, in the remainder of the chapter I turn briefly to consideration of the learning outcomes that emerge from participation in technical theater. That students learn basic skills with tools, certain kinds of procedural knowledge in theater projects, how to manipulate certain theater equipment like lighting instruments, and so on, I take to be well enough documented already so as to merit no further consideration here. Instead, I want to focus on two areas in particular: critical thinking and the appreciation of technical theater.

Critical Thinking Skills

Given the emphasis on technical theater as problem solving in the previous chapter, critical thinking seems to be a pervasive element in the problem solving approach endorsed by Linus and June. Moreover, critical thinking can be seen as an element of situated learning in general. The consideration of technical theater at Lincoln as a type of apprenticeship above resonates with Gardner (2006) who, speaking in particular of apprenticeships notes that they “are valuable not only because they build on student interests and strengths, but also because they foster critical thinking through regular informal assessment in the context of an authentic domain” (p. 208). An implication of this seems to be that there are multiple pathways to the development of critical thinking skills. On the one hand, there is the “figure it out as you go” model of discovery discussed above, which might be more charitably referred to as a process of discovery.

Naturally, there are a number of ways in which that discovery processes could operate as an element of apprenticeship. It is worth considering a particular example of apprenticeship that conforms to a typical concept of Western apprenticeship (Lave & Wenger, 1991) in which the master provides strict instruction to the apprentice. The
lightboard programing in the previous chapter provides an example of this. Linus, in fact, mentioned lightboard programing during our interview, noting:

And again, it kind of depends on the kid you can wind up with but they can develop some of the most critical thinking skills about like oh, okay, now I can understand why I am executing this light cue at that particular moment – because it goes with the music, or, umm, it coincides with some movement on stage and it’s not just because McClimon said that’s where you push the cue button. And sometimes it takes a couple rehearsals for them to say okay, now so watch this, watch this, see how that goes, okay, yup, now fine, good. (Interview, December 3, 2009)

Linus’s process of determining the lighting cues during technical rehearsal does involve a sort of qualitative problem solving or figuring out to which the lightboard operators are witness. The methodology through which the lightboard operators might learn is distinctly different from the discovery process in that they are not making the decisions or discoveries; they are witnessing Linus make them. Linus’s statement on the development of critical thinking skills is important to this. He states that the critical thinking does not necessarily take place at the moment of discovery, i.e. when Linus determines the appropriate lighting intensity and asks the operators to record it, but it can evolve throughout the rehearsals as the cues are repeatedly executed and the technicians have the opportunity to integrate all the elements of the production.

I would not be inclined to immediately accept Linus’s contention regarding critical thinking unless there were other forms of evidence to support it. In this regard it is useful to remember the transcript in the previous chapter in which Erica presented Linus with a detailed assessment of the problems she saw in the production and a number of possible solutions to them. I take this exchange as solid evidence of her learning. During my interview with the lightboard operators, they downplayed the significance of that event. When I asked them what they had learned, in technical theater and with their lightboard job as well, they mentioned painting and learning to hang and focus lights, and some other related skills along with learning about the process of programming the
lightboard, but did not mentioned anything about developing an understanding of the symbiosis of action and lighting on stage.

While they did not think of their diagnostic problem solving as particularly significant, they did in fact put it to use. At some point after Erica had her conversation with Linus, she and Grace took the initiative to solve some of the problems, primarily through discussions with the actors about where they were and where they should be during the play with respect to the lighting. Cori mentioned above that telling other people what to do became easier as one gained experience with the activity or process in question. This seems to have been the case with Grace and Erica. Although other factors, such as the proximity to opening night, previous failed attempts to get the director to correct the problems, and perhaps the sense that if they did not address the problems they would remain undressed, would certainly have played a part in their decision to speak directly with actors. Their confidence with the conclusions they had reached, enhanced by further experience with the lightboard and the lighting on stage must also have been factors in their decision to turn their critical thinking into action.

Offshoots: Soft Skills and Production Literacy

To conclude this chapter I turn to a different kind of development than the critical thinking and problem solving discussed here. I am in fact interested in Grace and Erica’s decision to try to instruct the actors, something generally reserved for the play’s director. This and similar actions relate to a learning that extends beyond technical theater. “Soft skills,” alternately called career skills, foundational skills, and so on (Teagle Foundation, 2008) have become a prominent topic for discussion. These skills include communication, enthusiasm, teamwork, networking, and professionalism (U.S.
Department of Labor)\(^6\). In this schema, Erica and Grace would be understood as employing sub-skills of communication and enthusiasm, and professionalism one hopes, in taking this initiative to work with the actors on their problems. This, along with their ability to diagnose problems in the production, is exemplified in the following excerpt, in which I had been asking them to discuss technical problems that they noticed during the play.

Grace I thought of another good example. Angie and Mitchel, there was this one scene where they met up in the dessert, and they would always meet in center [stage] so the light was on them, but then they would walk over, out of the light, every single time, even after we told them-

Erica Several times. Finally we just stopped. If you want to be in the dark, be in the dark. Not our problem.

Grace Um… So, you know- [inaudible]

Erica But it’s a lot easier for them to move than it is for us to change a cue, or even move a light…. That’s just a lot more complicated than moving…. Mainly it was just a couple of feet that like they would have to adjust to, or I don't know maybe getting out there a little sooner, or even just talking to us.

Grace They had to move slower-

Erica Yeah.

Grace They met in, in the center and then they kept walking, but they needed to meet a little off center and keep walking, so they were still in the light when Betty came on stage.


Grace [laugh] Or not.


(Interview, October 10, 2009)

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\(^6\) Also included is the skill of “critical thinking and problem solving” (p. 98) which I do not list above because the notion of these silks is considerably different than one developed earlier in this chapter.
As Erica noted, the process is not always successful at solving the problem they noticed. Sometimes it seems that the process does not always go at all well. Erica expressed some of the difficulties of informing actors of the problems:

When people do something wrong, and you tell them to do it right and then they like argue with you, you just automatically trump them because you’re like, ‘I can see it, you don’t know what you’re doing’ or like when they get mad at you for doing something wrong, then like you correct them. (Erica, Interview, October 10, 2009)

As I reflect on these technicians, these interviews, and what I observed them doing during the course of this study, numerous examples of these soft skills are evident. Several have been already been addressed here. For instance Cori being placed in charge did not only cause her to draw on her problem solving skills as she helped other students with their projects, but also involved application of most of the soft skills listed above. Additionally, the ability to take on responsibilities is prevalent, as illustrated in Linus’s casual remark that he could ask his group of student technicians if they could come in after school to run lights and sound for some activity.

Finally, I want to include a related point mentioned by Grace, Erica, Jonas – the technicians I interviewed who also had an interest in acting. In various ways, all of them noted in their interviews that participation in technical theater enhanced their appreciation not only of the work of technicians, but of the play as a whole as well. In his interview, Linus was hesitant to suggest a strong connection between technical theater and literacy, although that conversation was not prefaced with any discussion of his definition of literacy itself.

If you’re talking about lights and sound together, they have to kind of happen in concert with each other. They have to happen at a point where it achieves an effect on stage, both visually and orally and things like that. And then there might be a kind of literal interpretation there as well. (Interview December 3, 2009)

Grace and Erica made similar observations about their understanding of the play after being lightboard operators and Jonas reported similar thinking in his approach to
selecting props that he, as student director, would ask the technicians to create for him. In one sense this seems like a kind of literacy of the production aspects of theater, a recognition of what happens during a play and a developed shared sense of what the audience saw and heard on stage would mean. In another sense it seems to return to the sort of critical thinking marked by the simultaneous incorporation of multiple modes of representation and embodied literacies that are standard fare in technical theater.
CHAPTER VII
CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH

In the introduction to this work I stated that the most basic issue I observed was the way the body has been treated in education, and in some fashion the body or embodiment has been related to all of the topics addressed. Several other related topics have been addressed as well. Situated learning, understood or viewed from the perspectives of apprenticeship, legitimate peripheral participation, and activity theory has been central to my understanding of learning as a property of participation in the technical theater community. Composition, and embodied composition, considered as multimodal literacy and art making have been used to explore concepts of problem solving, learning by doing, and personal expression. The integration of traditional literacies such as reading, writing, and speaking into physically involved work has been analyzed to demonstrate the complexity of the activities in technical theater. Collaboration, especially in the case of physically involved work, and experiential learning, or learning by doing have been discussed as important facets of learning in technical theater. And learning with and about one’s body has been shown to be an important element of understanding embodiment. I have also said that technical theater is busy and messy and interdisciplinary, and this is reflected in the ways I have been able to address these topics. Clearly, some of these concepts have been examined more precisely and others in broader strokes. There is value in both the more specific and the more general treatments. In this chapter I review the data and analysis in the earlier chapters to draw conclusions from considering the specific incidents along with more general principles.

As I look back at all the theory and data in the previous three chapters, I am mindful that what I have written there is a presentation of technical theater divorced from the ways in which I speak and think of it outside the work of this dissertation, when I am
actually doing technical theater or talking shop with Linus and the students. It is also appropriate here to acknowledge this perspective and consider the work here in the context of what interested me before I applied theory and recorded observations. So, before beginning the review of theory and data, I provide a brief review on what drew me to this work initially, what seemed important at the beginning, so that at this moment when I am close to the end I can reflect on how well I have addressed what was exceptional at the beginning.

**Major Themes and Initial Interests**

One of my initial interests was in embodiment, in many senses. In my introduction to this dissertation, I mentioned that I saw student technicians with tools in their hands and I was interested in the thinking that they were doing while they held and used those tools, how thinking was mediated by artifacts external but proximate to the body. Later, as I taught students how to get their bodies to interact productively with tools in ways that had become so deeply embedded in my experience that I cannot remember learning them, my interest developed to include thinking and the body, learning physical skills and knowing how to have one’s body do something might affect the ways a person thought. And embodied literacy was a term I had been hearing but for which I had not been able to form a good understanding.

As an English teacher, I noticed technicians using literacy skills all the time, talking, reading and writing, drawing rough sketches and interpreting measured drawings in order to work through a construction problem or explain something to a friend. I noticed that students knew more later than they had before, that there was teaching and learning in the literacy acts the students shared. I also observed that the technicians learned more than was explained to them, that there was other learning that I could not see taking place. It occurred to me that none of the learning I could see was abstract or unconnected; it took place as bodies were in motion and it was immediately applicable to
a task at hand. When I taught students to use a drill, both they and I could immediately evaluate the degree of our success, and to me that immediacy was satisfying. Less satisfying was understanding that this sort of teaching accounted for only a fraction of the learning and at the time, I was unable to account for other forms of learning.

I was struck by the fact that not only the ways in which students were learning were different, but the teaching was as well. I noticed that the directors and I worked with students differently than I did in my classroom, and seemingly quite effectively. Sometimes technicians and I worked together on the same project, but generally students had far more independence in technical theater than in my classroom. They came to me for help when they needed it, went to their friends when their friends could help, and were generally “on task,” a term I had difficulty even applying in technical theater. The students were accountable to the play more so than to me, had their own understanding of their tasks, and almost always got them done, and almost never failed for lack of effort.

What the technicians were getting done typically involved production and composition. They were building things, making multimodal texts, and as an English teacher I sought analogues in their work to the ways I thought composition worked, I looked for pre-writing and revision, drafting and design, and realized I was missing something. Students were sometimes creating artful texts, sometimes doing production work. It was clear that some of their creations were direct interpretations of the play, but other times they were making elements of something larger, something that by themselves would not be as meaningful, only becoming so when joined with others. The work was always thoughtful, though – that is, full of thought. In fact, their work was often full of multiple thoughts as the student technicians integrated literacy and physicality and factual knowledge in countless complex ways.

This coming together of diverse elements reminded me of how little I knew about collaboration. As I participated, I watched entire sets, entire productions, emerge and be torn down, a massive protracted collaborative enterprise. Many forms of literacy were at
the heart of this collaboration, from the discussions surrounding construction, the shared interpretation of the play that was the final set. As much as I wanted to, at the time I had no way to understand how the process worked. I could see individual elements, though, as small groups of students working together much more energetically than groups in my classroom did.

Early in this project, I developed research questions to guide and help organize this rich field of inquiry. Initially presented in Chapter One, I share those questions below before turning to consideration of how I have developed an understanding of these technical theater experiences based on the theories and data presented in previous chapters. My research questions are:

1. In what ways are learning opportunities made available to students in the confluence of hands-on skills, critical problem solving, and artistic interpretation in the technical theatre curriculum?
2. How does the enacted pedagogy of technical theater shape the kind of learning that occurs during both in school and out of school activities?
3. What processes and resources for meaning making are available to technical theater students? What is the nature of the meanings these students construct?

**Theories and Themes**

As I return to the themes of composition, collaboration, and embodiment, it is clear that they intertwine and overlap in the ways they have been treated from a theoretical perspective. I begin by looking across theories of embodiment, as it provides the best option as a sort of organizing principle for the remainder of the themes.

**A Taxonomy of Embodiment**

I am satisfied that earlier discussions of embodiment have provided sufficient evidence and rationale to make the claim that embodiment is a concept important to
understanding cognition and learning in a post-Cartesian world. Further, embodied learning is significant as it is personal and pervasive, and how one understands embodiment has implications for how we understand pedagogy. Embodiment remains an elusive topic that awaits further research. In an effort to clarify this term, I gather together several theories and theorists that have been mentioned in this work, gathering them in one place and imposing a classification on them in order to show areas of similarity and difference.

4. Body as obstacle: acknowledging that the body exists, one role of pedagogy is to ameliorate its deleterious effects on learning (e.g. Jensen, 1998; McClelland, 2002), as in Osmond’s aforementioned description of using drama to allow students to burn off excess energy.

5. Body as tool: these approaches see potential in using the body to help students better understand traditional curricular content, which typically takes the form of disembodied abstract concepts (Armstrong, 2002; Wilhelm 2002). For instance, dividing a class and inviting them to act as fans of rival sports teams – including gesturing, trash talking and so on – to help students understand the feelings the Montagues and Capulets have for each other (Wilhelm, 2012, p. 12).

6. Incidentally embodied: approaches such as activity theory (Engeström, 1999, 2008) and communities of practice (Lave & Wenger, 1991; Wenger, 1998) displace learning and knowledge from the mastery of abstract concepts and locate it in lived practice. I describe these as incidentally embodied because although they entail embodiment, i.e. knowing is the ability to perform meaningfully in a context and learning is becoming able to perform meaningfully, little other emphasis is placed on the body. While little emphasis is placed on the body per se, the overarching conception of learning by doing and knowledge as performance implicate embodied experience as central to learning.
7. Robustly embodied: although not requiring involved physical activity (e.g. dance), this classification covers a range of theories in which the body proper plays a unique and indispensable role. For instance, following Deleuze & Guattari (1986) and Massumi (2002) Leander & Boldt (2012) see the body as a source of affect that permeates experience; Noland (2009) sees kinesthetic experience as a unique source of resistance to cultural conditioning; Osmond (2007) entertains a tripartite distinction among the body as knower, doer, and expressive medium; and Rose (1999, 2004) explores the hybrid nature of cognition through ethnographic research that demonstrates the integration of conceptual knowledge, sensory experience, modes of representation, and physical skills.

Any categorization of so nebulous a concept will have overlaps at the edges and different possibilities for where those edges are drawn. Category 4, for instance, covers a broad range of diverse theories. What should be clear in any case is that these theories represent a wide range of approaches to the body in education, and each approach has distinct implications of how learning is understood and pedagogy is conceived.

Categories 1 and 2, body as obstacle and body as tool, seem clearly insufficient to account for the depth and complexity of the data I have reported. Embodied learning has been shown to be about one’s own body, as in the case of the girl with the wrench, and neither of these kinds of theories even potentially addresses the kind of learning I described in this anecdote. Embodied learning also involves composition processes and the development of physical skills that impact choices in those processes that are not qualities that can be accounted for in these theories.

This does not have to mean that these approaches, at least the body as tool category, are necessarily wrong, but they are inadequate for my concerns; the body might be useful in the acquisition of abstract concepts about something other than the body, but it is necessary to be mindful that that is not the usefulness of the body extends beyond the mind. The issue of limiting the potential of the body as, a learner, a knower, a doer, and
an expressive medium (Osmond, 2007) is relevant in consideration of the next two categories. I mentioned at the beginning of Chapter Five that the theories in categories three and four do not exclude each other; they have different foci and different applications, but nothing prevents them from being used to compliment one another. This suggests more formal integration of these theories; for instance developing a theory of affect as an element in an activity system, as a potential avenue for further research.

Other research could benefit from employing different data collection techniques. As I mentioned in the introduction, embodied learning processes are complex and difficult to capture with a high degree of precision in field notes. There are any number of moments I wish I had video recordings: Cori building the grandmother’s house, during which project she seldom put down her cordless drill as she used it as an essential link in her thinking process; the girl with the wrench as she figured out the light; the postures and lethargy of the students – and me – cutting out leaves; and Albert, another volunteer, and I developing the plans for a massive set of stair steps for Chicago (Ebb & Fosse, 1976) - an ordeal that had each of us use writing, drawings, gestures, demonstrations, numeracy, oral literacy, and knowledge of materials, tools, and techniques as we tried to explain ourselves to each other. This would allow in turn for closer examination of the integration of tools with thinking, learning about one’s body, the impact of project setup on motivation, and the integration of multiple kinds of literacy as collaborative enterprise.

This is not to suggest that my approach was unsuccessful. As I noted, embodiment has been shown to have implications across all the themes I consider in this research. Similarly, its importance encompasses all three of my research questions in ways that are worth noting. Autumn and Isabel building the bookstand is a particularly clear example of the confluences mentioned in question one. The data shows them struggling to learn skills with tools and information about materials to solve the problems involved with making the bookstand – e.g. connecting pieces and stabilizing the central column – as they created a prop to characterize Sister Amnesia. The success of their
learning tools and materials and solving the engineer problems is evident in the piece itself. Drawing on Linus’s account, the more interpretative element of their learning may have occurred later, seeing the piece in action, but regardless was successful and the prop was enjoyed by the audience.

This distribution of learning across protracted time and activity is a feature of the pedagogical approach favored by Linus, which is best understood as a form of situated learning. However, with regard to the enacted pedagogy integral to research question two, multiple pedagogies are evident in the data. As I stated above, frequently teaching and learning are difficult to notice, and may occur between or among technicians, through observation and interpretation of each other’s actions, and as an emergent element of legitimate peripheral participation. Other lessons, for instance using a drill or saw, are immediate, embodied, and straightforward, but are also relatively rare. They are a crucial element of the pedagogy, but typically serve as preliminaries to other work. Critical thinking, for instance, has been shown to be an element of student centered problem solving as well as the highly teacher directed form of apprenticeship employed in lightboard programming. Knowing in technical theater has been shown to be the ability to perform valued operations, and learning is the development of that ability, as displayed by Erica and Grace as they became more able to program lighting cues themselves and took responsibility for correcting problems that the directors were not addressing.

Meaning making, as addressed in question three, is of course an integral part of technical theater, so much so that examples of it pertain to other questions as well. In building the walkway, Albert employed multiple resources to construct meaning – tools, techniques, materials, discussion with other techies, interpretations of the written text and his body – but also needed to learn about how his body moved in time as measured not only by the clock but by his words and the distance he moved. Tools and materials were also important to the lollipop and slotted spoon projects, and these projects also suggest
the possibility that the meanings being created are multiform, both as elements of the play and as expressions of personal significance. As with most texts or props created for a production, the lollipop and slotted spoon exist both within the restraints of the play but also within the purview of the technician to create in a way that satisfies the needs of the play as well as the interests of the creator.

Situated Learning Theories and Collaboration

In addition to embodiment, situated learning theories and collaboration have been important components of this work, and as indicated, embodiment is implicated in both. Famously, of course, Gardner (1983) began his thinking related to concerns of embodiment and collaboration with his multiple intelligences, interpersonal and kinesthetic among them. More importantly, it is worth stressing that the incidentally embodied theories in category three are both inherently embodied and pervasively collaborative. Lave and Wenger (1991) and Wenger (1998) understand their work as not only being a description of certain kinds of collaborative organization, but as a meta-theory about learning and the nature of learning and therefore knowledge. Learning is “increasing participation in a community of practice [that] concerns the whole person acting in the world” (p. 49) and knowledge is the ability to act in ways that are recognized as meaningful. Acting in the world emphasizes learning’s coparticipatory nature. This perspective is not entirely unique. Gardner (1999) defines intelligence originally as, “the ability to solve problems or create products that are valued in one or more cultural settings,” which has a resonance with Lave and Wenger, although Gardner’s concern is intelligence and not learning. So, although I have classified Lave and Wenger as incidentally embodied because they afford no particular status to the body per se, the essentially embodied character of learning and knowing is evident in these theories.
Along with interest in embodiment, interest in collaboration among students and professionals, variously called collaborative learning, cooperative learning, learning communities, collaborative inquiry, and so on has continued to develop (Darling-Hammond, Wei & Adamson, 2010; Mindich & Lieberman, 2012; Lee & Smagorinsky, 2000; Lamb & Johnson, 2009; Teacher Education Quarterly, 2008). One prevalent concern in much of this work emphasizes the rationale for or expected outcomes of collaboration, e.g. in terms of achieved learning objectives. Other research concerns emphasize the structuring of activity or creation of community that facilitates collaboration. This second concern has been my primary interest in this work; indeed I suggest that an emphasis on learning objectives is misplaced, because as discussed by Lave and Wenger (1991) and demonstrated in my work on technical theater, there is relatively little failure in well-functioning communities. As noted by Lave and Wenger (1991) almost all apprentices eventually gain proficiency and status as masters. Because communities like technical theater at Lincoln have ample opportunities for legitimate peripheral participation, all students have opportunities for success that can be amplified by continued participation.

In addition to their movement of learning away from internalization and towards embodiment, Lave and Wenger (1991) are especially useful in elaborating some of the different forms that the collaborations can take. They discuss a number of different styles of apprenticeship that entail different sorts of collaboration between master and apprentice. Further, they and Wenger (1998) introduce different kinds of participation in communities, legitimate peripheral participation, which involves membership and meaningful engagement in the work of the community, as opposed to other degrees of participation that do not. The community as a whole is also a collaborative enterprise with many members engaged in different aspects of the community. This may be a broadening of traditional concepts of collaboration, but a warranted one based on not
only my data from technical theater but other enterprises such as acting in the play or performing on an athletic team.

One of the most compelling reasons to investigate technical theater as a site of collaboration is the multitude of forms that collaboration can take. In the data, collaboration between adults and students, and among students were discussed at length. Other kinds of collaborations, among the directors and between directors and volunteers, were also suggested. Especially as regards larger – i.e. community sized – collaborations, activity theory and situated learning theories can accommodate these different forms of collaboration, but it is not immediately apparent to me how application of these theories will help develop any particular further insight into the nature of particular instances of collaboration.

Of course, other research on collaboration has focused elsewhere than learning outcomes or group structuring. Barnes (1992, Chapter 2) for instance includes a careful examination of students working in a small group in his exploration of the ways students use speech to construct and internalize knowledge. Seemingly missing however is a similarly fine-grained examination of individuals’ bodies as they work together, embodied collaboration as it were. Cheville (2001) address a similar topic in her study of embodied learning among college athletes, as they develop an “intersubjectivity” that allows them to understand their own bodies in relation to other players’ bodies on the basketball court. This is a very promising approach but, much as technical theater, somewhat removed from the traditional classroom and many applications of collaboration. The participants in Cheville’s study were exceptional student athletes before they came together as a team and as a team spent hundreds of hours working together under the expert direction of their coach, conditions with goals not likely to apply to most collaborations.
At the end of Chapter Five I sketched a sort of taxonomy of collaboration that analyzed forms of collaboration in terms of the similarity of the collaborators’ work, and time they do the work in relation to each other. Missing from this is any consideration of the relation of collaboration to embodiment. One might naturally think of synchronous collaborations, or at least collaborations where multiple collaborators were proximate to each other, in this regard. However, the fourth category of embodiment above, the robustly embodied approaches, may be useful here. For instance, considering cognition as both embodied and extended, or embodiment not limited to just an individual’s body but as a system or assemblage of “the body and-“ (Leander & Boldt, 2012, p. 29) allows for the possibility of exploring the embodied collaborative interrelations among collaborators and Bowman and Powell discuss embodied collaboration as a feature of musical performances (2007, p. 1096).

Collaboration and embodiment is not the only aspect of collaboration available for further research. Besides exploring the mechanisms of embodied collaboration and what the benefits of such work might be, opportunity to investigate the collaborative construction of meaning through interaction such as gesture or demonstration, much as Barnes did through language is an intriguing possibility. Another topic I have not pursued here is the ways in which large collaborative enterprises like a play production develop into what has generally been considered at Lincoln high school to be a successful unity. Linus, June, and Jonas all discussed this in our interviews. The gist was that very little initial discussion or collective planning took place. Instead, participants developed their own concepts and trusted others to do the same. In the absence of extensive deliberate collaboration, there are puzzling aspects to the success of these large-scale collaborative compositions. Finally, the relation of composition to collaboration is a topic I consider in the next section.

Considered in these various ways, collaboration has been explored in relation to my second and third research questions and I need mention it only briefly here.
Collaboration is a natural part of learning through apprenticeship or as a member of a community engaged in goal directed activities. In the case of technical theater at Lincoln, Linus and June have structured the activity such that collaboration is an essential part. Perhaps the clearest instance of this was the building of the cabins for *Into the Woods*, which both Linus and June mention as an instance where a few students were given lessons and instructions that they shared with other students, creating the cabins with little other outside input. Moreover, many projects, including the walkway, the bookstand, and the tree, involved students using each other as resources for the creation of meaning. Particularly clear as Albert and the student technicians discussed and cocreated interpretations of Albert’s lurking movement, it is also evident in the Autumn and Isabel watching the forms the other created while experimenting with designs for the bookstand and in the stories Heather and Vivien shared building the tree.

Composition

I have approached composition from two perspectives. In Chapter Four when considering the walkway I used the framework of multimodal literacy, and in Chapter Five I considered projects such as the tree building as examples of art making. Each approach has strengths and, especially in the case of multimodal literacy, weaknesses in their application to technical theater.

One hesitates to critique the New London Group or dismiss multimodal literacy. As Boldt and Leander (2012) put it, “More than any other text, ‘A Pedagogy of Multiliteracies’ streams powerfully through doctoral programs, edited volumes, books, journal reviews, and calls for conference papers, as the central manifesto of the new literacies movement.” Of course, technical theater, barely recognized by old literacies, is hardly central to new literacies either, a perhaps felicitous state as composition in technical theater is difficult to fully understand in a New London framework. A number of facets of composition challenge the multimodal literacy approach.
Composition, as my observations demonstrate, is messy; so messy in fact that it challenges the veracity of the concept of design, the central tenet of multimodal theory. Whereas design holds that composition is the work of text makers whose central desire is the communication of propositional knowledge through the fabrication of socioculturally recognized semiotic signs, and who have control of their meanings and their abilities to express them in advance of the composition, the technicians building the walkway seemed to have neither a clear idea of either what they were building nor exactly how to express that in the materials available with the tools they had. Further, they did not have a clear idea of how the performances they were devising in association with the walkway would be interpreted by each other or the future audience. Instead of being designed in advance, meaning emerged in production; Jake in particular accepted multiple performances—multiple texts—as satisfactorily expressive of whatever meanings he desired to communicate. Albert, however, had difficulty matching the combination of performance and performance space to his intended meaning and was only satisfied after multiple attempts at his performance through which he learned what he needed to know to complete his text.

Composition like this in technical theater is robustly embodied. Multimodal literacy sees the body as a tool that might generate textual meaning and from which textual meaning can be read. While I did not include it in the taxonomy above, as it is not in particular an approach to the body, the most natural category for it would be the second. The multimodal literacy body is, at best, a tool, and while gestures can have meanings and be read there is nothing ontologically to distinguish them from e.g. colors or numbers. By not according any special significance to the body, multimodal literacy has not only failed to capture the fact that meaning is emergent but also the way the body is implicated in the emergence of meaning.
Nor is it clear how collaboration works with the concept of design. Several challenges present themselves. While collaborative compositions are unlikely to match any design that any collaborator had prior to the beginning of production, the form of collaborative compositions explored here seemed to evolve through the interactions of the collaborators as the text emerges. While multimodal literacy allows that meaning is a product of sociocultural context, within a context meanings seem to be not only knowable but known in advance, and if meanings are not static, at least they are slow moving. Collaborators, such as the walkway builders, discussing or otherwise interacting around a text develop new interpretations and considerations of their text on the spot, ask each other to comment on potential meanings as they take shape, and revise own their understandings in relation to each other.

It is also not entirely clear that the texts composed in technical theater are composed with concerns that are entirely semiotic in nature. According to multimodal literacy, texts are created with the intention of communication. That is, they are not created – as most elements of a theater production in fact are created, at least in their details – for largely practical reasons. Nor are they are created for or from any sense of enjoyment; but “Power tools are very fun to use.” Cori said, and Jonas, “likes drilling into stuff,” two elements of the creation of most texts. Beyond the experience of using tools and materials multimodal literacy does not consider the proprioceptive pleasures of moving in a particularly configured space like Albert running lines on the walkway, or the thrill of danger that Cori also noted, “You get to go high places. Like in the gymnasium. [laughs] Well, and in here. Up in the loft, and in the catwalk. [pause] As long as you’re not afraid of heights that is.” The data I have presented, not to mention my experiences making texts, suggest that texts are in fact created in idiosyncratic ways for idiosyncratic reasons, because they bear affective links with the composer. Inasmuch as technical theater artifacts – props, scenery, lighting effects – can be considered to be texts and instantiate a communicative intent, any design of the composer(s), should there
be any, is but one step on a long, winding path towards meaning, a path crowded with coincidence and exigent circumstance. Recall Linus’s comment that the audience did not laugh at the bookstand; rather the stand was part of a larger piece that included audience and actors and interpretation of Sister Amnesia’s character that the authors of the bookstand did not, could not, foresee, “a hard thing to teach in the scene shop two weeks before it happens.”

Two different approaches to composition were also considered, one involving the three necessary conditions for art making developed originally by Beittel, and briefly the idea of artistic composition as qualitative problem solving introduced by Ecker. By understanding meaning as an emergent or post-hoc property of composition these approaches avoid some of the problems encountered by multimodal literacy. Moreover, by focusing attention at the point of creation, as was Beittel’s objective to, “move as closely as possible to the creating stream of consciousness,” (1972, p. 6) avoids the temptation in multimodal literacy to read back from completed texts to the thought process that went into them as though design were a rational and well ordered process.

This clearly is an area that could be rewarding for future research. While the concept of design is problematic, exclusive focus at the point of creation of a stream of consciousness devalues the possibility that creators, perhaps especially some creators with experience in composition and a mastery of tools and techniques, are deliberative in their approach and begin composition with meanings aforethought. There is clearly room to expand the study of elements that many people use as parts of their composing process such as oral story telling, outlines and drafts in writing, pictorial studies in painting, and model building in set construction.

I have also discussed that creation happens in technical theater that is not artistic – neither the product can be considered art or the process considered art making. Acknowledging that production can exist on a spectrum from the powerfully creative act of arting to the mundane nature of workaday doing is a start to understanding Heather’s
composition of the good looking tree: “It’s creative. But it’s not artistic.” Elaboration of the way that composition works in the absence of one or more of the essential elements is required to help understand that vast array of texts that may be made with care and creativity but which do not inspire critical reflection.

In response to my third question, students in technical theater bring any number of resources to bear in the creation of meaningful texts. Beyond those mentioned just above, e.g. the availability to tools, materials, and collaborators, a consideration of the conditions in which Beittel’s conditions for art making are likely to occur is in order. An element of the repertoire of the technical theater community Linus has developed at Lincoln allows students (and adults) the chance to make personally significant texts. Although very different projects, the bookstand, the tree, the lollipop, and the slotted spoon share characteristics derived from the way projects are typically conducted, given sufficient time and participants. In all of these situations students had access to tools and materials and either sufficient skill or help available to use them, and they had time to work relatively uninterrupted. They knew what the project was for but due to the collaborative nature of technical theater were not constrained to a mere instantiation of any meanings Linus had in mind.

So, within a range, they knew the meaning they wanted to convey and took deliberate steps and made important decisions regarding how to convey it. Making those decisions allowed the technicians to work out the details for themselves in their own idiosyncratic ways. And they did so by “working over into materials some equivalent of [their] idiosyncratic meaning” (Beittel, 1972, p. 2). This reflects Beittel’s essential conditions for art making, artistic causality, idiosyncratic meaning, and intentional symbolization. What I conclude from this is that the pedagogy Linus and June have enacted at Lincoln, the community practices that enable students to work on important projects for the play with expert guidance but considerable freedom leads to a situation in which the essential conditions for art making are likely to be realized.
Classroom Implications

The prevalent discourses of education devalue the body and therefore what is done with the body (Rose, 2004; Lewis, 1993). In a culture where “knowledge work” (Crawford, 2009; Teagle Consortium, 2008; Braverman, 1999) is valued at the expense of “unskilled” labor” (Rose, 2004) any education that emphasizes the body is unfortunately suspect (Shusterman, 2006). While such an environment in education is disadvantageous to technical theater, multiple other factors are prevalent as well. Discourses of reform, heavy emphases on math and science, and a burgeoning culture of standardized testing (Sadovnik, O'Day, Borhnstedt, & Borman, 2008) do not recognize technical theater as an important element in student learning. Finances of Lincoln’s theater department are too complex to discuss at any length here. Suffice it to say that while there is considerable revenue generated from ticket sales, there is more than considerable ongoing expense involved in the production of shows. This is true before consideration of the costs of maintaining performance spaces and paying the salaries provided to the directors and assistant directors through supplementary contracts1. Cuban (2004) explores discourses of efficiency, the business model of schooling, and for-profit education. The increasing importance of technology in all areas of society also finds its way into schools. Scholars and academic organizations (ACRL, 2006), commercial enterprises (ETS, 2009), and non-profit organizations (UNESCO, 2005; MacArthur Foundation, 2007; Kaiser Family Foundation, 2005) have all advocated conceptions of technological literacy and asserted their importance, “to better position [students] for success in a technology-based society” (ETS, 2009). It is difficult to see

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1 In talking to a number people involved in high school theater, I have been led to believe that having a technical theater program as well funded as Lincoln’s, including a technical director position such as Linus’s is rare. The three traditional high schools in this district all have similar theater and technical theater positions available. Williams (2003) explores the availability of technical theater and related positions in high schools at some length.
how technical theater or emphases on embodied learning in general fit into discourses of efficiency or technology.

While technical theater seems to be on the wrong side of these discourses, Rose, Crawford, Lewis, and others make the case for the importance of hand-on learning, as does Cori when she unfavorably compares book learning to experience. Although there is every possibility that they are being overlooked by reform, technology, and efficiency-minded educators, there are aspects of technical theater other than embodiment that are entirely relevant to modern education. I mentioned above the concept of soft skills as it relates to technical theater. While such skills might be developed in many activities, and not developed by every technician, technical theater at Lincoln does seem to present a structure for activity that especially encourages such skills by distributing responsibility for the production among the group, encouraging student independence in many projects, and providing opportunities for students to develop such skills through meaningful work, both in play productions and as Linus mentioned, at other activities at the school.

A particular instance of this relates to technology, composition and publication. Jenkins (2007) describes what he calls, “participatory culture.” This is a reenvisioning of adolescent culture as mediated by multiple forms of technology, including communications technology. The ability of adolescents to be linked with their peers electronically creates new opportunities for them, such as collaborative problem solving, personal expression, collective intelligences, publication of texts, and what he calls “transmedia navigation,” the ability to follow stories or track meaning across expressive modalities. Old fangled as it may be, many of these seem like elements of technical theater. Collaboration, critical thinking and problem solving, and personal expression have already been considered at some length. Collective intelligence is a feature of many collaborative groups in which – at least before they teach each other what they know – one technician has proficiency with one tool or material and another technician has a different relevant skillset. Jenkins’s description of transmedia navigation resonates with
technical theater, for instance in relation to the lightboard operators as they integrate
different modalities in the process that Linus credits for their development of critical
thinking skills, and with the bookstand makers who follow the significance of their prop
from its construction through its presentation on stage where it interacts with the
performances of the actors, the audience, and the text of the play. In short, I am mindful
that new technological literacies are not always entirely new literacy.

While I advocate technical theater, in my experience few teachers want students
using power tools in their classrooms, or indeed the room next door, and not all students
have an abiding interest in theater production. The question arises of how the positive
aspects of technical theater can be incorporated into other learning situations with less
noise and sawdust. While many of the powerful features of technical theater have been
revisited in this conclusion, I want to draw particular attention to one classroom with
which I have considerable familiarity. In a previous study (Schott, 2010) I used the
theory of community of practice as developed in Wenger (1998) to examine the highly
successful and award winning newspaper publication class in the journalism department
at Revere high school. The journalism teacher and Linus share a number of aspects of
their pedagogy, including a generally hands-off approach to management and a belief that
the students should do as much of the work as possible. A number of other aspects of the
journalism class repeatedly reminded me of technical theater at Lincoln. Students in the
journalism class worked both individually and collaboratively on projects that were
assigned to fit in with the overall publication but that had loose parameters within which
the student writer could develop the piece in personally satisfying ways. The class was
organized as a community with shared responsibilities that had little chance of being
successful without broad participation from many, if not all, community members. Some
students stayed late and worked harder, but without everyone’s contribution, the paper
would not be published. Veteran and novice journalists worked side by side, with
veterans frequently mentoring less experienced students. The division of labor – jobs
included writing, photography, graphic arts, editing, accounting, and selling
advertisements – meant that students could specialize in one area but also collaborate
with, teach, and learn from students working in other areas. Students almost never failed,
and from the beginning of the school year new students engaged in legitimate peripheral
participation through working on pieces that would be published in each issue of the
paper.

It did not surprise me to observe that many students found the structure of the
class daunting and moved on after a single trimester but all of the journalists I
interviewed described it as their favorite class, and not incidentally the one that least
resembled any other class. Considering the similarities and successes of these two
programs suggests key elements that might be useful in education generally.

**Final Thoughts on Apprenticeship, Learning and Technical Theater**

As a language arts teacher I typically avoided giving simple answers to what I
considered to be complex questions. If a student would ask about, for instance, the best
camera angle or lighting to use for part of a video project his or her group were working
on, my answer was procedural: I would tell the student to consider the possibilities and
compare the effect or meaning they created to their goals as a filmmaker. If a student
wanted to know about the theme of or symbols in a novel, my response was essentially
the same: I would encourage them to consider the possibilities, look at the evidence and
devise an argument for theme he or she thought best. Students mostly found this
frustrating. It is difficult for me to get away from the belief that responding to these
questions with straightforward answers – use a high angle shot to emphasize the
character’s vulnerability, William Golding thinks that human nature is power hungry and
destructive, Boo Radley is the mockingbird – is the wrong thing to do. The examples are
not entirely the same, but I find a tension here when I think of the technicians
programming the lightboard and Linus’s assertion that lightboard operators can learn acute critical thinking skills. Erica and Grace’s diagnosis of the problems in the performances shows an incredible amount of learning during an intense period where she had numerous other things to learn as well. There are ways to understand their learning – the constant feedback from Linus, the constant observation of the immediate effects of how the lightboard was operated, the chance to see parts enacted repeatedly as cues were worked out and refined all contributed to what she learned. For me it has become a lesson in the value of different approaches to instruction.

That in itself is an interesting twist, as I have argued above that one of the standout features of technical theater at Lincoln is the way that Linus has structured the activity to minimize overt instruction and locate learning opportunities in the chances provided to students to make things, make decisions, do meaningful work, and otherwise participate in the life of the community. Not every high school technical theater program would be similar; despite avowed intentions, Revere’s in fact is not. This work of student technicians is important, and a few final features deserve speculation. One is that the work of the community really is work. It is immediate, and hands-on, and apparent to anyone who looks. Technicians are typically tired at the end of a Saturday work session. And at the end of the day it is easy to observe the progress on the set and assess the day for oneself.

Of course, many students work at jobs outside the school, and may enjoy similar elements at those jobs as students do in technical theater. Students have many opportunities at school to be involved in the same way or do the same work as their peers – choir, football, even acting. In technical theater, technicians do the same work as their peers, but it is also the same work as their teachers and the adult volunteers. Linus and June are undoubtedly in charge, and on busy days Linus may spend much of his work time helping students begin projects. On typical days, though, the majority of his time is spent doing technical theater – building things, hanging lights, carrying lumber. He
works with students in groups, but in those groups does the same work as the students, not entirely different than Albert in the walkway chapter but with perhaps a more careful consideration of equitable sharing in the labor.

The same is generally true of the adult volunteers; I point to the students demanding I join them in the leaf making project as evidence. Not only do we adults share in the labor, but as friends we enjoy each other’s company. Recognizing our expert status, we do not hesitate to share experiences or teach a student how to use a tool, but otherwise the work that we do is the same work as the techies. June is in charge of painting the backdrops; she mixes the paint and sketches out the designs but when students help, they are painting the same backdrop as she is. This is a particular kind of collaboration, or apprenticeship, that I think is rare in schools. Typically, even in activities such as show choir or athletics in which students are actively engaged, there is a different demarcation of the roles of teacher and student. Moreover in technical theater, as stated by Linus and June, students come up with many of the ideas, improve on the directors’ ideas, correct the directors when they are mistaken.

Another part of this is that the students are also a part of the adults working together. With Linus in charge and the rest of us taking instructions from him as part of our collaboration on the project; and naturally there are other times when one of us will show Linus how to do something or will do something for him that we are better at than he is. In educational terms, there is a lot of good modeling going on; this can be understood as the nature of apprenticeship in this context, features of the activity system, rules of the community, and it invites students to join in and move towards full participation. I think this helps to disabuse students of the notions that teachers are radically different from other people and that learning is somehow other than “an integral part of generative social practice in the lived-in world” (Lave & Wenger, 1991, p. 35).
And, of course, learning is a two-way street; the students do improve on our plans and techniques. In a grumpy funk Linus and I stayed late one school night to make a major prop for *Go, Dog. Go!* Massive, elaborately engineered and structurally sound we cherished a certain pride for it until the next day when Jonas showed us a much simpler and better design – the one he had had all along. This is not the norm, but it is certainly not unprecedented. And, if this form of coparticipation in the learning community has benefits of the students, it also has benefits for the adults learning from them. I asked June about this:

Probably the biggest lesson that I have learned is that - to trust them, that they can do it. And not be afraid that they are going to ruin this. You know, it used to, I used to have a lot more ownership when I started. But that comes from being an artist and doing your own paintings, and that’s my work out there. And I’ve gone from that to wanting it to be the kids’ production and not my production. And so, um, they taught me that if I help them and show them I can trust them to do what needs to be done.

(Interview, September 18, 2009)
APPENDIX A:
LOGGING AND CODING PROCEDURES

Logging and coding interviews and field notes was an iterative, multi-step process. There was considerable variation based on factors outside of the study such as how much time I had on a given night to devote to data gathering, as well as factors within the data itself such as the duration of an observation or the length of the field notes. Here I describe my process for logging and coding interviews. The process for field notes was similar.

Within a few days following each interview, I listened to it in its entirety. As I listened to the interview, I had time to write subjective impressions, notes on my interviewing techniques, and notes for questions to ask in later interviews. As per the concept of theoretical sampling, I also developed ideas for activities to observe in future fieldwork. I would regularly look back at these reflections, sometimes adding to them if I had new information about the interviewee. The following is an edited excerpt from my initial reflection on my interview with Cori. The spotlight operators, mentioned in the last line, good naturedly mimicked the on-stage singing and dancing (very quietly) through most of the performance when the spotlights were not on.

Note not just her interest in power tools (fun) but also her appreciation of danger. At the same time while she like it, she’s worried about other people – actors – getting injured. She is very protective of the shop, safety, tools.

Question – does this extend to other techies? Does it see herself as a mentor / guardian of younger students? (Remember her ‘yelling’ at the kid for the Vivien pole dance comment.)

Note how… idk… fond she is of actors. Surprising? (Contrast Erica liking to yell at people.) Do I imagine more separation between techies and actors than there is? (But also at technical rehearsal they stay separated). Power / status thing? She seems to like to help them.

Other times, though, annoyed with actors breaking props. Maybe she is just more ‘team oriented’ than them? Likes seeing a production come together. Hates Go, Dog, Go!. Hmmm.
Interesting thing on stage fright / performance / on-stage vs. backstage. Recall spotlight operators for *Nunsense*.

These reflections were conceived primarily as guides to use as research continued. I took a more systematic approach to analyzing the interviews during the actual writing of the dissertation. This approach began with “logging” the interviews. One facet of my interview logging made extensive use of audio editing software\(^1\). The software allowed me to easily insert “memory locations” into the audio file. Memory locations are markers which are set to particular time locations in the audio file’s playback and which can be named or labeled. Clicking on a memory location from the list of locations automatically plays back the file from that location. This was exceptionally useful to me because it allowed me to instantly review relevant portions of the interview without having to listen to extended sections that were not of concern. A screenshot of the audio timeline from my interview with Linus is shown in the photo below.

The second element of interview logging was writing a description of what was said at each memory location during the interview. This log was kept in a separate word processing document as list numbered to correspond to the memory location numbers. I wrote the log as I listened to playback of the audio file. I listened to each section of the interview multiple times as I added and edited memory locations and logged the conversation. The contents of this log were then coded for topic and theme.

I found this approach particularly useful because it provided several opportunities to listen closely to the content of the interviews initially. It also was particularly easy to re-listen to sections of interviews as coding progressed. This meant that I could refine codes and repeatedly reassess the relevance of individual

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Figure A-1  Screenshot of interview logging.
comments in an interview as I made connections to other interviews and field notes. This meant that as I reviewed I frequently listened to related sections from two or three different interviews in succession as I decided whether they should share a code or if I should refine my coding to account for subtle differences.

Examples are shown in tables A-1, A-2, and A-3. These are single log entries, corresponding to one memory location, from my interviews with Linus, June, and Cori. On the left is my log of the conversation and on the right the codes I applied to that log entry. I deliberately chose examples of coding and logging that related to each other and that were discussed in earlier chapters. The codes shown are their final versions and represent multiple stages of evolution. Due to the iterative nature of the process I am unable to trace exactly the progression of the coding. However, I do know that I began with the simple initial categories of “lessons” and “collaboration,” which have been refined below to include several sub categories, e.g. “lessons – setup,” “lesson setup – alternate,” and “lessons – mini-lessons.” The progressive refinement of the “collaboration” code was similar.

Following logging and coding, I used the coding to identify portions of interviews relevant to particular topics. I then listened to those sections to decide whether to transcribe them and include them as data in the previous chapters.

Table A-1 Linus interview log example.

| 22- | We need something that looks like this – how to set up a project – creative force – we need something that looks like – go draw a harp – comp here’s a blueprint – polar opposites | Lessons  |
|     |                                                                 | Lesson - setup |
|     |                                                                 | Lesson setup (alternate) |
|     |                                                                 | Creativity |
|     |                                                                 | Arting / doing |
|     |                                                                 | Pedagogy / philosophy |
|     |                                                                 | (Cori – drill project) |
Table A-2  June interview log example.

| 29- | Different styles / variations – kids taught each other to do the stones – 1 person in charge, they showed new kids – very happy with results – she basically supervised the set – that’s how you know it’s successful | Lessons  
|      |                                          | Lesson set-up  
|      |                                          | Collaboration  
|      |                                          | Collaboration- student-student  
|      |                                          | Success (example / definition)  
|      | (see # 20) (see #14)                     |

Table A-3  Cori interview log example.

| 20- | Styrofoam drill project (teach actor during children’s theater)– mini-lesson (foam cutter) – pattern on object – scale – let him do it – turns out okay – no chance to critique | Lessons  
|      |                                          | Lesson setup  
|      |                                          | Lessons- mini-lessons  
|      |                                          | Collaboration  
|      |                                          | Collaboration-student-student  
|      |                                          | Mentor  
|      |                                          | Apprentice  
|      |                                          | Community  
|      |                                          | Pedagogy / Philosophy  
|      |                                          | (see Linus #22)  |
APPENDIX B:
INTERVIEW QUESTIONS FOR TECHNICAL DIRECTORS

As originally conceived during the Institutional Review Board approval process, the areas of interest for my interview with the technical director and assistant technical director, Linus and June, are as follows.

Engagement / Collaboration / Attitudes

- Which students do you see readily engaging with the learning / class?
  - How typical does this seem?
  - For specific students, what are the things / aspects of tech theatre that are responsible for the engagement?
- Which students do you see not engaging with the learning?
  - How typical does this seem?
  - How will students who are not engage get opportunities to learn?
  - How important is that engagement in a class like this?
- What peer-to-peer roles do you see students assuming?
  - Examples of collaboration, mentoring, peer to peer learning
  - Missed opportunities or students avoiding opportunities
- In what ways are these roles similar to roles in previous semesters?
  - Are you seeing similar roles?
  - Similar numbers of students in those roles?
  - How are these roles distributed across experience levels?
- In what ways are these roles different from previous semesters?
  - Are expected roles going unfulfilled?
  - Are students occupying roles you consider new / novel?
  - What’s new / different / surprising about tech this year?
- What opinions are students forming about this class, its objectives, point, etc.?
  - Do they think they are learning? If so… what?
  - Do they see class as valuable? Fun? Pointless?
  - Does it relate to them personally, or to the rest of their school life?
- Students as theatre technicians
  - Do they / who does see themself as belonging to a group / are they techies?
  - Why and how do students develop this self-perception?
  - How do they see themselves contributing to the school community?
  - How do they see their contributions valued? By whom?
  - Examples / individual cases / differences?
- How do student attitudes compare to those of other faculty at Washington, both within and outside of the language arts department?
- What is the reputation of the class and activity with students at large? In what ways does participation in the class change students’ attitudes?
Pedagogy

- Discuss your pedagogical approach(es) thus far.
  - Crucial elements of instruction? Content imperatives? Why?
  - Crucial methodologies for particular content / skills / objectives?
  - How these differ from other classes you teach?
  - What from tech instruction carries over to teaching your other classes?
- What considerations match instructional technique to learning objective?

- Formal roles
  - What are they for this play? E.g. stage manager, props manager, spotlight operator, stagehand, etc.
  - Who did you appoint to what roles in the play? Why?
  - What formal roles / awards / recognitions have you given to tech students?
    - What do they signify? Why did you give them?
    - How are those students and other students responding to this?

- Informal roles
  - Who is particularly enthusiastic / effective / dedicated to the current play?
  - Or to mentoring roles or other informal roles?

- How do direct whole-class instruction and direct instruction by peers compare, with respect to effectiveness? Examples?
  - How do these differ for different broad content areas, i.e. basic skills, application and problem solving to create theatrical effects, dramatic interpretation

Learning

- How are individual students progressing?
  - Content / direct instruction?
  - Application of skills, problem solving, drama

- How is learning assessed?
  - What are the objectives?
  - What is the rationale for them?
  - What sort of remediation is possible?

- Is there any behavior / deficiency in the operation of the community that causes you concern as a teacher?
- What is your critique of these issues of the paper?

Overall

- How are the class and volunteers performing, e.g. compared to other years and expectations.

- How are the set and preparations for the current play progressing?

- How do you gauge the level of commitment to the project of producing the play?
APPENDIX C:
INTERVIEW QUESTIONS FOR STUDENTS

Interviews varied widely. As originally conceived during the Institutional Review Board approval process, the questions I intended to ask students are listed below.

Background and subject’s interest in tech theatre
• How did you choose this class or activity? Options you considered?
• Have you done tech theatre before? Have you done similar classes before?
• Did you start in Stagecraft or as a volunteer?

Stagecraft class
• How did you do? Did you enjoy it? What were your classmates like?
• In these regards, how did it compare to other classes?

After school teaching, if appropriate
• Why is tech theatre interesting to you? Do you like drama?
• What do you like about it?
  o Social aspects, belonging, etc.
  o Work, contribution, part of a large project
  o Recognition
• How much time does it take you / how much do you do it?

Other classes / interests
• Do you do other activities?
  o Are they similar to tech?
  o What’s good about them?
• What are your favorite classes / activities? Why?
• What subjects / activities are you best at? Why?
• Who are your favorite teachers / coaches / faculty? Why?
• Do you have career plans? Plans for classes next term / year?
  o Does tech relate?
• What are some things you’ve done in other classes that have been especially good / fun / instructive? Why so?
• What is something you have done or learned doing tech that you have used in another class?
• What things have you learned in other classes that have helped you in tech?

Learning
• What’s it like hanging out in the shop every day? Using power tools? Hitting things?
• What do you think people learn doing tech? Is it valuable?
• Can a person learn similar things in other classes?
• How is this class taught compared to other classes?
• Talk about an example of something you did or built
  o What did you do? What did you figure out?
  o What knowledge and skills did you use?
  o How did that project fit into the whole play / set / performance?
• What are some favorite and least favorite tech activities / aspects?

Attitudes
• Tell me about yourself as a student? How has this changed…? Why?
• What kind of kids take Stagecraft? Do tech?
• Is there a techie group? Who is in it and how does one get in?
• Why is there a techie group? Why would one want to be a techie? Benefits?
• What do you think about techies? How are you positioned in relation to them?
• What is the attitude of the administration towards tech theatre and techies?
• How interested are students in school plays? How much do they know about tech theatre?
• What do other students think about tech / techies? Important, valuable, fun, nerdy, etc.
• Are you going to keep doing it?

Student as technician
• What are the skills of a good technician?
• What are your skills as a technician?
  o Good at? Not as good at? Examples?
  o Enjoy? Not enjoy? Why?
  o Compared to other students?
  o Compared to earlier in the term / last term / last year
• What official roles have you had in class or in plays?
  o How did you get them? Try out? Why?
  o Why were you chosen for that role? How good were you?
  o What was good about the experience? Learn anything?
• What are your unofficial roles? How do you fit in?
  o What is something you do to help the class or the projects?
  o Is it extra work? Why do you do it?
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