Linguistic Evidence of Cognitive Distribution: Quantifying Learning Among Undergraduate Researchers in Engineering

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Abstract

The Research Communication Studio at the University of South Carolina nurtures undergraduate learning in engineering through guided interaction among student peers, near-peer graduate mentors, and faculty members. The RCS bases its pedagogical approach on Dorothy Winsor’s concept of thought and knowledge as a network distributed among members of a group with shared goals. Possessing various levels and aspects of expertise, the RCS staff and students together construct knowledge by communicating their understanding—or gaps in understanding—of the participating undergraduates’ research and related deliverables during the small, weekly meetings of interdisciplinary studio groups.

Through collaborative research, the RCS staff, which includes graduate students and faculty in linguistics and in composition and rhetoric, is developing means of analyzing how cognition is distributed among studio participants. This paper presents results of the current study. To closely investigate the communicative interface at which learning occurs, certain structural features indicative of cognitive development were isolated—for example, questions, responses, modals and epistemic adverb phrases, and cognitive and communicative verbs. The content of students’ conversational turns was described in terms of explanations or references in the transcripts of the videotaped sessions; also, the content of the meetings was categorized in terms of whether the discourse topic concerned genre or core research.

The quantity and patterning of structural and content features in students’ verbal interactions offer insights not only about how students learn in the studio environment, but also about how learning broadly occurs as a social phenomenon. As the significance of social interaction in lifelong learning gains recognition, quantitative research on verbal communication in educational settings promises considerable insights into the learning process.

The Research Communications Studio

The Research Communications Studio (RCS) is a research and education project in three engineering departments at the University of South Carolina (http://www.che.sc.edu/centers/rcs/rcsmain.htm). The project focuses on language and communications as tools for conducting research, as well as the written and oral means of disseminating the results of research. Supported in part by a grant from the National Science
Foundation, the project investigates the effect of the Research Communications Studio concept in improving recruitment and retention, increasing the number of student publications and presentations, and successful completion of their research projects. Continuing assessment of the project is carried out in collaboration with the University of South Carolina’s Office of Program Evaluation in the College of Education.

The Research Communications Studio model is built on cognitive research that promises to improve learning of complex materials, transfer of learning to new situations, development of self-directed learning capabilities and motivation, and participants’ working knowledge of communications in research and technology. Graduates with these abilities will be quick start professionals in industry, research environments, and academia.

Studio participants are undergraduates in chemical, electrical, and mechanical engineering who work as assistants in research projects directed by an engineering faculty member. In addition to their work on specific research projects, these students meet weekly in a Studio group composed of three or four undergraduates, an engineering graduate student, a communications graduate student, and a communications faculty member. For each meeting, undergraduates bring a draft of some communications related to their research project as assigned by their research director. The participants’ work, which can include a variety of reports, presentations, journal articles, posters, or other technical genres, provides the content for the Studio sessions. Students have the opportunity to discuss their research projects with peers, near peers, and professionals, to find out how interested audiences respond to their work, and to receive helpful feedback as they develop their writing and presentation abilities.

Now in its fourth semester of data collection, the RCS continues to reflexively research the learning processes that occur in studio sessions. Through this research the RCS identifies effective strategies for facilitating group and student learning processes, while investigating the processes of learning overall.

Distributed Cognition and the Theoretical Background of the RCS

The research communications studio (RCS) incorporates social constructionist theories of cognitive development emanating from the work of Lev Vygotsky. These Vygotskian theories, which provide the theoretical grounding for this proposal, are cited in the National Academy of Science publication, *How People Learn*, as major contributions to modern cognitive science. Vygotsky’s most influential concept is the zone of proximal development (ZPD), a “bandwidth of competence that learners can navigate with aid from a supportive context, including the assistance of others.”

Vygotsky’s ideas led to further explorations of social influences on learning, such as guided participation and distributed cognition. The concept of guided participation focuses on the effects of expert and peer guidance in facilitating learners’ cognitive development. Distributed cognition, according to engineering educator Dorothy Winsor, “treats thinking not as an action that takes place wholly inside an individual’s head, but rather as an activity that is distributed among the individual, other people, the physical environment, and the tools the person uses, including language and such language structures as genres.” Drawing from observations, interviews, and writing samples, Winsor’s study of engineers in the workplace found that

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“cognition was distributed among people and tools as well as groups of people in the engineering center; learning to use communication tools allowed even these novice employees to participate in generating knowledge.”

Edwin Hutchins likewise documents the presence of distributed cognition in the workplace. In “Learning to Navigate,” Hutchins describes the process of directing a naval vessel to port. Recording conversations among the sailors and observing ship logs and other tools, he found that people learned from through their interaction with one another and with the tools that were part of their everyday work environment.

The concept of distributed cognition is central to the third hypothesis cited in the original proposal for the RCS. That hypothesis states that a studio curriculum founded on theories of metacognition and distributed cognition will expedite students’ cognitive development as researchers, provide them with effective tools for managing their self-directed learning, and enhance their effectiveness as team members in collaborative learning, research and design.

Broadly stated, our working understanding of distributed cognition in the studio includes any kind of exemplification, idea generation, or contemplation—in other words, any contribution to the group’s learning, or that of any of its individual members. The RCS attempts to understand and foster distributed cognition by encouraging students to communicate their research to people of differing disciplines and/or educational levels. The studio seeks to build on previous ethnographic studies by generating both qualitative and quantitative explanations of how interactive learning occurs and what it accomplishes. The present study does not test learning outcomes with respect to distributed cognition, but offers an understanding of how distributed cognition operates in the studio, contributing unique data, methodology and analysis to a growing body of knowledge about the concept.

**Objectives and Motivations**

For over a decade, engineering education has been moving to a new paradigm that privileges experiential, or active, learning over passive learning through the lecture mode. The reported benefits from active, inquiry-based learning are far-reaching: the excitement of discovery enhances students’ motivation to learn, and improved motivation leads to improved recruitment, retention, and student success. Systems of inquiry-based learning build authentic and productive connections among research, teaching, and learning to the benefit of students, faculty, and institutions.

However, the field lacks concrete data on how theories of guided participation and distributed cognition work in the real teaching and learning situations of engineering research. A critical question concerns how to define and identify the characteristics of the engineering research environment as a “community of practice” that make knowledge accessible to novices. According to Lave, “communities make possible certain kinds of transformations of understanding, identity, and knowledgeable skill, not simply changes of a quantitative sort,” but she acknowledges that we do not know what conditions “make deep transformations possible.”

In the same vein, she observes that “near-peer relations seem to facilitate sharing of knowledgeable skills,” but that we don’t know how this occur. Lave’s observations and questions point to the current state of knowledge in the field: the positive results from involving
undergraduates in research are accepted. However, the characteristics in the engineering research community that produce those positive results are unknown.

Students’ entrance into a community of practice and their development of a researcher identity both requires and entails the growth of particular social and technical skills. They must begin equipped with sufficient experience to engage in that community, but at the same time, negotiating the different sorts of knowledge important to the community enables them to claim it. Furthermore, by constructing that community alongside others they strengthen the community of practice as a whole.

The RCS is founded on the idea that students’ network of connections within a discourse/academic community enhances their cognitive potential within an optimized zone of proximal development. The goal of this paper is to describe, illustrate and evaluate instances of several categories of interactive contributions towards students’ development as researchers. These categories will be defined and described in the following Methodology section. Additionally, we incorporate previous work investigating the use of four linguistic speech patterns widely recognized to be indicative of cognitive development: epistemic modals and epistemic adverbial phrases, questions, cognitive verbs, and overlap. The data for this paper comes from the analysis of both a 40-minute segment of a videotaped studio session that occurred on April 9, 2002, as well as the transcript of the first ten minutes of the same session.

**Methodology**

Our criteria for selecting an appropriate studio session for analysis included the following:

- the session must have already been transcribed
- the session must not be from the first semester the program was in operation

Working with an existing translation would save time, and using a session from the second semester would ensure that the participants had time to become used to the RCS dynamics. The Office of Program Evaluation at the University of South Carolina transcribed fifteen RCS group sessions from the first two semesters that the studio was in operation, so we randomly selected one of the sessions from the Spring 2002 semester.

After watching the video file and making notes, we developed nine categories that we felt described interactive learning, which are explained in the next section. We then independently reviewed the video and recorded instances of interactive learning, noting the video player time stamp, the person speaking, and the category that best fit the speech. We compared the two sets of data, resolving any discrepancies that arose from different approaches to coding. We determined that each conversational goal should be recorded, even when one person creates more than one conversational goal in a conversational turn. For instance, in one conversational turn, a studio participant might explain her research, request a critique of a poster from the rest of the group, and explain that she wants to incorporate a group member’s suggestions into the next revision of her slide show presentation.

Once we had described the instances of interactive learning in the session, we verified the first 10 minutes and five seconds of the transcript, and corrected any mistakes. We chose to limit the corrections due to the extremely time-consuming nature of transcription. We ran a computer
search on the corrected section of the transcription to search for epistemic modals and epistemic adverb phrases, student questions, cognitive and communicative verbs, and instances of verbal overlap. Afterwards, a linguistics Ph.D. candidate reviewed the results of the search to corroborate that all the instances of the linguistic markers could be assumed to indicate cognitive activity, as opposed to being part of an idiomatic expression, for instance.

**Categories of Interaction**

After real-time ethnographic research conducted during RCS sessions, as well as close study of video recordings in which they were not participants, the English and linguistics graduate research assistants defined and described nine categories of interactive learning in order to better describe distributed cognition in the studio environment. Instances of interactive learning—conversational contributions that comprise constructed learning—fall into several categories, and represent a detailed description of cognitive contributions during the session studied for this paper.

*Elicitation Of Critique (ELICIT)*

A participant elicits critique when he or she requests feedback on an idea or mode of presentation. Also, prompting a participant to analyze another participant’s work, or to affirm knowledge is considered elicitation.

*Critique/Analysis (CRIT)*

Critiquing, analyzing, or making suggestions about the mode of presentation, logic of argument, or depth of knowledge of another person’s work in or out of the group are examples of critique/analysis.

*Adoption (ADOPT)*

Adoption of a suggestion made by another participant or someone outside group as manifested in some change is representative for this category. Also included are utterances in which a student makes reference to a previous version of her work, or describes how her work has changed as the result of adopting or adapting a critique.

*Instruction (INS)*

Instruction on the part of one of the participants in procedural or other knowledge.

*Internalization (INT)*

Internalization involves internalizing, referencing, or otherwise demonstrating that instruction in earlier sessions has been operationalized by the student.

*Contextualization (C1 and C2)*

C1 is contextualization of a student’s own research by that student. C2 is contextualization of someone else’s research.

*Explanations (E1, E2, and E3)*

E1 is an explanation of a student’s own research or related concept, whether communicative or otherwise related to their research. E2 is an explanation of another student’s research or related concept.
E3 is an explanation of procedural knowledge, such as showing or demonstrating how to do something.

Negotiation (NGO)
Negotiation is the collaborative construction and synthesis of information or knowledge, including problem solving. This category includes statements and sequences of statements that, taken individually, might not appear to be indicative of cognitive development, but at the same time are crucial components to a larger construction of information and understanding.

These interactive categories describe many of the kinds of distributed cognition that occur in studio sessions. In addition to serving as a means of identifying instances of distributed learning, these categories also might serve as guidelines for eliciting certain types of interaction in programs similar to the RCS.

**Structural Linguistic Features of Studio Discourse**

Several linguistic features that have been associated with cognitive activity—representing different levels of language structure—have been selected in order to test whether they support and correspond to the instances of distributed contribution independently identified in the video session.

**Epistemic Modals and Epistemic Adverb Phrases**
Epistemic, or evidential, modal verbs and adverb phrases possess two main functions: “They indicate the source of knowledge, and the speaker’s degree of certainty about the proposition expressed.” Epistemic adverb phrases include *I figure, I think that, I’m just guessing, probably, maybe, perhaps, I guess;* epistemic modals can include *would, could, can, may, will, should.*

**Examples:**
- Modal: It *might* be used for various applications.
- Epistemic Adverbial: Eventually, it will *probably* be part of my goals.

**Questions**
Although interrogative form may serve many different functions, for this analysis only interrogatives which functioned to elicit information were counted as questions. For example, at one point a mentor says to a student, “Could you go back to the slide?” This is really a directive rather than a question; thus, although it has the form of a question, it is not coded as such.

**Example:**
*Is that like in-progress report, or progress report and other stuff?*

**Cognitive and Communicative Verbs**
Recognized by linguists as a semantic category, these verbs refer to a higher-level cognitive process or a communicative process, including *understand, explain, hypothesize, clarify, conclude, verify, nullify, compare, correspond, convey, say, tell, get across.*

**Example:**
When we have to give it back to y’all and try to *explain* it to someone else is helping me *understand* what I am trying to do.
**Interruption/Overlapping Discourse**

Instances where students’ discourse overlaps indicate co-construction of ideas, and anticipation of the next thought or thoughts. Finishing sentences is an example of interruption/overlapping discourse.

**The Students**

The student subjects who are the focus of this research include one chemical and two electrical engineers; two of the students graduated in the same semester under study; the third, who continued in the RCS for two subsequent semesters, will graduate in May 2004. Future research may take into account the gender and language backgrounds of the students. The demographic makeup of the students and RCS faculty is described in Error! Reference source not found..

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Table 1. Makeup of faculty and students in the RCS Wednesday session on 9 April 2002

It must be noted that RCS students are self-selecting participants who must be nominated by their faculty advisors; they are generally highly motivated and capable students. However, as participant observers we have noted that student collaboration challenges students—as well as the academic and professional fields in which they are fledgling members—in ways that individual study could not. We believe the interactive character of the session under study is reflective of students’ cognitive, social, and professional development.

All of the students continue to excel in their engineering careers as RCS alumni. S2, a senior, worked on his Honors College thesis during 2003 and won an award for his poster presentation at the 2003 national AIChE meeting in San Francisco.

S3, now a graduate student in electrical engineering, completed and defended his Honors College thesis during his last semester in the RCS program. He is now a member of the international Virtual Test Bed (VTB) project team based at the University of South Carolina and recently presented his research to the VTB Users and Developers Conference in 2003.

Finally, S1, now a graduate student in electrical engineering, received an NSF fellowship in 2003. She is participating the Engineering Fellows program, an NSF-funded project to develop the communication skills and teaching abilities of graduate and undergraduate engineering students and enhance science education in South Carolina schools by providing direct assistance to teachers in the classroom. In spring 2003, she won an award for her poster presentation at the USC Discovery Day, a university-wide competition for undergraduate researchers.
Data Analysis and Significance of Findings

The studio session took place late in the second semester of RCS. As a result, the participants were familiar with each other’s conversational patterns and interacted without the situational awkwardness that sometimes affects communications when group participants are unfamiliar with each other. In this session, students 1 and 2 participated the most, because their final deliverables were the ones being discussed; student 3 participated in talking with them about their deliverables, but did not have a deliverable of his own to discuss for that session. S2 seemed to participate less than S1 did, but because of how participation was coded, S2’s reading of his abstract and discussion of it afterwards constitute one long turn, as opposed to the more give and take of S1, whose deliverable that day was a poster.

Figure 1 details how often the participants contributed to the group’s interactive learning, according to the nine categories defined as indicating distributed cognition.

![Number of Times Each Studio Participant Contributed to the Group's Interactive Learning](image)

Figure 1. Number of times each studio participant contributed to the group’s interactive learning

At first glance, the graduate engineering mentor seemed to be participating the most, but his participation is only a little over half that of the students taken as a whole, at 40 versus 70. Given that the graduate mentor’s role is to provide feedback and advice to the students, this balance of participation is appropriate. As illustrated in Figure 2, most of M’s constituted critique and analysis of the ideas and work that the undergraduate students bring to the studio.

The levels of participation detailed by the bar graph in Figure 2 accurately represent that session’s dynamics.
Figure 2. Graphical representation of instances of categories of interactive learning by participant.

The faculty member defined her role as eliciting questions when the discussion energy level flagged, and the majority of her participation is in the elicitation category. Her other main mode of participation is in the negotiation category; negotiation of meaning is also an appropriate category for a person interested in keeping the conversational dynamics lively and informative. The graduate mentor does more talking than any other one participant, because there were lengthy discussions of professional best practices in this studio session. The graduate mentor is the expert in this field; his explanations help the undergraduates increase their sense of their own professionalism.

Figure 1 indicates that S1 was the most advanced with respect to a professional researcher identity, and that impression is borne out on the session video. Her three major roles in the studio – negotiating meaning and offering critique and analysis were consistent with her developing ethos in the engineering discourse community.

S2 is a strong undergraduate researcher all-around. He was as comfortable offering a critique of another student’s work as he is explaining his own research, or participation in negotiating meaning.

The majority of S3’s participation was in his analysis of the work he had left to do to complete his honors college requirements, and a great deal of reflection of how the things he learned in
RCS improved his communication skills; the bar graph reflects this level of participation. The data on contributions per participant in Figure 2 are summarized in Table 2.

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<th>S2</th>
<th>S3</th>
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</table>

Table 2. Numerical representation of instances of interactive contributions by participant

Another interesting patterning of the types of interaction is the way they cluster for the different conversational topics that develop during the session. Figure 3 illustrates the number of instances each type occurred during each of nine topic segments.

![Clustering of Interactive Contributions for Nine Topic Segments over 40 Minutes](image)

Figure 3. Clustering of interactive contributions for nine topic segments over 40 minutes

Whereas the topic of S1’s poster involves only elicitation and critique, discussion of the plotter additionally involves some instruction and internalization. Instruction overwhelmingly
characterizes talk about S3’s honor’s thesis, and also S1’s lesson plans. Instruction and internalization appear to occur during half the session, more or less.

Not surprisingly, both critique and elicitation appear to be present throughout the entire session; however, negotiation occurred towards the end of the session when participants discussed S1’s lesson plans, letters of recommendation, S2’s poster abstract and a related topic involving audience analysis.

Notably, explanation of students’ own research also seemed restricted to those topics. One reason for this might be that the session was less focused toward the end, such that participants’ roles were less strictly defined so that all participants may take on a relatively equal role as co-negotiators.

In addition to the types of interactive contributions studied, four structural features were analyzed in the first ten minutes of the video transcript. Those features are summarized below in Figure 4.

![Number of Instances of each type of Structural Feature During the First 10 minutes of the Session](image)

**Figure 4.** Number of instances of each type of structural feature during the first 10 minutes of the session.

While epistemics outnumber the other features by far, this could be due to the fact that the category represents individual words while questions and overlap represent whole utterances. Also, epistemic modals may occur with epistemic adverbials, and may co-occur with cognitive and communicative verbs. What seems clear is that each of these structural features is present in the ten-minute transcript.

However, the features are not evenly distributed during the ten-minute segment, as illustrated in Figure 5 below.
Although the structural features are scattered throughout the segment, their density is greatest between 0 and 350 seconds; this is also where almost all of the epistemics occur. Cognitive and communicative verbs also are more dense during this period, and interruptions and overlaps all occur roughly within this frame.

Comparison with the distribution of interactive contribution types during the same interval reveals some curious patterns. Figure 6 illustrates the clustering of interactive categories in thirty-second segments, across the first ten minutes of the session.
Figure 6. Clustering of types of interaction during the first 10 minutes of the session

Although structural features and categories of interaction clearly do not map to one another, their distribution does roughly coincide. The fact that these sets of descriptors were developed independently of one another to identify and measure distributed cognition—and that they appear to occur in the same vicinity of the ten-minute interval—strengthens the validity of the test instrument.

Conclusions and Future Directions

This research contributes to the field insight into how distributed cognition occurs in Studio sessions. Also, it offers tools that are useful not only for approaching questions about the learning process as a theoretical puzzle, but also for guiding and facilitating the kinds of interactive contributions that we many have argued are crucial to students’ cognitive development.

In order to further investigate the initial findings presented here, more extensive analysis will be conducted based on the methodologies developed in this study. Analysis will extend to the other RCS sessions during Spring 2002 in which the same team members met. The patterns of students’ participation over the course of the semester may reveal further insights about the course of their individual cognitive and professional development as well as their interactive
development as a team. Such a direction might be able to address the incipient formation of communities of practice, as well as the avenues by which individuals may join them.

Also, selections from additional transcripts will be edited for accuracy and the methodology for analyzing structural language features in those excerpts will be refined and extended. Finally, the ways in which distributed cognition influences or interacts with the emergence of students’ metacognition, their awareness of the learning process, will be explored. To this end, further subdividing interactive categories might aid in investigating when and how participants become aware of their learning.

Case studies which focus on a student’s discursive interaction and non-linguistic performance across more than one semester also may indicate the interplay of distributed cognition and metacognition, along with the anticipated effects of these phenomena on students’ cognitive strides and claims on researcher identity.

Acknowledgements

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Appendix I: First 10 minutes of Transcript

RCS  Wednesday  4-9-03  Transcription Key:

[ ] frame paralinguistic events such as laughter
( ) denote questionable part of transcription
{ marks overlap with previous speaker; excludes
minimal responses and side conversations
? denotes questions (information-seeking)
^^^ marks unintelligible speech
“ ” marks reported speech

1 F: Which do you say “Oh no” to?
2 S1: Ah, I was just joking. Industry’s not so bad.
3 F: [laughs]
4 S1: I like industry. Well, the little part that I saw. The little--
5 M: {I did too when I started. “This is so cool I have so much
6 responsibility.” Then it became, “Ach, God, I have so much responsibility.”
7 S1: { Well, see I--I only had it for a few months at a time,
8 so I… I didn’t have ^^^. How many credit hours does a full time student have?
9 M: Twelve
10 F: What do you need to do with your poster?
11 S1: Um, I just want to swipe it off the wall, and...
12 [Everyone laughs]
13 S1: And also--
14 M2: {You can’t ^^^
15 S1: Well, it’s going to; it’s going to. Because then you can say “Hey, through RCS she was
16 able to win 500 dollars.” And ^^^
17 F: {That’s right.
18 M2: {That’s right.
19 F: I’ve got to take a picture of you swiping your poster? 
20 S1: Alright, uh, and I want, uh, you guys’ opinion on if you think I should change anything,
21 (well) I mean I know that the slides aren’t exactly in the right order that they’re supposed to
22 be; they’re going (in unusual orders).
23 01:05
24 F: Okay so you want us to help you look at these.
25 S1: Right.
26 M2: I don’t know if you need it, we still have that ^^^ presentation as well if you need to
27 make changes.
28 S1: Well (of course there is still room for change). I have it somewhere.
29 M2: Cool.
30 S1: It will be returned afterwards. Hopefully
31 F: {Hopefully for our decor.
32 01:25
33 S1: Right. Hopefully a big first prize written on it.
34 [Everyone laughs]
35 M2: {There you go; that sounds good.
36 M: I’d like to see a few more slides.
S1: [Looking at poster] Will they fit on there?
M: Make that nine, make that nine slides. [Nodding]
S1: Ok. That’ll work. [Nodding]
M: That’s what I’d like.
F: What what what would you put in the slides?
M: Well, I'm not—I haven't quite gotten to that point yet but I think that if you can extract some more information...

01:50
S1: {And I can change the—why the PIL method is better by by putting in that sentence that um, Rod was talking about, you know, trouble shoot through the code and... ^^^}
M: Mhm. [Nodding]
S1: {And in the paragraph I didn’t say anything about the 401 car. Do you think I should leave that in or take it out? ^^^ (because it's an application)
M: {No, I think you can leave it in, as, as an application of Processor-in-the-loop; absolutely.}
F: That’s a neat picture, two pictures.
M: Yeah.You know with the alternate PIL design process,
F: Good Morning, Justin.
M: the font's really small, so you can even..
S1: {Right, stretch that out for a couple of slides.}
M: That's the focus of your presentation, right,
S1: {Basic ^^^}
02:05
M: is the Processor-in-the-loop design process(?)
S1: What about the (basic design process there)?
03:00
M: I’d try to make the words (a little bigger if you could, maybe put arrows between ^^^.. so that they’re not like ^^^
S1: I can do that. [Nodding] {If they can’t go from one to two to three,}
F: Good morning Rod.
S1: and it actually says step one, step two, and then just three; there’s no step three ^^^.
M: Yeah. [Nodding] {Turning to camera} Oh we're being video taped.
S3: Is it EE or civil engineering, one of them has a plotter and that’s what ^^^ ^^^
M: {Civil has.}
S3: That would make sense. Civil has a plotter. ^^^ 'cause ah
M: {We do too but (it won't make posters); it's really bad.
S3: Well, there’s a way to do it ‘cause that’s how Chris Long did his for the graduate symposium.
M: Yeah, supposedly the ChemE group has some sort of agreement with civil, so I would talk to... (your) advisor.
03:50
Well I've already, like ^^^ set up 'cause Chris knows the guy because he did it all before. Uh, but I think that’s what Gatske wants me to do. ^^^ (Make a big poster).

(To have a big poster, yeah).

It’s just something about the formatting and the slides just like you were saying before about setting it to four by, or three by four size... So ^^^ ...

Yeah. ^^^

It's in civil. They have a very good plotter in civil.

And Libby’s working on us getting access to it, right? I think.

Oh, well maybe to the same plotter yeah. Could be.

Oh, I don’t know. It was to make a poster.

Yeah, well that’s, that's probably the (only machine in this building that's capable of doing it).

Rod would you ^^^ for just a little bit; you can kind of report.

Okay.

Ah, (submitted my abstract so I'm just waiting).

Okay.

[S2 writes his objectives for the session on the board while others look on]

[Laughter] I actually went (to class on two hours of sleep. ^^^

So when now when do you have the defense?

I need to find some time that Dr. Dougal is free to go, and Libby. And scheduling Dr. Dougal to anything is difficult, but I'm going to try (Dougal) for next week.

Uh huh.

Now are you going to do a run-through? Like we talked about?

[Nods] {I would like to. I would like to. Um, at the end of this week or the beginning of next week ^^^ (possibly).

Well um, if you want to do it down in my lab with a screen projector the whole nine yards you can do it. Just let me know when. Afternoons are better for me, personally, so.

Afternoons are better (for me too).

I (won't be awake)....

[Everyone laughs]

^^^ wake in the afternoons (either). [laugh]

So you're almost done; do you have it written?

I have the um, I have completed the uh thesis, I haven’t sent it to you yet but I will do that. The thesis and I will turn— as soon as I have the schedules that will put what to do in I will turn that in to the Honors College. And after the defense I will (revise it so that that’s finished). Final draft.

Alright. So are you, do you feel like your pretty much ready when you get the schedule?

07:02

Yes, I believe so, I still have to finish off the slides. I think I have ^^^.

That's great. 
S3: There will be, I’m sure there will be a lot of changing that (I will have to do) because I personally can’t judge how my own presentations are going; I found that out. Early enough, you know.

07:30
F: When did you find that out?
S3: Um, well I— Last semester RCS was also one of those great helps when realized that other people would actually be able to help me to do better. But, before that I just thought that I could not just do a good presentation (and I left it at that).

[Everyone laughs]
M: Did you um, did you give any thought to making a handout with terms?
S3: I will be making my handout on Thursday.
08:00
M: Um, tentatively, do you want to do something Friday afternoon?
S3: Sure.
M: What time is best for you?
S3: Um, any time (after three).
M2: We have a projector if you guys need it.
M: Do you have a, do you have a laptop that the presentation is on?
S3: Yes, I have my laptop to bring. To put the presentation on.
08:30
M2: We can bring the projector on Thursday ^^^so it will be here on Friday.
M: Okay.
M2: We'll make sure (you guys have it).
S3: Thanks.
M: Let’s, let's tentatively say Friday at 3.
S3: Okay.
M: Do you know where (the lab) is?
S3: No.
M: The mechanical side of the building.
S3: Um huh.
M: In the basement. Room A021.
M2: Doesn’t that (want to keep you from wanting to do) the presentation?
[Everyone laughs]
F: (That's a nice place down there).
S1: (Experiments).
09:00
M2: (That’s right). ^^^
S1: The (sub) basement?
M: It's the floor below mine.
S1: It's freaky down there.
M: It's scary. There used to be people that lived down there.
F: Really lived there?
M: Yes.
F: Homeless people?
M: Yes.
S1: Well if no one else wants to go there...
S3: What's the room number again?
09:30
M: A021

F: We see, always see John with his notebook—Um, I don’t want to get too involved in this question, but we're thinking of next year having uh, students—we’re considering-- having RCS students keep a, a notebook that they can bring to RCS meetings. What would you think of that?

10:05