

Preliminary Study of Online Class Discussions: Cognitive Complexity and Student/Instructor Roles

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Purpose of the Study

Describe and compare:

- **Cognitive complexity** of class discussions between students and instructor
- **Discourse** properties during class discussions
- Final **grades** and project / exam grades
- Student **satisfaction**

in **two modes** of course delivery:

- **Online**
- **On-campus**

Course

- ◆ SpEd 861: *Programs for Infants with Disabilities*
 - 3 credits
 - Learning objectives:
 - knowledge and skills
 - ▲ associated with delivery of early intervention to families with infants and toddlers who have developmental delays or identified disabilities.
 - Practicum required
 - weekly home-visiting
 - Evaluation tools:
 - exams, self-reflections, applied projects, in-class activities and contributions to discussions

Subjects: Instructor

- ◆ Female
- ◆ Ph.D. in Early Childhood/Special Education
- ◆ 15 years clinical work with infants with disabilities
- ◆ College Teaching Experience: 23 years
- ◆ Graduate Courses: 19 years
- ◆ Distance Education: 4 years / 14 courses
- ◆ Online Teaching: 3 years / 10 courses
- ◆ SpEd 861: 15 Xs / 1 X online
- ◆ Two Outstanding Teaching Awards

Subjects: Students

	On-campus	Online
15 females	7	8
Ages	5 under 31 yrs	7 over 31 yrs
Degree / non-degree	5 degree 2 non-degree	5 degree 3 non-degree
Enrollment Status	6 part-time	7 part-time
Profession	7 educators	5 educators 1 OT 1 SLP 1 Psychologist

Learning Environments

On-campus 16 weeks	Online 8 weeks
blackboard.unl.edu <ul style="list-style-type: none"> • Classnotes / video clips • Reading Discussions 	blackboard.unl.edu <ul style="list-style-type: none"> • Classnotes / video clips • Reading Discussions • Class Discussions / activities
Computer classroom <ul style="list-style-type: none"> • 3 hrs weekly • Before- / after-class access to instructor • Class discussion / activities 	Community video-conferencing <ul style="list-style-type: none"> • 2 X during semester • Phone access to instructor by appointment
Home or work computers	Home or work computers

Class Discussion

Research Methods

- ◆ **Surveys**
 - mean responses
- ◆ Audio-taped/**transcripts** of on-campus class discussions
 - coded
- ◆ **Printed** online class discussions
 - coded
- ◆ Student course **evaluations**
 - mean ratings
- ◆ **Interviews** with students & instructor

Data: Demographics

(written surveys)

- Age, degree plans, professional experience
- Learning Style Profile
 - adaptation of Kolb, 1984
- Computer Skills
- Time commitments
 - 2 week log

Data: Class Discussions

- ◆ **Cognitive Complexity** (adaptation of Bloom's Taxonomy)
 - Level 1: Knowledge / Comprehension
 - Level 2: Application
 - Level 3: Analysis / Evaluation
 - Level 4: Creation / Synthesis
- ◆ Mean **Reliability** of Coding:
 - on-campus: 73.5% agreement
 - 60-80% over four samples
 - online: 77.5% agreement
 - 50-82% over four samples

Data: Class Discussions

- ◆ **Discourse** Patterns
 - Initiation vs. Response
 - Question vs. Comments / Explanations
- ◆ Mean **Reliability** of Coding:
 - On-campus: 93.5% agreement
 - ▲ 63-100%
 - Online: 92.6% agreement
 - ▲ 77-100%

Unit of Analyses for Coding

- ◆ Student or instructor **speaking turn**.
 - Any initiation, response or continuation by a speaker;
 - Any new speaking turn or shift in topic.
 - Can be as short as one word ("Yes") or as long as many sentences.
 - Social back-channeling was not considered a turn / unit
 - "Hmmm", "OK", "Ah"

E: Does anybody notice that about their child and you, your relationship, that he is now doing things a little bit longer or a little longer duration than when you first met them? Anybody have an example of that? (Pause for response)

S6: I guess last week when we, when I first came over he was in his high chair and they were finishing eating and I sat at the table to talk to mom about the things I'd brought and then she put him on my lap 'cause she was cleaning up his high chair. He grabbed my pencil and started to scribble and he. The first or second time that I came he did the same thing but it was really short and he didn't show much interest. And this time, he did it for like at least five minutes. And then I got, she gave me another pencil and I would scribble and he would scribble and I would scribble and he would scribble.

E: If you follow him, he stays with it?

S6: Yeah. He did it for quite a long time.

E: Okay, anybody else? Did you find you can extend their focus, their interest by doing something with them?

S3: A little girl I worked with, she didn't get a lot of joint attention at home so when I'm there we can stay in an activity for a long time, I mean a really long time. And every time mom says, "Well, she never stays at one thing for very long", "Well, when I'm playing with her and talking to her . . ."

E: Yeah, commenting on it and kind of elaborating on it

S3: And she's feeding me and I'm helping her feed the baby, so we play for a long time.

E: So, is that a focus for you in your visits with your parent to get that parent ...?


S3: We're working really hard on that.

E: Okay, yeah what you're getting at is so many things, different domains, but the cognitive domain is so important to that joint attention and joint focus and the joint action that has to come into it and then certainly, contingency. Having responses happen when the child does something. So the child starts to see a relationship between the effects of his actions immediately, brilliantly. You know it's quite highlighted it doesn't have to be five, ten, twenty minutes to see the effect. That's why projects are not a good idea with this age group because they can't wait that long to see the finished project.

Results: Demographics

NO significant differences noted between the two groups of students for:

- Learning Styles
 - both groups were more "feelers and watchers" vs. "thinkers and doers"
- Age
- Degree plans
- Professional experience
- Computer skills
- Final grades and most assignment grades



Results: Time logs

- ◆ **Significant differences** between groups for:
 - **Time** spent reading classnotes online
 - Online
 - ▲ 2.66 hrs / week
 - On-campus
 - ▲ 1.22 hrs / week
 - ◆ **Points** earned for discussion of readings online
 - Maximum 50 points
 - ▲ Online
 - ◇ 42.1 points
 - ▲ On-campus
 - ◇ 33 points

Results - continued

- ◆ **Significant differences** between groups for:
 - **Student ratings** for value of reading discussions online
 - 5 point scale
 - ▲ Online: 4.25 points
 - ▲ On-campus: 3.17 points

Results: Class Discussions

- ◆ **Significant differences** between groups for:
 - **Levels of Cognitive Complexity**
 - **Number of Student and Instructor**
 - **Questions**
 - **Comments**
 - **Speaking Length / Turns**

Cognitive Complexity: **Students**

- ◆ **Significant differences** between groups
 - Online Mean = 2.68
 - On-campus Mean = 2.02
- ◆ Specifically:
 - Level 3 > Levels 1, 2, 4 in both courses
 - **Level 4 > in online course**
 - **Level 1 > in on-campus course**
- ◆ **No significant differences** noted among students within either course

Cognitive Complexity: **Students** (Instructor)

	1 Knowledge/ Comprehension	2 Application	3 Analysis/ Evaluation	4 Creation/ Synthesis
On-campus	41.8% (28.3)	13.3% (17.8)	43.2% (52.3)	1.6% (1.6)
Online	10.0% (13.1)	17.4% (19.0)	68.4% (65.5)	4.2% (2.4)


Cognitive Complexity: **Instructor**

- ◆ **Significant differences** between courses ($p = .001$)
 - 2.0 X more use of **Level 1 on-campus**
 - .2 X more use of Level 3 online
 - .5 X more use of Level 4 online
- ◆ Online
 - Instructor's use of all levels = Students' use
- ◆ On-campus
 - Instructor > Students for Level 3
 - Instructor < Students for Level 1 ($p = .001$)

Student-Instructor Discourse

Significant Findings (see Table 1)

- ◆ Frequency:
 - Instructor talk > Student talk **on-campus**
 - Instructor talk = Student talk **online**
- ◆ Instructor Initiations
 - on-campus > online
- ◆ Instructor Responses
 - online > on-campus



Student-Instructor Discourse

- ◆ Speaking Length / Turns:
 - Mean length of **Instructor turns: online = on-campus**
 - Mean length of Student turns: online > on-campus
 - Mean # Student turns: on-campus > online
- ◆ **Questions**
 - **Instructor: online = on-campus**
 - Students: online > on-campus
 - Instructor Answers: online > on-campus
- ◆ **Comments**
 - **Instructor: online = on-campus**
 - Students: on-campus > online

Results: **Correlations** (see Table 2)

- ◆ **No Significant Correlations for:**
 - **Student Cognitive Complexity** and
 - Demographics
 - Learning Style Profiles
 - Time Logs
 - Final or Project / Exam Grades
 - Questions or Comments
 - **Learning Style Profiles** and
 - Time Logs

Significant Correlations

◆ Online group

- Student Cognitive Complexity and
 - Computer Skills (-.77)
 - Student Speaking Turns (+.157)
 - Student Answers (-.153)
 - Self-Reflection Assignment (+.91)
- Instructor Cognitive Complexity and
 - # of Turns (-.309)

Significant (low) Correlations

◆ On-campus group

- Instructor Cognitive Complexity and Instructor's:
 - ▲ Initiations (+.149)
 - ▲ Responses (-.149)
 - ▲ Questions (-.187)
 - ▲ Comments (+.20)
- Students' Cognitive Complexity and Students'
 - ▲ Initiations (+.112)
 - ▲ Responses (-.112)

Significant Correlations

◆ On-campus group

- Student Learning Profiles and Student:
 - Speaking turns (+.76)
 - Responses (+.77)

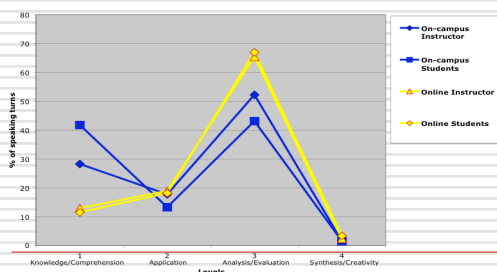
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Summary

- ◆ Online course provided a **better match** between instructor and students for cognitive complexity
- ◆ Online course resulted in **higher cognitive complexity** for student's contributions to class discussions

Summary

Cognitive Complexity in On-campus & Online Discussions



Summary

- ◆ Demographics **do not** appear to influence cognitive complexity of class discussions
 - not learning style profile, computer skill or age/major
- ◆ Student time commitments to course **do not** appear to influence cognitive complexity of class discussions

Summary

- ◆ Length of Student turns **does** appear to influence cognitive complexity at least online
 - **Longer** speaking turns per student (online)
= **higher** levels of cognitive complexity
 - **Shorter** turns per student (on-campus)
= **lower** levels of cognitive complexity

Summary

- ◆ **Instructor's** frequency of talk and use of responses/comments **does** appear to influence students' levels of cognitive complexity
 - **More initiation** of topics (on-campus)
= **lower** levels of student cognitive complexity
 - More **responses** and **more comments/answers**
= **higher** levels of student cognitive complexity

Summary

- ◆ **More** student **talk** (\geq Instructor talk)
= **higher** levels of cognitive complexity

Online instruction offered greater opportunity for student talk

Implications

- ◆ Online courses can adequately meet or exceed on-campus course efforts for high levels of critical thinking
- ❖ Whether online or on-campus, instructor talk-time needs to be minimize and **student talk-time needs to be maximized** if higher levels of critical thinking are to be achieved

Implications

- ◆ Online class discussions may be a way to **augment on-campus teaching efforts** in order to achieve the higher-level complexity of class discussions

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Research Needed

- ◆ Analyses of the instructor's
 - Cognitive complexity over the term
 - Questions/Comments and student cognitive complexity
 - Scaffolding by instructor
- ◆ Analyses of speaking patterns that result in higher cognitive complexity in student contributions
 - Length of student turns (# of units)
 - Number of student turns

References

- ◆ Anderson, L. & Krathwohl, D. (Eds.) (2001). *A taxonomy for learning, teaching and assessing: A revision of Bloom's taxonomy of educational objectives*. New York: Addison, Wesley, Longman, Inc.
 - ◆ Heckman, R. & Annabi, H. (2003, January). *A Content Analytic Comparison of FTF and ALN Case-study Discussions*. Proceedings of the 36th Hawaii International Conference on System Sciences (IEEE): 1-10.
 - ◆ Kolb, David A. 1984. *Experiential Learning: Experience as the Source of Learning and Development*. Prentice-Hall, Inc., Englewood Cliffs, N.J.
 - ◆ McCormick, D.F., & Whittington, M. S. (2000). Assessing academic challenges for their contribution to cognitive development. *Journal of Agricultural Education*, 41 (3), 114-122.
 - ◆ Miller, G. & Pilcher, C.L. (2001). Levels of cognition reached in agricultural distance education courses in comparison to on-campus courses and to faculty perceptions concerning an appropriate level. *Journal of Agricultural Education*, 42 (1), 21-28.
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Questions?

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