A Content Analytic Comparison of FTF and ALN Case-Study Discussions

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Abstract

While much research has shown that ALNs can produce learning equivalent to FTF classrooms, there has been little empirical research that explicitly and rigorously explores similarities and differences between the learning processes that occur in ALN and FTF activities. Transcripts from eight case study discussions, 4 FTF, 4 ALN, were content analyzed. The study used a content analytic framework derived primarily from previous work of Anderson, Archer, Garrison and Rourke. These authors developed a model that studies cognitive, social, and teaching processes in ALN discussions. Based on the work of Aviv [5], the current scheme also considers characteristics of the discourse process. The findings provide evidence that ALNs generate high levels of cognitive activity, at least equal to, and in some cases superior to, the cognitive processes in the FTF classroom.

1. Introduction

Many researchers have argued that asynchronous learning networks (ALNs) provide an excellent vehicle for discussion-based learning activities. Some of the reasons cited for this assertion are increased reflection time, more democratic participation, benefits attributable to writing, etc. While much research has shown that ALNs can produce learning equivalent or better than FTF classrooms (e.g. see [1; 6]), there has been little empirical research that explicitly and rigorously explores the similarities and differences between the learning processes that occur in ALN and FTF activities. There is a lack of rigorously obtained data that shows in detail *how* FTF and ALN discussions are conducted, and *how* they achieve their respective effects.

One form of discussion-based learning is the case study method of instruction. While research suggests that students working in asynchronous networked environments can produce high quality case study solutions (e.g. [6]), a similar problem exists – we have little detailed understanding of how case study discussions work in each ALN mode. This paper addresses these needs by presenting the results of a study that compared case study discussions in both FTF and ALN modes.

The study had three objectives:

1. **Descriptive**. To provide a rich, detailed, descriptive comparison of actual case study discussions in both FTF and ALN modes.
2. **Methodological**. To expand our understanding of several content analysis approaches for analyzing ALN discussions.
3. **Pedagogical**. To explore methods for improving the conduct of case study discussions in ALN mode.

To achieve these objectives we observed 8 case study discussions: 4 FTF, 4 ALN. The same instructor conducted all 8 discussions. We used a content analytic framework derived primarily from the previous work of Anderson, Archer, Garrison and Rourke (see [19; 3; 9; 5]). This paper reports primarily on Objective 1 above, and provides a descriptive comparison of FTF and ALN case study discussions. Subsequent papers will discuss methodological and pedagogical issues in more detail.

2. Background

The Case Study Method of Instruction

The case study method is used in many settings in which professionals are trained, including management, medicine, law, and education. It is a collaborative and constructivist learning technique because students are expected to consolidate their learning by teaching one another [17]. The purpose of case study discussions is to

allow each student to help all the other students in the class gain a new perspective on case events.

Research on collaborative learning in technology-mediated contexts suggests that online collaborative learning can produce results comparable or better than those in face-to-face environments [1; 6]. But while ALN results can be equivalent or better, ALN processes may be significantly different than in FTF situations. For example, Curtis & Lawson [8] found that while there were substantial instances of collaboration in the ALN activities they observed, the nature of these collaborative behaviors was different than in FTF collaborative learning. Heckman et al. [11] found that the number of roles is reduced and the role structure simplified when technology is the primary means of group interaction. These studies suggest that the critical success factors for asynchronous collaborative learning may be different than in FTF environments. For this reason, it is important to understand in detail how the dynamics of FTF and ALN case study discussions are similar or different.

Content Analysis of ALN Discussions

Prior to 1992, ALNs were commonly studied using surveys, interviews, empirical experimentation, participant observation and case study methodologies [14]. Mason [14] pointed out that researchers had ignored the learning indicators available in the content of transcripts of ALN discussions and attempted to identify the skills and abilities ALN participants demonstrated in the discussions as indicators of learning. Henri [12] also recognized the richness of the ALN transcript in indicators of learning processes. She argued that in order to assess the use of CMC in education, a detailed content analysis framework was needed.

Henri [12] built a model containing three levels: the first addressing the product of learning, the second and third addressing the process of learning. There are five dimensions to this framework: participative, social, interactive, cognitive, and metacognitive. This framework served as the launching pad for the use of content analysis to analyze ALN content by many other researchers. Scholars like Hiltz and Turoff [13], White [19], Olson [16], Hass [10], and Newman et al. [15] built on Henri's framework and ideas to improve our understanding of ALNs.

In recent years, Anderson, Archer, Garrison and Rourke have been developing an analysis tool intended to be efficient, valid, reliable, and practical for the use of researchers and teachers alike. This tool is designed to evaluate the learning process of individuals collaborating using ALN [9]. Building on the work of scholars focusing on social interdependence, critical thinking, and constructivist learning [13; 19; 16; 10; 15; 9] presented a model that studies cognitive, social, and teaching processes (or *presence* as they refer to their dimensions.) Garrison et al. [9] argue that from the presence of social, teaching and cognitive indicators, a community of collaborative inquiry emerges. Their framework identifies the intellectual content of messages (*cognitive presence*), the instructional role (*teaching presence*), as well as the interaction among the members (*social presence*.)

Aviv [5] also developed a framework to analyze the content of messages and the nature of interactions. In his framework he builds on work of scholars focusing on critical thinking, constructivist learning and social interdependence (such as [12; 13; 15]). Aviv's framework identifies three processes to be present in ALN discussions: *social process*, *response process* and *reasoning process*. Using the three processes he analyzed the collaborative learning process in an ALN discussion.

Research Framework

We attempted to create a unified framework based on previous work that could be used to analyze the content of both ALN and FTF discussions. The framework we developed is based on the schemes used by Garrison et al. [9] and Aviv [5], which represent the most current integration of past work on critical thinking, constructivist learning and social interdependence. Preliminary data, suggested the addition of certain themes that previous research did not account for. Thus, the final framework is an integration of the works of Garrison et al. [9] and Aviv [5] with a few additions of our own. It uses four interdependent process dimensions to characterize the learning process: *social, teaching, cognitive and discourse.* The coding scheme is progressively elaborated in three hierarchical levels, as described below.

First Level: Four Major Processes

The presence of *cognitive*, *social*, and *teaching* activities, shaped by a particular style of *discourse*, is what creates the learning community. While Garrison et. al. [9] refer to their three categories as ***presences*****,** we adopt the terminology used by Aviv [5], ***processes*****,** to refer to the dynamic and interdependent nature of these behaviors. Both Aviv and Garrison et al. consider their elements to be interdependent [5; 9].

Cognitive Process. The cognitive presence and reasoning process are similar in both frameworks in that they measure the skills and activities used to construct meaning and reach a higher level of learning [9; 5]. However, Aviv arranges the indicators of cognitive

process in a hierarchal fashion to exhibit the level of skills and complexity, a practice we adopted in our framework. The cognitive element in both models is considered to be an outcome indicator for educational experience, since critical thinking and the achievement of higher levels of learning are assumed to be the goals of education. The other processes presented in the frameworks by both Garrison et al. and Aviv are considered to be processes that support this goal [9; 5].

Social Process. The social process in both works aim to capture the interpersonal characteristics and group cohesiveness [5; 9]. Social interdependence theory of cooperative learning suggests that cooperative learning promotes higher-level reasoning [5]. This is especially important in the asynchronous computer-mediated setting since the technology can mask the personal characteristics that are usually more readily apparent in the FTF setting. Aviv employs broad and general categories for the social process, indicating whether or not there is a social response present or not. Garrison et al. [9] define specific indicators to measure the characteristics of the social interaction.

Discourse Process. Aviv [5] introduced the response process as his third element in the framework. This element is to measure the content-relevant communication between learners and instructors. This is a response to the social interdependence theory of collaborative learning that suggests that responses from learners to learners differ than those responses from learners to instructors. The theory suggests that responses of learners to learners are at the highest level, from a cognitive perspective, preceded by responses of learner to instructor and the last in the non-responsive utterance [5]. Again, this element supports the cognitive process and adds another dimension. Because we expanded this process to include other attributes of the discourse, we refer to it as the *discourse* process in our framework.

Teaching Process. Teaching process is Garrison et al.'s third element in the framework. This element measures the design of the educational experience and facilitation [9]. Either instructors or learners can carry out this category; however, instructors usually perform the role. This element is also one that supports the cognitive element and the social process.

Second Level: Sub-Categories

The second level includes sub-categories that further group indicators in each of the four first level categories.

Aviv [5] includes a ***social process*** in his model, but does not identify specific indicators of social process. For that reason, we chose to adapt Rourke et al. [18] without modification. Rourke et al. [18] identified the three categories of *affective response*, *cohesive response* and *interactive response*.

The ***teaching processes*** in our framework are adopted with no modifications from [3]. This process includes two second level categories; *direct instruction* and *facilitating discourse*.

Our framework combines the ***cognitive process*** indicators developed by Garrison et al. [9] and those of Aviv [5]. While two of the second level categories we adapt are those of Garrison et. al. we do include some of the basic third level indicators that were developed by Aviv [5] in addition to some indicators of our own that emerged from the data. The cognitive process includes three categories on the second level. The first two, *exploration* and *integration,* were developed by Garrison et al., while the third, *analysis,* was introduced by us. These three categories represent different levels of learning. Consistent with Aviv's approach, the second level categories are ordered to illustrate the hierarchal nature of the levels of learning each indicator measures. The category we named *analysis* was introduced to fill the gap between exploration and integration. *Analysis* is the stage where frameworks are applied and problems are identified systematically.

Discourse process includes two second level categories, the *response process* developed by Aviv [5], and *discourse characteristics* that we introduced. Response process measures the interactions occurring by identifying the speakers and targets of utterances. The discourse process, on the other hand, was developed to highlight several linguistic attributes of the discourse.

Third Level (Specific Indicators)

The third level includes the specific indicators in each second level category described above. These indicators were applied directly to the data in the transcripts. As indicated above, most third level indicators were adopted directly from previous work [3, 5, 9, 18], with the introduction of five additional codes. In the cognitive process we introduced two indicators: *Rote Factual Response* and *Analysis.* In the discourse process we added three indicators: Identifying the *speaker* of an utterance (student or teacher), f*ormal* and p*assive voice.* Appendix 1 presents the specific codes in the third level and gives examples of each.

3. Method

We observed 120 seniors in Syracuse University during two case study discussions. They were enrolled in two

sections of the capstone course for the B.S. in information studies degree program. The sections contained 53 and 67 students. Since the capstone course is case-based, these discussions were normal course activities. Each student participated in two discussions. One took the form of a traditional, face-to-face, in-class discussion. The other was conducted asynchronously, using the bulletin board feature of WebCT, an instructional tool utilized in the course.

For these discussions, each section was randomly divided into two equal subgroups Section A, comprised of 50 students, was divided into A1 (25 students) and A2 (25 students.) Section B was divided into B1 (33 students) and B2 (34 students.) This division into four smaller subgroups allowed us to observe eight individual discussions: four in FTF mode, and four in ALN mode. It also permitted us to control for systematic order effects, group composition effects, and effects due to differences between the two cases used as discussion stimuli. The observation period lasted two weeks, allowing one week for each discussion. In week 1 all four groups discussed Case 1 (2 FTF mode, and 2 ALN mode.) In week 2, all four groups discussed Case 2 (each group changing discussion mode.)

The first author was the class instructor, and the discussion facilitator in both mediums. Each discussion was structured by the facilitator into three sections, with identical starting and transitioning questions in each mode. To control for the differences that might arise from the facilitator's interactions with the different groups and over the different mediums, we constructed strict facilitator guidelines intended to promote consistency across mediums.

In-class discussions were recorded and transcribed. Complete texts of ALN discussions were extracted from WebCT logs. The transcripts were analyzed by the second author using the coding scheme described above in section 2. A second coder was trained to use the coding scheme, and recoded randomly selected portions of the transcripts. The inter-rater agreement was 86% of all coding decisions.

4. Results

Discourse Process

Table 1 presents a comparison of the discourse processes in FTF and ALN case study discussions, and provides a first indication of how these two modes differ.

The first and most obvious observation is the sheer difference in the number of individual utterances. From a manual count of utterances, we found that in the average FTF discussion, there were 287 individual utterances, compared to 74 in the average ALN discussion. The FTF discussion was much more "back and forth" in nature, with the teacher asking questions and students responding, as shown by the relatively equal number of utterances by teacher (141) and students (146).

Table 1. Discourse Process in FTF and ALN Discussions

	ALN		**Face-to-Face**	
	Number	**Percent**	**Number**	**Percent**
Target/Speaker	149	79.33%	613	76.35%
NonResponsive	6	3.20%	2	0.19%
Response to learner	46	24.67%	173	21.56%
Response to tutor	22	11.87%	151	18.85%
Student	63	33.73%	146	18.14%
Teacher	11	5.87%	141	17.61%
Discourse Characteristics	39	20.67%	190	23.65%
Passive Voice	33	17.33%	9	1.15%
Informal	6	3.33%	181	22.50%
Total	188		802	
Average # Utterances/student	2		5	
Teacher: Words/utterance	50		80	
Student: Words/utterance	100		30	
Ratio:Student/teacher utterances	5:1		1:1	

The presence of the teacher was much more pervasive in the FTF discussions, averaging 141 utterances compared to an average of 11 utterances in each ALN discussion. In the ALN discussions, students carried a much greater share of the discourse. The ratio of student/teacher utterances was 5:1 in ALN, compared to 1:1 in the traditional classroom. In addition, student utterances were longer in ALN (100 words versus 30 words), while teacher utterances were shorter (50 words versus 80 words.)

FTF discussions employed much more informal language and active voice construction, while ALN discussions were more formal and employed much more passive voice. There was relatively little difference between FTF and ALN in the proportions of non-responsive utterances, responses to teacher and responses to student

Social Process

Table 2 presents a comparison of the social processes that occurred in these FTF and ALN case study discussions. While there were a greater number of social processes observed in the average FTF discussion (154 versus 124), the proportions of the three major categories (affective response, cohesive response, interactive response) were very similar in each mode.

The nature of the interactive responses in each mode, however, illustrate a fundamental difference between them. The FTF discussions were much more question driven (with virtually all questions coming from the teacher), while there was a much greater incidence of continuing a thread in the ALN discussions.

Table 2. Social Process in FTF and ALN Discussions

	ALN		Face-to-Face	
	Number	**Percent**	**Number**	**Percent**
Affective Response	8	6.67%	9	5.53%
Emotional Expression	4	3.43%	0	0.00%
Use of humor	0	0.20%	5	3.41%
Self-disclosure	4	3.03%	3	2.11%
Cohesive Response	19	14.95%	26	16.75%
Vocatives	13	10.10%	15	9.59%
Salutations & phatics	3	2.22%	0	0.00%
Use inclusive pronoun	3	2.63%	11	7.15%
Interactive Response	97	78.38%	120	77.72%
Continuing a thread	61	49.49%	0	0.00%
Ask questions	7	5.86%	94	61.30%
Quoting from others	0	0.20%	0	0.00%
Referring explicitly	11	8.48%	5	2.93%
Complementing	3	2.02%	6	3.90%
Expressing Agreement	15	12.32%	15	9.59%
Total	124	100.00%	154	100.00%

Teaching Process

It is clear that there were many more examples of traditional "teaching" in the FTF discussions. Table 3 shows that, on average, there were 125 instances of direct instruction in FTF, while there were only 18 in ALN. While the majority of these instances were to *confirm understanding*, the average FTF discussion contained 15 instances of *presenting content,* while the average ALN discussion contained only 2. There were also examples of *focusing the discussion* in the FTF discussion, which did not occur in the online mode. These focusing actions can be distinguished from larger, preplanned transitions in the discussions, which were coded as *discussion strategy*, and which occurred in both modes.

There were also more instances of *facilitating discourse* in the average FTF discussion. Most of these instances took the form of *drawing in participants*, which typically took the form of calling on specific students, often as "cold calls," a phenomenon that did not occur at all in the online discussions.

Finally, there appeared to be increased occurrence of *identifying agreement and disagreement* in the online discussions. Closer inspection revealed that, in the online discussions, virtually all of these instances were performed by students themselves, and not by the teacher. In fact, 14 of the 26 instances of *Teaching Process* (54%) in the average ALN discussion were performed by students. In the average FTF discussion, however, only 8 of 148 instances of *Teaching Process* (5%) were performed by students.

Table 3. Teaching Process in FTF and ALN Discussions

	ALN		Face-to-Face	
	Number	**Percent**	**Number**	**Percent**
Direct Instruction	18	68.93%	125	84.92%
Discussion Strategy	3	11.65%	5	3.05%
Present content	2	6.80%	15	10.34%
Focus discussion	0	0.97%	7	4.92%
Sum discussion	2	8.74%	3	1.86%
Confirm understanding	9	33.01%	93	63.22%
Diagnose misconception	0	0.00%	2	1.02%
Inject knowledge	1	2.91%	1	0.51%
Response to technical	1	4.85%	0	0.00%
Facilitating Discourse	8	31.07%	22	15.08%
Drawing in participants	1	3.88%	16	10.68%
Encourage std contribution	0	0.00%	0	0.00%
Identify agree/disagreement	5	19.42%	2	1.53%
Seek consensus/agree	1	2.91%	2	1.53%
Setting climate for learning	0	0.00%	0	0.00%
Assess the efficacy	1	4.85%	2	1.36%
Total	26	100.00%	148	100.00%

Cognitive Process

In the average FTF discussion we observed nearly twice as many instances of cognitive process as in the average ALN discussion (139 versus 71). However, Table 4 indicates that the distribution of the instances presents an interesting comparison.

In FTF discussions, the instances of cognitive process were predominantly in the lower order *Exploration* category. They consisted mainly of *rote factual response* and *information exchange*, almost entirely in direct response to questions from the teacher about the "facts of the case." In FTF discussions, *Exploration* instances accounted for 70% of all cognitive instances, compared to 17% in ALN discussions. This suggests that a more leisurely process of information exchange, potentially rich in detail, occurred in the FTF discussions.

In contrast, the ALN discussions contained more high-level Cognitive Process instances, both in absolute and relative terms. The most striking difference was in the Analysis category, with nearly twice as many instances occurring in the ALN discussions. Interestingly, the number of instances of the highest level Cognitive Process, *Integration*, was identical in both modes, suggesting that students were able to synthesize the facts

of the case and come to judgment and resolution equally well in both modes.

Table 4. Cognitive Process in FTF and ALN Discussions

	ALN		Face-to-Face	
	Number	**Percent**	**Number**	**Percent**
Exploration	12	17.19%	97	70.22%
Rote Factual Response	3	3.86%	34	24.37%
Triggering event	2	2.46%	3	1.99%
Information Exchange	8	10.88%	61	43.86%
Analysis	42	58.60%	24	17.51%
Analysis	18	24.56%	12	8.84%
Simple clarification	24	32.98%	11	8.12%
Deep clarification	1	1.05%	1	0.54%
Integration	17	24.21%	17	12.27%
Connecting Ideas	0	0.35%	1	0.72%
Inference	0	0.00%	2	1.26%
Judgment	5	7.02%	8	5.60%
Resolution	12	16.84%	7	4.69%
Total	71		139	

5. Discussion

The findings show quite clearly that even though the same students discussed the same cases, in discussions led by the same instructor, following identical discussion plans, there were substantial differences between the ALN and FTF discussions. Table 8 summarizes the major findings.

Table 8. Summary of Findings: Comparison Between FTF and OL Case Study Discussions

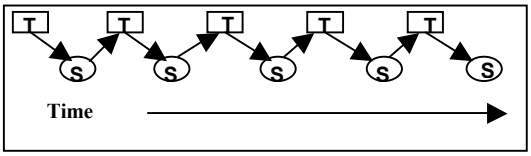
- Teacher presence was much greater in FTF discussions..
- Virtually all student utterances in FTF were responses to the teacher. In ALN discussions nearly two-thirds of student utterances were responses to other students.
- FTF discussions used more informal language and active voice..
- Student utterances were longer in ALN, while teacher utterances were shorter
- The major interactive operation in ALN was continuing a thread., while in FTF it was asking a question (usually by the teacher.)
- There was a greater incidence of *direct instruction* in the FTF discussion. This was true of confirming understanding (a feedback function), presenting content, and focusing the discussion.
- There was a greater incidence of drawing in participants, especially through cold calling on students, in the FTF discussions.
- More than half of the instances of Teaching Process in the ALN discussion were performed by students rather than the teacher.
- In the average FTF discussion there were nearly twice as many instances of Cognitive Process as in the average ALN discussion.
- In FTF discussions, the instances of Cognitive Process were predominantly in the lower order *Exploration* category.
- In contrast, the ALN discussions contained more high-level Cognitive Process instances, both in absolute and relative terms.

We will further discuss the implications of these differences by exploring three themes: (1) the sequence of dialog, (2) the relative contribution and role of teacher and student, and (3) the nature of cognitive processes in each mode.

Sequence of dialog in FTF and ALN case study discussions

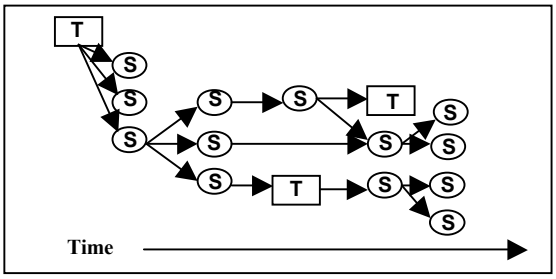
Even though teacher and students were discussing the same cases in each mode, the patterns of dialog in time were very different. The most obvious difference, of course, is that the FTF discussions occurred over 90 minutes, while the ALN discussions occurred over 7 days. The FTF discussions were of a steady, linear, turn-taking character (see Figure 1.) The teacher **[T]** asked a question (sometimes preceded by a comment), and a student **[S]** responded. The alternation of teacher and student was consistent. Each utterance was a direct response, tightly coupled to the immediately previous utterance. Each speaker was often talking directly to someone – students always responding to the teacher, teacher often directing a cold-call question, follow-up question, or feedback to a specific student. The time gap between utterances was regular and very short.

Figure 1. Pattern of FTF Dialog



The asynchronous dialogs lacked the linear, turn-taking character of the FTF discussion. (See Figure 2.)

Figure 2. Pattern of ALN Dialog



After the teacher initiated the discussions, a number of students responded, sometimes simultaneously, and often with no reference to other student responses. Once a discussion was going, many students might respond to a provocative comment by another student. The teacher occasionally responded to a few student comments, but mainly summarized the discussion and led transitions into new discussion areas. A number of student comments and several teacher comments generated no explicit response. It was possible to have several parallel discussion threads going simultaneously. Several students noted in a follow up survey that they "did not have time" to read other student comments before posting, and others complained of duplicated postings.

Thus it was not clear that students had received previous utterances in the dialog. The gaps between utterances were irregular.

Role of teacher and student in FTF and ALN case study discussions

These differences in the pattern and sequence of dialog have a profound effect on the conduct of asynchronous case study discussions. Much of the pedagogical literature on the case method instructs the teacher to "choreograph" discussions in order to allow students to make an increasingly complex set of discoveries and syntheses (e.g. [4]). Such choreography has traditionally been achieved through an incremental build-up of facts and inferences, and the linear nature of FTF dialog makes this incremental build-up relatively easy to control. The process is typically Socratic in nature, with instructors heavily using the functions of *questioning* and *feedback*.

In these asynchronous dialogs, students tended to ignore the lower-level, triggering, fact based questions initially posed by the instructor, and tended to immediately post problem analysis and solution responses. Because each response in the ALN discussion is larger and more complex, and because many responses occur at once, often near the end of the discussion period, there is difficulty structuring the feedback process. The typical Socratic questioning and feedback functions are to some extent dependent on the linear nature of the FTF dialog.

This suggests that instructors must choreograph ALN case study discussions differently than those conducted in FTF mode. Certain structural devices such as requiring students to post daily give the instructor the ability to more closely simulate the linear nature of the FTF discussion. But if asynchronous learning networks are to be truly "any time, any where," such constraints may be artificial and limit some students.

The nature of cognitive process in FTF and ALN case study discussions

There was a higher absolute and proportional incidence of abstract analytical processes in the ALN mode. The FTF discussions, on the other hand, contained a greater incidence of lower level cognitive processes in the *Exploration* category. This difference was probably a function of the "choreographic" issue noted above. In the linear, FTF discussion, the instructor was able to insure that the facts of the case were initially explored in a leisurely, detailed fashion, but was unable to accomplish this in the ALN mode.

Does this difference in the pattern of cognitive process matter? Should we conclude that the higher incidence of analytical expression in ALN discussions is an indicator of a more successful learning experience. Or does the absence of a richly detailed exploration of the facts make it less successful? Unfortunately, the design of this study does not provide additional comparisons of the quality of learning in each mode. In order to keep the process as natural as possible in the context of the course, we did not ask students to prepare additional, identical assignments that could be graded by independent assessors. Nevertheless, the findings suggest two speculations about the possible cognitive strengths and weaknesses of each mode.

1) One tenet of the case method is that it is experiential, or situational [6]. It is intended to simulate a realistic situation so that the student can get at least some of the benefits of experiencing that situation. If the complexity and ambiguity of realistic situations are to be simulated a sufficient level of concrete detail must be explored. Thus, we argue that ALN discussions will better achieve the experiential goal of the case method if they are able to find ways to incorporate more rather than fewer of the concrete *Exploration* processes.

2) These findings are consistent with previous work that characterize written ALN transcripts as demonstrating higher levels of abstract cognitive process. Because they were required to write rather than speak their responses, students appeared to be more careful, more formal. and far more reflective about their answers, as previous research suggests. These benefits of writing are unobtainable in the traditional case study discussion, but can be incorporated into the FTF case study process, by having students prepare either individual or group written assignments. .

Limitations

We note that observations based on these eight discussions do not necessarily reveal invariable attributes of either ALN or FTF learning modes. These discussions were based on a specific form of stimulus, the case study, which may have attributes that are different from other learning activities. In addition, these particular students were predominantly resident undergraduates enrolled in a traditional on-campus program. They were unlikely to have the same experience or motivation for ALN discussions as older, nontraditional, non-resident and ALN experienced students. Finally, some outcomes in this study may have been due to the idiosyncrasies of this particular instructor.

Conclusion

Despite these limitations, the findings provide useful empirical data for those attempting to maximize the learning potential of case study discussions in both face

to face and ALN modes. For example, these findings suggest that a combination of FTF and ALN methods might prove beneficial for on-campus students. And they indicate a need to find ways in ALN discussions to provide individual feedback and better access to the rich, concrete details of the case. They also provide additional evidence that ALNs generate high levels of cognitive activity, at least equal to, and in some cases superior to, the cognitive processes in the FTF classroom. This evidence confirming previous findings [1][6], is important because it comes from a new source of data – a rigorous and detailed comparative content analysis of FTF and ALN case study discussions.

Future research should turn to questions of reliability and validity of the methods used in this and previous content analytic studies. For example, while we have demonstrated that this framework can be used reliably by multiple coders, it remains to be demonstrated that it can be used reliably across multiple studies. Work is also needed to demonstrate that the cognitive processes identified here are true indicators of learning. Until they are triangulated with other, independent measures of learning, we will be unable to make this assertion. Thus, this study and its predecessors provide the foundation for much future research.

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Appendix 1: Coding Scheme

Based on Model of Community of Inquiry (Garrison, Anderson, and Archer (2000)) and ALN Process Model (Aviv (2000))

Category		Indicators	Definition
Social Process: Thematic Unit	Affective Response (Rourke et. al.)	Emotional Expression (Garrison et. al.) & (Rourke et. al.)	Expression of emotion, includes repetitious punctuation, conspicuous capitalization, emoticons.
		Use of humor (Rourke et. al.)	The use of teasing, cajoling, irony, understatements, and sarcasm.
		Self-disclosure (Rouke et. al.)	Presents details of life outside of class, or expresses vulnerability
	Cohesive Response (Rourke et. al.)	Phatics, salutations (Rouke et. al.)	Communication that serves a purely social function; greetings, closures.
		Vocatives (Rouke et. al.)	Addressing or referring to participants by name.
		Addresses or refers to the group using inclusive pronouns (Rouke et. Al.)	Addresses the group as we, us, our, group.
	Interactive Response (Rourke et. al.)	Continuing a thread (Rouke et. al.)	Using reply features of software, rather than starting a new thread.
		Quoting from others messages (Rouke et. al.)	Quote others messages or responses.
		Referring explicitly to others' messages (Rouke et. al.)	Direct references to contents of others' posts.
		Complementing, expressing appreciation (Rouke et. al.)	Complementing others or content of others' messages.
		Expressing agreement (Rouke et. al.)	Expressing agreement with others or content of others' messages.
		Asking questions (Rouke et. al.)	Students ask questions of other students or the moderator
Cognitive Process: Thematic Unit	Exploration (Garrison et. al.)	Rote Factual Response	State basic information from material or add to previous comment
		Triggering Event (Garrison et. al.)	Start of the discussion or topic, sense of puzzlement, transition and initiation into new line of thought.
		Information Exchange (Garrison et. al.)	Basic Information and brainstorming. Presentation of new ideas to group.
	Analysis	Analysis	Present argument or apply framework to evaluate situation
		Simple Clarification (Aviv)	Identify previously states hypotheses and reformulating the problem.
		Deep Clarification (Aviv)	Identify hidden assumptions and identification of needed information.
	Integration (Garrison et. al.)	Connecting Ideas (Garrison et. al.)	Use of metaphors, analogies, and explicit similies and relationships.
		Inference (Aviv)	Make inferences linked to previously proposed ideas.
		Judgment (Aviv)	Make evaluation of others' ideas
		Resolution (Garrison et. al.)	Apply new ideas, coming to conclusions and recommendations.
Teaching Process: Thematic Unit	Direct Instruction (Anderson et. al.)	Discussion Strategy (Aviv)	Explicit discussion of what the students and the teacher do to proceed. Procedural rather than substantive.
		Present content (Anderson et. al.)	Instructor presenting materials and asking questions related to material.
		Ask questions	Instructor asking questions on the material

		Focus the discussion on specific issues (Anderson et. al.)	Student or Instructor focusing discussion by directing attention to particular concepts or information.
		Summarize the discussion (Anderson et. al.)	Student or Instructor summarizes the discussion to develop and explicitly delineate the context.
		Confirm understanding through assessment and explanatory feedback (Anderson et. al.)	Student or Instructor assesses students' comments and provides explanatory feedback to confirm understanding.
		Diagnose mis-conceptions (Anderson et. al.)	Student or Instructor providing clarification and correcting students' misconceptions.
		Inject knowledge form diverse sources (Anderson et. al.)	Student or Instructor providing knowledge from difference sources (e.g., textbooks, articles, internet…) and provides pointers to the sources.
		Responding to technical concerns (Anderson et. al.)	Instructor or student responding to technical questions.
	Facilitating Discourse (Anderson et. al.)	Identifying areas of agreement/disagreement (Anderson et. al.)	Instructor or student identifying areas of contradictions and agreements
		Seeking to reach consensus/understanding (Anderson et. al.)	Student and instructor articulating consensus and shared understanding.
		Encouraging, acknowledging, or reinforcing student contributions (Anderson et. al.)	Instructor's acknowledgement and encouragement of students and their contributions.
		Assess the efficacy of the process (Anderson et. al.)	The instructor moving the conversation along and ensuring effective and efficient use of time.
		Setting climate for learning (Anderson et. al.)	Instructor creating an environment that is not threatening and encouraging of sharing of ideas.
		Drawing in participants, prompting discussion (Anderson et. al.)	Instructor calling on students to participate and including everyone in the discussion.
Discourse Process: Message/Utterance Unit	Target/ Speaker	NonResponsive (Aviv)	Statements that do not include a response (but are relevant).
		Response To Tutor (Aviv)	Respond to message/comment made by instructor.
		Response To Learner (Aviv)	Respond to message/comment made by another student/learner.
		Student	Utterance by student
		Teacher	Utterance by teacher
	Discourse Characteristics	Informal	Slang vocabulary, sentence fragments, insecure feelings or thoughts as opposed Complete sentences, complete thoughts
		Passive voice **(sentence)**	Action performed upon the speaker or specified agent