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**Assessing & Improving Online Learning Using Data from Practice**

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**Abstract:** This research uses a qualitative case study approach to investigate online course instruction, and the dimensions of both learner and facilitator/instructor engagement. The research team analyzed archival data from course management software "Course Statistics," and coded indicators using word processing software to examine learner and facilitator writings in the courses.

**Introduction**

Online course delivery using text-based computer-mediated communication (CMC) has created the need to investigate numerous questions about the quality of online instruction and the quality of students' learning experiences. Questions such as: Does the lack of face-to-face contact diminish the personal dimensions and quality of online instruction? or How is student achievement affected by online instruction? The need for answers to these questions was identified by Barab, Thomas, and Merrill (2001). They addressed the fact that much is often discussed about the technical components of distance education, but less often discussed is the human or social dimension of these environments. They found that online instruction can foster a reflective and social environment.

This line of research began with an attempt to identify principles of good practice for designing online courses as guided by the theoretical perspectives of andragogy and constructivism. Malcolm Knowles described a conceptual framework for facilitating adult learning in the 1970s with the exposition of his worldview perspective labeled andragogy. The relationship between the learner and facilitator in which it is the facilitator's responsibility "to provide a caring, accepting, respecting, helping social atmosphere" (Knowles, 1984, p. 17) is part of the basis of andragogy. Another essential element is flexibility and the freedom of the adult learner to become a more self-directed learner. Advocates of the Constructivist approach to facilitating learning share similar views. Knowles, Holton, and Swanson (1998) note that "the parallels between moderate views of constructivism and andragogy are striking. Both stress ownership of the learning process by learners, experiential learning, and problem-solving approaches to learning" (p. 143).

The following list of principles of good practice developed from andragogy and constructivist learning are reflected in the design of these adult education online courses.

- a) Course design and activities include relevant content as the context for learning and design of authentic tasks.
- b) Course design and activities include collaborative learning tasks.
- c) Course design and activities are flexible to accommodate different ways of learning and incorporate material to engage multiple intelligences.

- d) Course design and activities facilitate the learner's building of understanding and meaning on prior experience and understanding.
- e) Facilitator demonstrates mastery of course content and instructional design processes.
- f) Facilitator's instructional design empowers learners to become increasingly self-directed and self-actualizing. (Merrill, 2000)

### **Research Methodology**

The focus of the research was to identify and closely analyze the data collected from sections of online courses in an Adult Education graduate program. The study design is in the qualitative or naturalistic research paradigm using case study methodology. One of the hallmarks of qualitative research is the flexibility of the design. The design specifies an initial focus, primary questions to initially guide the research, and plans for observations to be made and data to analyze.

These research questions were formulated to initially guide this research:

- a) What kinds of Learner-focused data are collected while conducting an online course?
- b) How can these Learner-focused data be used to provide effective assessment for continuous improvement of an online course?
- c) What kinds of Facilitator-focused data are collected while conducting an online course?
- d) How can these Facilitator-focused data be used to provide effective assessment for continuous improvement of an online course?

We were seeking ways to determine the extent and quality of learner engagement in relation to the overall course and by examining specific learning events (such as discussion forums or chats) designed by the facilitator. One dimension of this engagement in the overall course is analysis of the statistical data including number of log-ins, e-mail messages sent, discussion forum postings, and chat room postings by both students and facilitators. The level of social and cognitive engagement shown in course writings provides a perspective about the extent and quantity of learner engagement. We began with the list of principles of good practice from andragogy and constructivist learning to define indicators. In the process of defining ways to make operational indicators, we developed a Venn diagram with the three overlapping circles identified as “content,” “affective domain,” and “course” (structure).

During further review of relevant literature we identified a model very similar to the concepts evolving in our investigation of adult education courses. This model of a community of inquiry, developed by Garrison, Anderson, Rourke, and Archer (2002) at the University of Alberta. uses a Venn diagram to describe three elements of an educational experience: (a) cognitive presence (b) social presence, and (c) teaching presence.

We realized the model of Garrison, Anderson, and Archer (2000) was developed to the point we could utilize the social presence concept and coding indicators used by them and further refined by Swan (2002) for our investigation. The Social Presence Indicators consist of three categories: Affective (with five specific codes), Cohesive (with five specific codes), and Interactive (with five specific codes plus one emergent one we are testing).

We looked closely at the concept of cognitive presence and the coding indicators identified in the original research, but found those were not useful in describing the written student work we were seeing in adult education graduate courses. We have developed and are

testing a set of cognitive indicators using descriptors based on the revised Bloom's Taxonomy of Educational Objectives for the concept of cognitive presence (Pohl, 1995). Our Cognitive Presence Indicators consist of these three categories: Content Description (with two specific codes), Content Analysis (with three specific codes), and Content Reflection (with two specific codes).

The Cognitive Presence Indicators in the original research use an inquiry-based model. Those Cognitive Presence Indicators include four categories: Triggering Event, Exploration, Integration, and Resolution with specific codes for text analysis. Adult education graduate courses focus on a more specific body of content, such as the theory and practice of program planning. The more open inquiry-based model did not appear to fit the learning events in a course where participant understanding is structured around a more defined content focus.

For our initial analysis we selected two synchronous Chats from Module Five, one asynchronous Discussion Forum on a Case Study from Module Six, and the asynchronous Final Reflections Forum from Module Eight. Archived texts for each these four learning events were coded by Merrill and Young separately. The initial coding of Discussion Forums and Chat Sessions was done using MS Word to highlight specific examples in the text with different colors and inserting appropriate codes for the each of the social and cognitive presence indicators.

## **Findings**

The findings of this initial research are reported using the questions formulated to initially guide this research.

What kinds of Learner-focused data are collected while conducting an online course? The results from this analysis of the student data automatically collected by the course management software identify the following indicators of engagement from four courses:

- Student log-ins ranged from an average of seven (7) per week in one course to twelve (12) per week in another course during the 15-week semester. The average for all four courses was 9.7 times per week.
- Student email sent ranged from five to 76 during the semester. An average for all courses was 26 email messages per course during the semester.
- Student Chat postings, in the two courses incorporating Chats, averaged about 30 postings per chat (each course included three Chats each lasting 90 minutes).
- Student Discussion Forum (threaded discussions) postings ranged from 12 to 94 per semester. This range is wide because the courses not including Chats utilized more Discussion Forums.

What kinds of Facilitator-focused data are collected while conducting an online course? The results from this analysis of the facilitator data automatically collected by the course management software identify the following indicators of engagement:

- Facilitator log-ins ranged from an average of eight per week in one course to twenty-seven per week in another course during the 15-week semester. The average for all courses was 15.5 times per week.
- Facilitator email sent ranged from 136 to 374 during the semester. An average for all courses was 250 email messages per course during the semester.

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- Facilitator Chat postings, in the two courses incorporating Chats, averaged about 64 postings per chat (the courses included three Chats each lasting 90 minutes).
- Facilitator Discussion Forum (threaded discussions) postings ranged from 5 to 42 per semester. The range is this wide because the courses not including Chats utilized more Discussion Forums. One of the features of Oncourse is that the course email function sends facilitator comments on students' Forum postings and records them in the online Gradebook, rather than appearing as a public posting under the students' postings.

The student and facilitator data automatically collected by Oncourse provides a snapshot of the number of log-ins for courses and types of email, Chat and Forum interactions. Facilitators log-in frequently and rely on email to communicate regularly with students.

We now turn to examine the use of the Social Presence Indicators developed by Garrison, Anderson, and Archer (2000) and Swan (2002) and the set of Cognitive Presence Indicators we are testing to analyze and code the archived text from specific learning events from an adult education graduate course with a focus on program planning. The Social Presence Affective Indicators include paralinguistic, emotion, value statements, humor and self-disclosure. The Social Presence Cohesive Indicators consist of greetings, vocatives (using proper name), group reference, social sharing and reflection. The Social Presence Interactive Indicators consist of acknowledgement, agreement, approval, inquiry, and personal advice. In this category we added an emergent indicator identified as "process interaction." This appears to describe some of the more mechanical interaction in Chats not easily coded with the indicators derived in the original research.

This is the first use of these Cognitive Presence Indicators developed for our online courses. The Cognitive Presence Content Description Indicators consist of knowledge and comprehension. The Cognitive Presence Content Analysis Indicators include application to intra-course examples, analysis and synthesis. The Cognitive Presence Content Reflection Indicators consist of application to extra-course situations and evaluation.

It is difficult to provide quantitative data for each Indicator coded in some meaningful way without going into more detail than space permits. The number of items coded varies in a chat because there may be five participants in one Chat and ten in another. Similarly, in one Discussion Forum learning event the student may be expected to post only once, whereas in another the expectation may be to make comments on three or four postings by other students. Table 1 is an attempt to provide a range of frequency of these indicators and show differences in magnitude without providing data in misleading ways as averages or percentages.

Our comparison of these coded documents shows there was better agreement between the coded analyses of the Discussion Forms than the Chat transcripts. This is probably due to the flow of discussion in a Chat, which is more likely to have multiple threads simultaneously, and more fragmented units of interaction rather than completely thought out statements in sentences or paragraphs found in a Forum posting. In a Discussion Forum students are given a topic or question to address and encouraged to work on off-line and then copy and paste their text into the Forum. These postings are more coherent and formal. The length of an item coded is often longer in a Forum, ranging from one or two sentences to a 200 – 300 word paragraph.

**Table 1: Representation of Frequency of Indicators in Learning Events**

D 506 – Program Planning Course – Spring Semester 2002				
Social Presence Indicators				
	Chat M5 # 1 – 5 participants	Chat M5 # 2 – 10 participants	Case Study Forum – M6	Reflections Forum – M8
Affective	~ 60 items	~ 100 items	~ 20 items	~ 25 items
Cohesive	~ 80 items	~ 175 items	< 5 items	~ 40 items
Interactive	~ 140 items	~ 190 items	< 5 items	~ 10 items
Cognitive Presence Indicators				
Content Description	~ 15 items	~ 20 items	~ 10 items	< 5 items
Content Analysis	~ 75 items	~ 100 items	~ 35 items	< 5 items
Content Reflection	< 5 items	< 10 items	< 5 items	~ 10 items

Multiple examples of all the Social Presence and Cognitive Presence indicators were identified in our coding. This provides support for the utility of these indicators to describe the archived text in this text-based CMC online graduate course. The Social Presence Affective Indicators were more consistently coded the same by both coders (more inter-rater consistency) than the Cognitive Presence Indicators in both the Chats and the Forums.

As expected, synchronous Chats include more Social Presence Indicators than an asynchronous Discussion Forum. There are also a substantial number of Content Indicators identified in the text, although of a shorter length. These are typically no more than one or two sentences. The Final Reflections Forum, where students are asked to reflect on the total course experience, also includes more Social Presence Indicators than may be found in a Forum assignment which produces more formal written responses.

The final question: How can these Learner-focused and Facilitator-focused data be used to provide effective assessment for continuous improvement of an online course? This initial research provides a detailed text-based analysis of learner and facilitator course engagement for instructional improvement. The understanding developed from this analysis of indicators of engagement enables facilitators to better understand the complex dynamics of text-based course delivery for continuous course improvement. The Community of Inquiry model with its categories of indicators and codes is a set of tools for close analysis of the text-based CMC learning experience.

### **Implications of Applications of the Findings**

The findings of this initial research project identify characteristics of online engagement in terms of students' and facilitators' frequency of log-ins, use of email, Forum and Chat postings based on the data from four cases. The findings may be useful to inform prospective students about the expectations of frequency of course participation as well as by the facilitator as one component of assessing student engagement and performance in an online learning experience.

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There appears to be support for most of the Social Presence Indicators of the recently proposed Community of Inquiry model, “Elements of an Educational Experience” (Garrison, Anderson, & Archer, 2000) based on our coding and analysis of the case of one course. The Cognitive Presence Content Indicators we developed and tested for the first time appear to have some utility, however more research and analysis is needed. One project for further testing would be to compare the results of coding the same text with both the original inquiry-based Cognitive Presence Indicators and our emergent content indicators. We did not attempt to integrate the Teaching Presence component of the model into this initial investigation, but it is an obvious next step so we focus on a course through each lens of this proposed model. The Teaching Presence perspective will also tie back to our principles of good practice, the starting point for this investigation of indicators of engagement.

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