

# Knowledge Construction in Inservice Teacher Online Discourse: Impacts of Instructor Roles and Facilitative Strategies

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## Abstract

*This study investigates how inservice teachers constructed new knowledge, the extent of knowledge construction achieved, and how instructors participated in and facilitated the online discussion to affect knowledge construction. One finding is that most inservice teachers seemed to favor discussion activities at the stage of knowledge confirmation rather than knowledge construction. Another finding is that some facilitation approaches used by the instructors when serving as both facilitator and co-participant were particularly helpful for enhancing knowledge construction. However, neither student-perceived learning nor satisfaction with instructor roles and facilitative strategies significantly differ between the two classes involved. (Keywords: knowledge construction, instructor role, online facilitation, and online discussion.)*

As asynchronous online courses become prevalent in higher education, some scholars have shown concern over the learning effectiveness of such courses as compared to the learning effectiveness of traditional courses (Hiltz, Coppola, Rotter, & Turoff, 2000; Koory, 2003; Parker & Gemino, 2001; Scheer, 2000). Although much research has shown that online learning can produce learning outcomes equal to or even better than face-to-face classrooms, the majority of such studies have been conducted with surveys of student and faculty perceived learning and satisfaction (Hiltz & Arbaugh, 2003). There are two validity concerns with survey data. One problem is the non-response bias. Non-respondents may have different perceptions of the online learning experience. Another problem with survey data is that it is self-reported data. Eighty-one percent of research on online learning has been conducted on undergraduate students (Olson & Wisner, 2002). Many of the undergraduate students may care more about grades than how much they learn. If the student does not receive a good grade or does not like the instructor and course based on personal preference, then he/she may indicate lower satisfaction on the survey (Hiltz & Arbaugh, 2003). In addition, although such survey data can offer some helpful insight into student learning, such data only represent attitudinal data (Hiltz & Arbaugh, 2003; Kirkpatrick & Kirkpatrick, 2005). That is to say, student perceived learning and satisfaction does not directly and accurately assess critical-thinking learning outcomes. Thus, relying only on a student perceived learning and satisfaction survey to evaluate online learning effectiveness without assessing actual learning outcomes is a questionable strategy.

A way to directly and objectively evaluate and demonstrate student learning outcomes is needed. Since the discussion forum is considered a major component of most online courses, one reasonable and reliable way of evaluating online learning effectiveness is through assessing participant collaborative knowledge construction in the online discourse. Participants actively engage in discussion/inquiry-based activities when they produce learning outcomes based on constructing knowledge requiring critical-thinking skills (Garrison, Anderson, & Archer, 2001). In this sense, online discourse is a very valuable qualitative artifact that can authentically document what students learn and how their knowledge is constructed.

Another issue associated with online learning is the challenge for many instructors to switch from the instructor-centered traditional classroom to the student-centered asynchronous online discussion forum (McIsaac & Gunawardena, 1996). Before engaging in the facilitator role and adjusting it from a content expert to a skilled facilitator, many novice online instructors either choose to stay silent, or observe on the sidelines, often hesitating to moderate the discussion (Lu, 2004). Many researchers have addressed the significance of the instructor role and suggested specific approaches (Anderson, Rourke, Garrison, & Archer, 2001; Bender, 2003; Collison, Elbaum, Havind, & Tinker, 2000; Salman, 2000). However, empirical studies focusing on the instructor roles and facilitative approaches in online discussion and their relationship to knowledge creation and student learning have not yet been well documented and investigated (Swan, 2003; Tallent-Runnels, Thomas, & Lan, 2006).

To address these research gaps, this study focuses on: 1) how student knowledge is constructed in online discourse (constructivist knowledge construction), 2) the degree to which knowledge construction is achieved (quality of online discourse), and 3) how an instructor participates in and facilitates the online discussion to enhance knowledge construction (facilitative strategies).

## **THEORETICAL FRAMEWORK**

Literature has shown that online courses work best in a constructivist environment (Relan & Gillani, 1997), specifically, a social constructivist environment (Bonk & Cunningham, 1998; Zellermyer, Mor, & Heilweil, 2004). In general, constructivists claim that learners actively construct their knowledge based on prior experience, as opposed to being passively taught with a fixed body of knowledge. Learning is defined as a continuous process of “active construction, testing, and reconstruction of cognitive models of the student’s world” (Ellis & Fouts, 1996, p. 53). In other words, in the constructivist view, a conceptual change resulting from either knowledge construction or reconstruction serves as the indicator of student learning.

Two main constructivist theories, cognitive and social constructivist, are often identified and discussed in education and online learning (Bonk & Cunningham, 1998; Ellis & Fouts, 1996; Marshall, 1992). Cognitive constructivists, based on Piaget’s model of knowledge, emphasize that individual knowledge construction is based on prior experience and results from interaction with the subject of knowledge and environment. Social constructivists, on the other

hand, based on Vygotsky's view of learning, emphasize the social-cultural environment in which the individual co-constructs knowledge in interaction with others.

An increasing number of studies incorporating online learning are grounded on social constructivism (Campos, 2004; Kanuka & Anderson, 1998; Romiszowski & Mason, 1996; Stacey, 1999). Students collaboratively construct knowledge and negotiate meaning through socially interactive conversation among participants and instructors in an online community. The instructor serves not only as a facilitator but also as a co-participant who co-constructs knowledge with the students (Marshall, 1992). A useful way to help us conceptualize this online environment is Garrison's "Community of Inquiry" (Garrison, Anderson, & Archer, 2000), which includes cognitive presence, social presence, and teaching presence as three elements of this framework. Regarding cognitive presence, Garrison and associates proposed the "Practical Inquiry Model" (PIM) based on Dewey's concept that education is the collaborative reconstruction of experience. An educational experience intended to achieve higher-order learning outcomes is best embedded in a community of inquiry. This model is consistent with the social-cultural constructivist view that a student collaborates with others to socially construct knowledge in the online learning community. In addition, this community of inquiry provides a rich collaborative and reflective environment for higher-order learning, which is required for knowledge construction.

## **KNOWLEDGE CONSTRUCTION IN ONLINE DISCOURSE**

In such a critical community of inquiry, cognitive presence is defined as "the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse" (Garrison, Anderson, & Archer, 2003, p. 115). That is, assessing cognitive presence or knowledge construction is measuring higher-order critical thinking in the online learning environment. Garrison proposed four phases for assessing cognitive presence: triggering event, exploration, integration, and generating a solution or hypothesis of the dilemma or problem. The results of this application may lead to further problems and new triggering events; therefore, the circle might continue.

Another model frequently used to assess knowledge construction in a computer-conferencing context is the interaction analysis model (IAM) developed by Gunawardena and her colleagues (Gunawardena, Lowe, & Anderson, 1997). She suggested five phases in the social construction of knowledge: sharing/comparing, dissonance, negotiation and co-construction, testing, and application. These phases do not always occur or follow in sequence. In addition, different phases might actually occur at the same time (at the same message). The more phases the computer-conference demonstrates, the higher the quality of the discussion. The higher the number of participants activated at each phase, the greater the variety of resources the participants may call upon in the process of negotiating meaning. In this way, this model shows the extent of knowledge construction.

Like other researchers (Aviv, Erlich, Ravid, & Geva, 2003; Campos, 2004; Jeong, 2003; Mcloughlin, 2000), Garrison, Gunawardena, and their associates

support the view that the dilemma, tension, or disagreement between the group and the individual actually provides the energy and the drive for the collective processing of knowledge construction, and this would result in conceptual change. In terms of knowledge construction, IAM and cognitive presence of PIM have similar phases. In comparison, IAM is stronger than PIM. First, IAM identifies more specific types of cognitive activity in the critical discourse, such as argument, resource, and evidence of changes. As a result, IAM provides researchers with more specific codes to investigate the knowledge construction process. For example, in Phase I, IAM includes codes for sharing observation, corroborating examples, and showing agreements but PIM does not. Second, IAM provides a more holistic view of discussion flow and knowledge construction (Jeong, 2003; Marra, Moore, & Klimczak, 2004). It is more practical for analyzing online discourse.

Both PIM and IAM provide a theoretical framework for assessing the levels of knowledge socially constructed by the group of participants in the learning community. Recently, more researchers have assessed knowledge construction by using either PIM or IAM. Using PIM, some studies have shown that most participant postings in discussion forums are limited to the trigger and exploration phases (Garrison, Anderson, & Archer, 2003; Marra, Moore, & Klimczak, 2004; Meyer, 2003). Other studies using IAM report similar findings. That is, most student postings remain at Phase I, sharing/ comparing information (Gunawardena, Lowe, & Anderson, 1997; Kanuka & Anderson, 1998; Mcloughlin, 2000), with the exception of one study which showed that most postings remained at Phase I and II, discovery and exploration of dissonance or inconsistency among ideas, concepts, or statements (Moore & Marra, 2005). To supplement IAM, Kanuka and Anderson (1998) added two categories to account for social interchange and social discord. They found that most participants, in increasing the overall knowledge base, acquired and exchanged information that was compatible with their existing knowledge. Their views remain unchanged. Basically, most participants tended to ignore contradictory ideas that could otherwise promote discussion and critical thinking, preferring social interchange instead. In fact, in practice, this problem is often not recognized because many instructors assess student online participation in terms of number, frequency, and length of student postings, not in terms of quality of posting/knowledge construction (Hiltz & Arbaugh, 2003), which would be the best indicator of critical thinking. Until recently, not many researchers have conducted meaningful qualitative analysis of online discussion forums (Marra, Moore, & Klimczak, 2004).

## RESEARCH QUESTIONS

Although the IAM and PAM models offer ways to assess knowledge construction in online discourse, they have two limitations. First, the participants identified in these studies were graduate students or professionals in the field of instructional technology. Therefore, it would be interesting to see how in-service teachers, whose job is to help students gain knowledge, would participate in knowledge construction processes in online discourse. Understanding how

inservice teachers would function in the online knowledge construction process and how they would cope with conflicting viewpoints in their learning can shed light on how they might facilitate student learning either in the classroom or online.

Second, while offering different possible reasons to explain why negotiation and application of new knowledge were rarely reached, most researchers have not further investigated how instructors facilitate the knowledge construction process and how their participation might affect the stages of knowledge construction. Although Garrison and colleagues (Anderson, Rourke, Garrison, & Archer, 2001) have identified three categories (instructional design and organization, facilitating discourse, and direct instruction) and detail tasks for teaching presence in the PIM model, the studies using PIM do not investigate the relationship and impact of cognitive presence and teaching presence.

This study provides empirical information to overcome these two limitations. Garrison's Community of Inquiry serves as the theoretical foundation for this study. Gunawarden's IAM, and two indicators specifically associated with online facilitation proposed by Garrison and his colleagues, provide the conceptual frameworks to assess the quality of group knowledge construction and help us analyze the instructor role and facilitative strategies in the knowledge construction process.

The research questions for this study are:

1. To what extent is knowledge construction achieved in an online discourse among inservice teachers?
2. How is knowledge constructed by inservice teachers in their online discourse?
3. How do instructor roles and facilitative approaches affect knowledge construction?

## RESEARCH METHODOLOGY

This is a mixed-method research with qualitative and quantitative methods used to collect and analyze data. The data collected for this study included course evaluation surveys and transcripts of weekly online discussions. The course evaluation survey, which was different from the official course evaluation conducted at the end of the course as required by the university, contained questions specifically designed to target perceived learning outcomes and satisfaction in response to instructor roles and facilitation. Some items were open questions designed to gain student-written comments.

The data were collected from two sections of a distance education course for inservice teacher professional development at a Midwest university. This course was a seven-week summer course. Each section was taught by a different online instructor. One of the researchers in this study worked with both instructors to develop the course format and online activities. The online instructors agreed that the two sections would share the same class syllabus, lecture notes, and course materials. Section A had 11 participants and Section B had 10 participants who were inservice teachers. On the first and last week of the course, the

participants met in person with the instructors in the classrooms. For the remaining weeks of the classes they participated in five online discussion sessions through the university online course management system.

To answer the research questions of this study, the two experienced instructors, who had online teaching experience, agreed to play different instructor roles in their own course sessions. The instructor in Section A played the role of a facilitator only. Whereas, the instructor in Section B played the role of not only facilitator but also a co-participant similar to other participants who posted their initial responses to the starter's questions and additional responses to participant postings. The course activities were designed based on the constructivist framework, specifically Garrison's "Community of Inquiry." In the first week, students were given an icebreaker activity to get to know other participants and become familiar with the discussion forum interface. Starting from the second week, students took turns serving as "starters" and "wrappers." The "starter" would post a reading summary and three discussion questions at the beginning of the weekly discussion. The "wrapper" would post a summary of discussion issues at the end of the weekly discussion. Students were required to make at least three postings to respond to the starter questions and to comment on other postings. During the weekend, students would post reflections on the online discourse and these would be shared with teammates. The course evaluation survey was distributed to students online during the last online session. The return rate was 100%.

Participants' online discussion transcripts were documented in the university course management system. Three out of five sessions were selected, (the second, third, and fourth ones), excluding the beginning and the last sessions when course warm-up and wrap-up were implemented. The online transcripts were analyzed with content analysis utilizing clustering and counting methods (Miles & Huberman, 1994). The data were coded according to predetermined categories and additional emerging subcategories. The coding schemes of IAM and facilitative tasks of two teaching presence indicators (facilitating courses and direct instruction) proposed in Garrison's Community of Inquiry framework (Anderson, Rourke, Garrison, & Archer, 2001) were used. We chose the former to analyze the phases of knowledge construction because of the strengths discussed previously and because of its frequent use by many researchers. We used the latter to code the instructor facilitative approaches because they were the most articulated facilitative strategies we found among the current online learning literature; also they have already been tested empirically. The emerging subcategories were identified, discussed, and defined by our team during the coding process. We found that "idea" was the most appropriate choice for unit of analysis after trying other units of analysis; this better fit was because of the purposes of the study and structure of online postings.

To increase validity, we utilized multiple methods (Denzin & Lincoln, 2000) and peer examination (Merriam, 1988). To enhance reliability, we and the online instructors formed a team to code one session of online discussion transcripts from each section. During the team meetings, we proceeded through the process of 'knowledge construction' (Marra, Moore, & Klimczak, 2004)

to further define, negotiate meanings, and reach agreement regarding how to apply the modified IAM protocol to code participant postings. We discussed all inconsistent coding until reconciliation was reached in the training sessions. Then, we started coding the remaining online discussion transcripts. (The inter reliability rate is .76 using Cohen's Kappa method.)

## FINDINGS AND DISCUSSIONS

**Finding #1: Most postings stayed in Phase I “Sharing/comparing information,” but ‘social discord’ phenomenon was found.**

Addressing the first research question regarding the extent of knowledge construction achieved by the inservice teachers in their online discourse, we found that the finding is similar to the findings of previous studies. For group knowledge construction, most postings in the three selected weeks from the two courses remained at Phase I (see Table 1, Section A 89.8% and Section B 95.7%).

The fact that most postings remained in Phase I indicates that participants frequently preferred to share and corroborate knowledge that was consistent with their existing understanding. This is the phenomenon known as ‘social interchange’ as discussed in Kanuka’s study (1998) and also found among pre-service teachers in their online discourse in Levin’s study (Levin, He, & Robbins, 2006). This finding is consistent with data in the course evaluation survey, which showed that more than 90% of students in both courses felt that they

**Table 1: Results Of Three-Week Online Discussions  
(Group Knowledge Construction)**

Three weeks	Section A Instructor as both Facilitator & co-participant		Section B Instructor as Facilitator	
	# of unit of analysis	Total %	# of unit of analysis	Total %
<b>Phase I</b> Sharing/comparing information	326	89.8	337	95.7
<b>Phase II</b> Dissonance	21	10.2	10	4.3
<b>Phase III</b> Negotiation & co-Construction	14		5	
<b>Phase IV</b> Testing	1		0	
<b>Phase V</b> Application	1		0	
Total	363		352	

had learned information that they could apply to the real-world environment. Although some disagreement occurred, few students responded to it. Instead, many participants chose to ignore 'social discord' (Kanuka & Anderson, 1998) or not respond to the postings in public. Some participants chose to respond in their reflective postings.

From the constructivist viewpoint, learning is considered an active re/construction of new knowledge and prior knowledge. We can clearly see from Table 1 that most of the inservice teachers in the two classes had not succeeded in attaining this learning outcome. Nevertheless, the degree of attaining participants' "preferred learning outcome" (sharing and confirming information) is reflected in the satisfaction with the online course. This finding confirms the possibility discussed above that data based on the self-reporting of attitudes does not authentically indicate learning effectiveness, nor indicate critical-thinking knowledge construction. Therefore, this finding shows that measurement of participant learning effectiveness derived from the content of online discourse does not always correlate with survey results based on self-reporting.

Moreover, though it is understandable that inservice teachers would appreciate any affirmation and support from their community of practice; in this study we found that engaging mostly in the sharing and exchanging of information seemingly results in neglecting the kinds of optimal opportunities for negotiating and constructing new knowledge that comes from disagreements, tensions, confusion, and dilemmas generated in the online discussion (Campos, 2004; Garrison, Anderson, & Archer, 2003). Furthermore, less knowledge construction means less higher-order critical thinking (Campos, 2004; McLoughlin, 2000), especially when inservice teachers merely consolidate existing knowledge, reproduce information, or affirm each other's points of view. Thus, for these inservice teachers, does learning mean *only* sharing and reaffirming information found in the course readings with others? Perhaps it could have meant more if they had been willing to move out of their comfort zones, to become more assertive, challenge existing knowledge, and actively seek conceptual change. It is essential for future study that we reexamine what learning and learning effectiveness means to inservice teachers, focusing on their responses and attitudes to tension and dissonance in the quest for knowledge. They would likely pass any such limited learning attitudes to their students, who would then lose precious learning opportunities for constructing knowledge. It is also critical that online instructors think about how they can encourage students to take risks and advance their discourse to the higher phases of knowledge construction. The effective facilitative strategies identified and discussed in findings #3 shed light on this issue.

**Finding #2: Online discourse is a collective process including knowledge confirmation and knowledge construction. Group knowledge construction shown in online discourse is not necessarily equal to individual knowledge construction.**

In terms of how inservice teachers constructed their knowledge, we observed in the online transcript that most participants in this study shared and com-

pared information about their observation, opinion, agreement, clarification, and experiences, in responding to the starters' questions and other comments in the postings. Some participants further explored the inconsistency among ideas, concepts, and statements by asking questions, presenting different perspectives and understanding, and negotiating new meanings based on the discussion. In the inquiry-based forum, these postings served as stimuli for participants to encounter each other's individual knowledge in two different ways: 1) individual knowledge conveyed in the postings confirmed or corroborated their existing understanding; 2) individual knowledge in the postings challenged or contradicted their existing understanding, then participants negotiated and reflected conceptual changes in the public postings or private world. The knowledge presented in the online forum resulted from collective efforts. This process included not only knowledge confirmation (social interchange and no conceptual change) but also knowledge construction (conceptual change).

The wrappers' weekly discussion summary clearly recapped the results of the group discourse as group knowledge. However, the results of group knowledge are not necessarily equal to individual knowledge resulting from individual knowledge construction. In this study, we found that some participants did not express disagreement with the postings or support for the counter argument right after the discussion, but mentioned them in their reflective posting after the end of the group discussion. This phenomenon probably resulted from either the weekly posting deadlines or 'social discord' (Kanuka & Anderson, 1998).

Thus, assessing knowledge construction in the online discussion can involve two areas: group and individual knowledge construction. Since the existing models such as IAM and PIM actually assess group knowledge construction only, an authentic method for assessing individual knowledge construction, particularly one that demonstrates the learning effectiveness of online courses, is needed.

**Findings #3: Section A (instructor as both facilitator and co-participant) had more postings regarding new knowledge construction (from Phase II to Phase V) than did Section B. The Section A instructor applied facilitation approaches more frequently emphasizing conceptual changes than the instructor of Section B. However, students' perceived learning and satisfaction do not show significant difference between these two courses.**

To address the third research question of this study, we investigated how on-line instructor roles and their facilitative approaches affect students' knowledge construction. Two experienced online instructors performed the different instructor roles, one as facilitator and co-participant (Section A) and the other as facilitator only (Section B). The levels of knowledge construction, student perceived learning and satisfaction in the course evaluation survey, and instructor's tasks (facilitation and direction instruction) were analyzed. In terms of levels of knowledge construction, Section A had 37 postings at Phase II through Phase V while Section B had only 15 postings (see Table 1). Comparing these higher-level postings to Phase I postings (326 in Section A and 337 in Section B), a

two-by-two contingency table was compiled and the chi-square test result was significant ( $X^2 = 9.32, p < .01$ ). Therefore, levels of knowledge construction differed between the two classes. Section A had generated much more knowledge construction results than Section B according to the online transcript. However, this finding is not consistent with data on student perceived learning and satisfaction. Since the sample size of this study was small, chi-square test was not appropriate for assessing the differences in survey responses between the two classes. Instead, Fisher's exact test was applied to compute directly the probability of observed frequencies in a two-by-two table (Kuzma & Bohnenblust, 2001). The Fisher's exact test results indicate that no significant difference was found between Section A and Section B regarding how students perceived learning, instructor role, and facilitation (see Table 2). This suggests that the differences between the knowledge construction of the two classes are not reflective of differences in student perception of learning and satisfaction with instructor roles and facilitative approaches. In other words, more knowledge construction does not necessarily equate with a higher level of student perceived learning and satisfaction. This finding confirms the view discussed in the introduction: Student perception of learning and satisfaction does not necessarily reflect the actual critical-thinking learning outcomes, nor level of knowledge construction. It also raises questions about cases of actual practice in which many instruc-

**Table 2: Fisher's Exact Tests On Selected Survey Results From Course Evaluation Survey**

<b>Perceived Learning</b>						
<b>Item</b>	<b>Survey Questions</b>	<b>Section A</b>		<b>Section B</b>		<b>p</b>
		Agree n (%)	Disagree n (%)	Agree n (%)	Disagree n (%)	
A1	I have learned information that I can apply to my practice.	9 (81.8)	2 (18.2)	10 (100)	0 (0)	.48
A2	I have learned a lot from this course.	10 (90.9)	1 (9.1)	10 (100)	0 (0)	1
<b>Satisfaction with Instructor Role and Facilitation</b>						
<b>Item</b>	<b>Survey Questions</b>	<b>Section A</b>		<b>Section B</b>		<b>p</b>
		Agree n (%)	Disagree n (%)	Agree n (%)	Disagree n (%)	
I1	The instructor motivated students to interact.	9 (81.8)	2 (18.2)	10 (100)	0 (0)	.48
I2	The instructor had a good command of the subject matter.	10 (90.9)	1 (9.1)	10 (100)	0 (0)	1
I3	The instructor did a good job facilitating this course.	9 (81.8)	2 (18.2)	10 (100)	0 (0)	.48
I4	The instructor actively participated in the large group discussion.	8 (72.7)	3 (27.3)	9 (90)	1 (10)	.58

tors and researchers believe that student perceived learning and satisfaction can be viewed as main indicators of learning effectiveness. As instructors of online constructivist environment, should we teach for student perceived learning and satisfaction or for knowledge construction? Should we teach students only to confirm knowledge, which pleases them and makes them comfortable, in order to receive good course evaluations? Or should we teach to challenge students to construct knowledge that in some cases might not please them, nor make them comfortable? This tension between student perceived learning and satisfaction and knowledge construction needs the attention of educators and researchers because it associates with whether or not learning effectiveness is clearly defined and communicated between learners and instructors or between researchers and practitioners, and how it can be appropriately assessed in the field of online learning.

To answer the question of whether appropriate instructor facilitation can advance the phases and how this may affect the quality of group knowledge construction, the facilitation and direct instruction of both instructors were documented in the online transcript and are analyzed and listed on Table 3.

**Table 3: Frequency of Facilitating Discourse and Direct Instruction**  
**Facilitating Discourse**

	<b>Indicators</b>	<b>Section A</b>	<b>Section B</b>
F1	Identify areas of agreement/disagreement	3	1
F2	Seek to reach consensus/understanding	3	0
F3	Encourage, acknowledge, or reinforce student contributions	6	0
F4	Set climate for learning	1	1
F5	Draw in participants, prompting discussion	1	4
F6	Assess the efficacy of the process	1	0
	Sum	15	7

**Direct Instruction**

	<b>Indicators</b>	<b>Section A</b>	<b>Section B</b>
D1	Present content/questions	5	11
D2	Focus the discussion on specific issues	3	0
D3	Confirm understanding through assessment and explanatory feedback	2	0
D4	Diagnose misconceptions	2	0
D5	Inject knowledge from diverse sources, e.g. textbook, articles, internet, personal experiences (includes pointers to resources)	7	7
D6	Respond to technical concerns	0	0
	Sum	19	18
<b>Total</b>		<b>34</b>	<b>25</b>

Comparing the approaches of the two instructors, it was found that Section A instructor had more interventions with F1, F2, F3, D2, D3, and D4 approaches, whereas Section B instructor had only one or none. When both instructors performed D5 “inject knowledge from diverse sources,” five of the Section A instructor’s seven postings were coded at Phase II and Phase III, whereas all seven of the postings of the Section B instructor were coded only at Phase I. Although the Section B instructor did ask more questions (D1) than the Section A instructor, the questions seemed to focus on expanding or deepening student understanding about particular topics or issues, and seemed less focused on encouraging conceptual changes to generate new knowledge.

The next step of analysis involved looking at how the approaches of the Section A instructor enhanced or encouraged student knowledge construction. The data analysis team found that the Section A instructor intended, as co-participant, to model the making of postings at Phase II and Phase III levels when engaging in “Inject knowledge from diverse sources” (D5). In six interventions to encourage, acknowledge, or reinforce student contributions, four interventions were given to students who identified or explored disagreements in the postings. In addition, the instructor focused the discussion on specific issues (D2) and diagnosed misconceptions (D4) and facilitated the discussion by identifying areas of agreement/disagreement (F1), seeking to reach consensus/understanding (F2). With the encouragement, acknowledgment, and reinforcement of student contributions (F3), more students seemed to progress beyond the “social discord,” feeling encouraged and invited to express different opinions. Additional postings at Phase II to Phase V levels followed up soon after interventions in the discussion. One example that best illustrates this instructor’s facilitation approaches (bold text) and their impact on participant postings is summarized chronologically in Table 4.

Although students in Section A reported less learning effectiveness and satisfaction in regards to instructor facilitation approaches (compared to the students of Section B), the online transcript did show that the online discourse in Section A had knowledge construction results at Phase II, III, VI, and V levels. In addition, the Section A instructor did apply more facilitation approaches than the instructor of Section B, particularly using the following approaches: identify areas of agreement/disagreement (F1), seek to reach consensus/understanding (F2), encourage, acknowledge, or reinforce students contributions (F3), focus the discussion on specific issues (D2), confirm understanding through assessment and explanatory feedback (D3), and diagnose misconceptions (D4) according to the indicators of facilitating discourse and directing instruction identified in Garrison’s teaching presence. These approaches might be especially useful for advancing the phases and enhancing the quality of knowledge construction when online instructors facilitate critical-thinking learning outcomes. It is noted that all facilitation approaches would help lead students toward eventual construction of new knowledge. However, the key is whether the instructor 1) focuses on facilitating conceptual changes and 2) employs the facilitation approaches with appropriate timing. Future studies are encouraged to explore these two issues further.

**Table 4: One Example of the Section B Instructor's Facilitation Approaches (Bold Text) and Their Impact On Participant Postings**

Question #	Posting #	Date & Time	Phase #	Students or Instructor
...				
#1	1.4	5/22 1:10 p.m.	II (2A, 2B)	Students KF relied to 1.3
#1	<b>2.1</b>	<b>5/23 1:42 p.m.</b>	<b>II (2A, 2B)</b>	<b>Instructor replied to Student KF with additional acknowledge and encouragement (F3)</b>
...				
#7	4.1	5/23 2:37 p.m.	II (2B, 2A, 2B)	Student MP
#7	4.1.1	5/23 2:50 p.m.	II (2B)	Student MT replied to 4.1
#7	4.1.1.1	5/23 4:10 p.m.	III(3C, 3D)	Student RP replied to 4.1.1
#7	4.1.1.1.2	5/23 6:12 p.m.	II(2C)	Student MT replied to 4.1.1
#7	4.1.1.2	5/23 8:02 p.m.	II(2C)	Student MB replied 4.1.1.1.2
#7	<b>4.1.1.2</b>	<b>5/23 9:30 p.m.</b>	<b>III(3A, 3C)</b>	<b>Instructor replied with identifying areas of agreement/disagreement (F1) while seeking to reach consensus/ understanding (F2)</b>
#7	4.3	5/24 1:03 a.m.	II(2A)	Student MP replied to 4.1.1.1.2
#7	4.4	5/24 10:25 a.m.	III (3C)	Student KG replied to 4.3
#7	4.5	5/24 1:42 p.m.	III (3A)	Student MP
#7	4.6	5/24 3:23 p.m.	II & III (3C, 2C, 3C)	Student EM
...				
#6	2.4	5/24 11:22 a.m.	III (3C)	Student JC
#6	3.4	5/24 1:14 p.m.	II (2A)	Student KF
...				

## CONCLUSIONS

This study investigated how knowledge is constructed in inservice teacher online discourse and how online instructor roles and facilitative strategies affect the degree of knowledge construction. One of the main findings is that online discussions are a collective process involving both knowledge confirmation and knowledge construction. Most inservice teachers seemed to favor discussion activities at the stage of knowledge confirmation rather than knowledge construction. Another main finding is that some facilitation approaches used by the instructors when serving as both facilitator and co-participant were particularly helpful for enhancing knowledge construction in the discussion forum. However, neither student perceived learning nor satisfaction with instructor roles and facilitative strategies significantly differ between the two classes in this study. Additional research is needed to investigate the contrasting learning expectations of the researchers and practitioners and the dilemma that more knowledge construction does not necessarily indicate higher levels of learner satisfaction. Future studies can also examine how online instructors and students (particularly inservice teachers) define learning and its relation to knowledge construction, and why inservice teachers prefer knowledge confirmation in online discourse. Examining these issues will help us understand the online learning context and develop appropriate pedagogy and assessment methods to ensure the quality of online learning courses for future students.

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### Contributors

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## APPENDIX: EXCERPTS FROM A DISCUSSION THREAD

Question #2: Do you look at the testing results of a student before you have him/ her in class, or ask other teachers about the student?

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2.1. KR 05/23 01:10 PM [Phase II]

KF-I agree with you on the issue of trusting teachers and how students perform in their classroom as a better way of reflecting students. However, what if for instance you have a gifted and talented student and they are acting out and not doing their homework because they are bored? I think that sometimes maybe testing such as IQ can help us in that way too. I am so undecided too about IQ testing. I am undecided about most testing. I try to look at both sides objectively and I can see benefits to both testing and not testing. Thanks for the great entry:)

2.1.1. Reply to KR Section A Instructor 05/23 01:42 PM [F3, F5, D1]

You brought up a good point—we need to look at a variety of information about kids to get an accurate picture—not just formal assessments scores. I'm wondering what other types of assessment or observations you

(and anyone else in class) use that seem to prove to be most helpful or useful to your work with students?

....

MP questioned her classmates regarding doing formal assessment on their own.

4.1. MP reply to SE MP 05/23 2:37 PM [Phase II]

I have noticed this with a few of the other responses as well, so please don't think that I am choosing to single you out alone. I have noticed that many of our peers state that school psychologists are the only ones that do formal assessments in their schools. WHY? We all have school psychs to do tri-annual evaluations, but don't you want a more current reflection of performance? Why do you wait for a school psychologist to get to the student? You can do your own formal assessments! Teachers are just as qualified as psychologists to administer these tests. I would imagine that those of you who don't do your own have extremely overworked psychologists that might not be doing the best job that they could. If so, are you getting a real reflection of performance? Further, if you don't do your own formal assessments how do you assess present levels of performance? I hope I am not sounding too judgmental. I am not trying to be judgmental at all. I just think that more teachers should realize that they don't need a school psychologist to do their formal assessments.

4.1.1. MT 05/23 2:50 PM [Phase II]

I've only been a special education teacher this past school year, but this is my 21st year teaching; but that's what I do, teach. I would be out of the classroom too much if I did formal assessments on my students regularly. We give the Brigance yearly, but then rely on the coop's psychologists to do their job and perform other formal assessments, if necessary, in addition to the triennials...

4.1.1.1. Reply to MT from RP RP 05/23 4:10PM [Phase III]

MT this is my first year teaching, and I feel as if I am always doing special ed stuff. How is it that we are expected to teach and do all of the other paper trail stuff. I feel as if my paraprofessionals are running my class sometimes. I have to prepare this report, I have to hold this case conference, I have to call the social worker to make a home visit. I just want to be with my students and let the administration handle all the paperwork. The flip side of it all is that I have a clearer picture of the student that I have in the classroom, but sometimes it is overwhelming. Thanks MT for expressing how you just want to teach, I do too.

4.1.1.1.2. Reply to RP MT 05/23 6:12 PM [Phase II]

I think I'm very lucky, our building's principal assigned one of our instructional assistants to administer the Brigance, another assistant only schedules and set up conferences, start FBA's, and remind me about any other "special ed. Stuff" that needs done. She takes care of mailing out our progress reports, keeps track of our counts for the coop etc.... She is like the secretary for our department—I think this is a great setup!

4.1.1.2. MB 05/23 8:02 PM [Phase II]

It is good to have your perspective as a teacher from both sides of the spectrum. It is sad to think that a Special Education Teacher was unable or unwilling to assist the General Education Teachers with adaptations. The teachers are more than likely more comfortable sharing student information without worrying that you will think less of them for being either too negative or too optimistic. They know you understand the classroom constraints and personalities of your peers. I am looking forward to hearing more from you regarding General Education Teachers perceptions of Special education teachers and students.

4.1.2. Section A Instructor 05/23 9:30 PM [F1, F2]

I think it really depends on what you are considering formal assessments. For many of those tests, there actually is training that needs to be done by the tester and at the very least, study of the protocol and a clear understanding of the normative information, etc. Many teachers do not have that, or their district or coop specifically does not want them doing those types of formal assessments. Teachers DO need to fully understand those assessments, and should be able to give some of them. I always gave the Brigance, some of the achievement tests, and some of the language and motor tests (I was first an Adapted PE specialist). I think it really varies with teacher experience and knowledge base, and district requirements. Teachers should be doing a lot of informal assessment and alternative assessments to have a continual baseline for their students' learning

.....  
4.3. MP's reply to MTs reply to MP MP 05/24 1:03 AM [Phase II]

I too am a first year special education teacher. I'm licensed in elementary ed. I spend every teachable moment teaching! However, once my students receive an assignment I am able to pull one of my students aside to do some formal assessments. The KTEA, for instance, takes me approximately 25 minutes to complete! I am still available for my students that are completing work if a question arises. My point—it can be done! I do it regularly.

4.4. Reply to MP KG 05/24 10:25 AM [Phase III]

In our co-op, they do not allow the special education teachers to do the formal assessments, especially when a student is first qualifying. I agree with MT in that we spec. ed. teachers have enough on our plates. We already spend a lot of time out of the classroom, doing observations etc., when we should be focusing on our IEP goals for our students. The only way to do that is to have more instructional time in the classroom. I feel that with CBA's, our school's NWEA, ISTEP, and classroom assignments and tests that we get a pretty good idea what that students is capable of.

4.5. MP 05/24 1:42PM [Phase III]

So perhaps the question should be asked what is formal assessment? To me a formal assessment is anything pen and paper or on a computer that has a prescribed method for administering. The KTEA, KeyMath, Brigance, and others like these are formal assessments. An informal assessment would include things such as observation, homework assignment evaluation, etc.

4.6. EM 05/24 3:23 PM [Phase II & III]

I agree that teachers are qualified to administer some tests, and that we should do some assessment because we do know the students better. I think that sometimes a tri-ennial is too big of a gap in testing time. Now that we won't have to re-eval every 3 years, then sometimes I get a move in that has 5 year old data. When a student moves in, often the only info you have is the data in the files.

In a corporation that I used to work in, teachers were not allowed to give some of the formal assessments. The rationale was that there had to be strict testing guidelines and continuity of the same person giving the test and a couple of other points that I don't remember...