Say What? The Quality of Discussion Board Postings in Online Professional Development

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Abstract

Background: Asynchronous discussion boards provide opportunities for participants in online courses to engage with course content and extend learning through the process of discussion. However, simply requiring online discussion does not guarantee high-quality discussion posts and interactions.

Goals: This study examined the extent to which discussion boards in the eRead Ohio online professional development courses support and extend learning and allow students to engage more deeply with the course materials. The study also examined the characteristics (i.e., rigor, relevance, etc.) of the discussion board prompts and the influence of the prompt on subsequent discussions.

Research Methods: Researchers analyzed discussion boards from three of the 150 eRead Ohio online courses using a coding system developed by Puntambekar, which allows for coding of cognitive demand and the extent to which the posting is related to theory or course material aligned to the updated Bloom's taxonomy.

Results: Teacher-participants reported increased insight into their practice and many described intended changes in practices. However, the vast majority of discussion prompts did not insist that students reflect and comment on course content in their response; few participants referred to course content to support current practices or changes in practice. Participants answered instructors' initial question and seldom challenged peers to higher levels of analysis or reflection. Although differences were evident among the level of prompts posed by instructors, neither the prompts nor responses reached high levels of the coding rubric, the level of the prompt was correlated with the level of responses that students produced. Questions that were rated at higher levels on the scoring rubric, in general, generated responses that fell at higher levels on the rubric. The methods applied for analysis in this study provide an example of a clear coding system to analyze discussion board activity during or after the completion of a course.

Key Words: Online teacher professional development (OTPD), discussion boards, asynchronous discussion

網上專業進修討論板發帖品質的探討

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摘要

*背景：*非同步討論板提供給網上課程參與者深入討論之機會，以促進他們課程內容的學習。然而，僅要求教師與學生在網上進行討論是不能保證高品質的板貼與互動效果。高品質的討論板提示可以保證高層次的討論和課程內容的分析，這對於線上討論的嚴謹性是至關重要的。

*研究目的：*此項研究探討在俄亥俄州電子閱讀網上專業發展課程中，討論板促進學生學習領域的擴展及他們鑽研教材之程度。該研究亦探討討論板提示的特點，線上帖子的嚴謹性、相關性、高層次的思維程度及討論板提示對隨後討論產生的影響。

*研究方法：*研究者運用潘坦拜克（Puntambeker）提出的編碼系統，對150個俄亥俄州電子閱讀網上課程中三個課程的討論板進行了分析。該編碼系統考慮了認知的要求，考慮了帖子與理論和教材的相關性，及更新後的布盧姆（Bloom）分類法。布盧姆分類法指定六個級別的認知要求：記憶、理解、應用、分析、評價與創造。

*研究結果：*就帖子數和參與者的互動而言，討論板是相對活躍的。學生們彙報說他們的實踐感悟有提高，許多學生描述他們的實踐中有預期的變化。然而，絕大多數的討論提示沒有要求學生對課程進行反思或回饋意見。極少數學生有提及課程的內容來支援他們目前的做法或改變他們目前的做法。參與者只回答了老師提出的初步問題，但沒有促使同學之間進行深層面的分析與思考。儘管老師們提示的層次差異是顯然易見的，但是提示本身與學生對提示的回答沒有達到編碼系統的高層次。老師提問的層次水準與學生答覆的層次水準是相關聯的。一般而言，問題如果以高層次呈現，就會產生高層次的答覆。本研究中線上討論的分析方法提供了一套迅速分析課中與課後線上討論活動的編碼系統。

關鍵字：網上教師專業發展、討論板、非同步討論

Introduction

Some of the most gratifying moments that we as learners have in classrooms are those times when a discussion prompts spirited and insightful exchanges that cause us to think and question our own beliefs. We feel energized, and the hum of the conversations lingers beyond the classroom. Sometimes, the hum is literal, as we converse while pouring into the hallways. Sometimes more vicariously, offering opportunities to relive high points and think of how we wished we'd responded. While the back-and-forth of the dialectic requires a quick mind and assertiveness to jump into the conversation, the world of the online classroom threatens many of us because it alters the traditional interaction of face-to-face, providing a different context that challenges us to retain the vigor of personal interaction in a virtual classroom. This same challenge is evident with the increasing use of on-line formats for teacher professional development.

Although the technology for robust online teacher professional development (OTPD) is at our fingertips (and ubiquitous), far less is known about how to use it to advance teachers' thinking, reasoning and instructional skill through professional development (McCombs & Vakili, 2005). Barab, Kling, and Gray (2004), for example, cite how little we know about how to build online learning communities that both inform teachers, and also help them solve practical problems of instruction. Further, different configurations of OTPD including elements such as length of training, instructional methods used in the training, and blended approaches that include both face-to-face and online components can have different impacts on learners (Bernard et al, 2004; Sitzmann, Kraiger, Stewart, and Wisher, 2006). A recent meta-analysis of web-supported learning studies showed that online learning is modestly more effective than traditional face-to-face instruction (US Department of Education, 2009). However, the authors of that study cautioned that simply offering an existing course in an online setting will not increase student achievement, but that the course should be redesigned to allow for additional learning opportunities, in particular, opportunities for self-reflection and self-assessment. This result is consistent with the cross-disciplinary research on human learning, the *How People Learn* (HPL) framework (Bransford, Brown & Cocking, 2000), which proposes three learning principles: (a) prior understandings influence new learning; (b) new understanding requires development of factual knowledge and conceptual frameworks; and (c) self-monitoring and reflection strategies support learning with understanding. Applying these principles to instruction calls for a learning environment that is learner-centered, building on what learners already know; knowledge-centered, emphasizing authentic achievement and mastery (Newmann & Associates, 1996); assessment-centered, offering multiple means for monitoring learning progress; and community-centered, encouraging social networks and collaborative teams that support learning (Schlager & Fusco, 2004).

Previous Research on Discussion Boards

Asynchronous discussion boards provide an opportunity for participants in online courses to engage with course content and extend their learning through the process of discussion (Blumfield et al., 1996). In an online discussion board, participants can reflect on previous postings and develop a thoughtful response or analysis of course content in an environment that can be less intimidating than face-to-face classroom discussions (Alvarez-Torres, 2001; Meyer, 1996). Also, while discussions in classrooms are dominated by instructor contributions,

online discussions allow greater student control and contribution (Harasim, 1987). Research has shown that deep engagement in online discussions can improve overall class performance (Ellis et al, 2006; Ellis et al., 2008; Krentler & Willis-Flurry, 2005, Offir, Lev & Bezalel, 2008; Schellens & Valcke, 2006; Schrier, 2004) and can help develop deep learning and critical thinking skills (Mauriano, 2006).

What constitutes deep engagement? Simply requiring instructors to offer and students to engage in an online discussion does not guarantee high-quality discussion posts and interactions (Buraphadeja & Dawson, 2008; Dennen, 2005; McLoughlin & Mynard, 2009). If tasks, prompts, and instructor feedback are not properly structured, and students do not engage in higher-order thinking, then the potential for this useful tool will not be realized. This article presents the results of a research study to understand the extent to which online discussion boards supported and extended participant learning in a set of online professional development modules for teachers of reading and allowed the participants to engage more deeply with the course materials.

Content and Delivery System of eRead Ohio Online Professional Development Courses

The goal of e-Read Ohio is to create an online professional development system for teachers of preschool through high school students. This initiative, which began in 2003, was originally funded by the No Child Left Behind Act through a Reading First grant and led by The Reading First-Ohio Center for Professional Development and Technical Assistance in Effective Reading Instruction. e-Read Ohio represents a model unique in the nation for investing Reading First dollars in an in-state program, and expanding the opportunities across the state. Through funding from the Ohio Department of Education, e-Read Ohio has expanded to provide effective and efficient high-quality online professional development in the area of literacy for Ohio's teachers, select and train online instructors across the state, and build Ohio's learning objects repository for professional development.

Table 1 shows the stages of the project from developing and studying the first online module through the current year's implementation schedule.

Table 1.

Timeline of eRead Ohio Project

School Year	Activity	Course	N Schools	N Participants
2004-2005	Developing and deploying first course Research study comparing implementation models: F2F, online, and blended	Scaffolding for Indiv Instruction	12	816
2005-2006	Pilot implementation	Scaffolding for Indiv Instruction	3	30
2006-2007	Pilot implementation	Scaffolding for Indiv Instruction Five Essential Components of Reading Instruction	12 and 100 individual particip in online course	406
2007-2008	Statewide Implementation	All courses	119	2,305
2008-2009	Statewide Implementation	All courses	329	8,230
Total			475	11,787

Since 2004, eRead Ohio has offered fourteen different courses to 11,787 teachers in 475 school districts (see Table 2). Teachers from every school in Ohio can participate in the program by learning, practicing, and applying techniques with measurable literacy benefits for elementary and secondary students in their classrooms. The e-Read Ohio menu of online course modules covers the most important topics and techniques in reading instruction, including differentiating instruction (DI), scaffolding, and the five essentials of reading (phonemic awareness, phonics, vocabulary, fluency, and comprehension). Teachers in e-Read Ohio's online modules learn interactively in simulations, video analyses, and case studies. They watch expert video, view classroom footage to observe model teaching in action, and apply literacy techniques from the modules into their class instruction. They work individually and in online discussion groups. Each course includes an online module, face-to-face sessions, and an asynchronous online discussion board. Participants in the online courses are required to engage in the online discussion by responding to instructor prompts and follow-up questions, responding to other participants' comments, and posting their own questions.

Table 2.
eRead Ohio Course Offerings

Course Title	Module/s	Sequence	Contact Hours	Graduate Credit	Grade Levels
Adolescent Literacy in a Changing World	1. Adolescent Literacy in a Changing World	Tech-F2F-Online-F2F-Online-F2F	15	1 credit	6-12
Assess-Plan-Teach in Action	1. Assess-Plan-Teach	Tech-F2F-Online-F2F-Online-F2F	12	1 credit	K-6
Building Comprehension in Grades 4-6	1. Fluency 2. Vocabulary, 3. Comprehension	Tech-F2F-Online-Online-F2F-Online-F2F	16	1 credit	4-6
Developing Adolescents' Content Vocabulary and Word Power	1. Developing Adolescents' Content Vocabulary and Word Power	Tech-F2F-Online-F2F-Online-F2F	15	1 credit	6-12
Differentiating Instruction for Diverse Student Needs	1. Differentiating Instruction	F2F-Online-F2F-Online-F2F-Online-F2F	12	1 credit	K-8
Early Language Learning	1. Oral Language 2. Phonemic Awareness 3. Phonics	Tech-F2F-Online-F2F-Online-Online-F2F	15	1 credit	PreK-3
Five Essential Components of Reading Instruction	1. Phonemic Awareness 2. Phonics 3. Fluency 4. Vocabulary 5. Comprehension	Tech-F2F-Online-Online-F2F-Online-Online-Online-F2F	24	2 credits	K-6

Fostering Students' Comprehension of Texts	1. Fostering Students' Comprehension of Texts	Tech-F2F-Online-F2F-Online-F2F	15	1 credit	6-12
Literacy Coaching in Schools	1. Literacy Coaching in Schools	Tech-F2F-Online-F2F-Online-F2F	15	1 credit	K-8
Scaffolding for Individual Instruction	1. Differentiating Instruction 2. Scaffolding	Tech-F2F-Online-Sm Group Mtg-Online-F2F-Online-Sm Group Mtg-Online-F2F	24	2 credits	K-5
School Leadership: Leadership for Learning	1. Leadership for Learning	Tech - Online	15	1	K-12
School Leadership: Professional Learning Teams	1. Professional Learning Teams	Tech - Online	15	1	K-12
Supporting the Adolescent Reader as Strategist	1. Supporting the Adolescent Reader as Strategist	Tech-F2F-Online-F2F-Online-F2F	15	1 credit	6-12
Supporting English Learners in the Classroom	1. English Learner Language	Tech-F2F-Online-F2F-Online-F2F	12	1 credit	K-8

eRead Ohio's evaluation and research agenda has examined several aspects of the online course delivery system. An early study found that student learning in blended and online courses was similar to that of course content delivered face-to-face (Roskos et al., 2007b). The results of this study are similar to those of other studies that have found that online learning is as effective as or more effective than face-to-face instruction (US Department of Education, 2009) and supported the development of an online delivery system for statewide professional development.

The eRead Ohio team's analysis of course content showed that despite the goal of the course developers for a constructivist approach to learning, the online modules have a didactic pedagogy (show and tell) rather than a constructivist one (teaching for understanding, Roskos, et al., 2007). The modules emphasize declarative types of knowledge (facts and concepts), and lower levels of cognitive demand (remember and understanding). Although the modules provide a limited level of learner participation, control, productivity, and creativity of experience, the sensory design of the modules was well developed and supportive of learner engagement. As a result of this research study, the team applied new instructional design methods during the development of a third, new module, to provide learners with more guided and self-initiated interaction. The analysis of the third module indicated that in fact, the design of the module was improved. This result suggested that modifying elements of online course design may provide a more constructivist environment.

Although the third module showed stronger design elements that included assignments and activities that were more challenging and allowed for greater learning of content materials, the study suggested a need for stronger strategies to support constructivist principles of instruction and learning in the online environment. The eRead Ohio

team hypothesized that the modules present the basic course information and that the supporting materials, including the online discussions, provide opportunities for higher levels of cognitive challenge and interactive engagement in course content.

Asynchronous Discussion Boards in the eRead Ohio Online Courses

Each eRead Ohio module includes a discussion board whose goals are to increase collaboration and interaction among participants, increase knowledge acquisition, provide an opportunity for professional discussions, and create a statewide conversation on like topics to establish a common knowledge base. Through the online discussions, participants have the opportunity to analyze how their practice reflects the online course content and how to improve their instructional strategies. At the time of the project, e-Read Ohio project instructors received basic training in how to facilitate discussion boards and also received prompts that they could use in starting discussions.

The goal of this study is to understand the extent to which the discussion boards in the eRead Ohio online professional development courses support and extend learning in the modules and allow students to engage more deeply with the course materials. The study investigated the following research questions: What are the characteristics of the discussion board prompts? To what extent do participants exhibit rigor and relevance in their online postings? Do postings show evidence of higher-order thinking? Across the online modules, what percentage of discussion is thoughtful or deeply engaged with the course content? What is the influence of the prompt on discussions? What do we observe about the role of the facilitator in the discussion? Do specific types of interjections lead to higher-level discussions? What kinds of facilitator interactions lead to thoughtfulness?

Method

Sample

Researchers analyzed discussion boards from three of the 150 eRead Ohio online courses offered in the 2006-2007 school year. The three courses, taught by different instructors (Instructor A, Instructor B, and Instructor C), all covered the same content area, and were offered at approximately the same time in the school year. At the start of the study, the research team read the discussion board transcripts to familiarize themselves with the content and quality of the discussions. The team met to discuss initial impressions of the discussions and decide which instructors' discussions to analyze. At this initial meeting, the team members ranked the quality of the discussions from high to low based on their initial impressions of the quality of the discussions. The research team, also the development team of the online course system, was familiar with the quality of the instructors. Each of the instructors was chosen as an e-Read Ohio facilitator because they had successful track records of professional development deployment. Instructors did receive instruction in the area of developing discussion online. The instructors were chosen to represent a range of skill in facilitating online discussions with an instructor considered to be strong, average, and low chosen for this study.

Instrument

Various content analysis rubrics and frameworks have been used for coding online discussions (see for example DeWever et al, 2006, and Meyer, 2006). Early research on discussion board participation simply examined quantitative data about levels of participation while later research went beyond level of participation to examine the content of the

discussions, social construction of knowledge, and critical thinking (DeWever et al., 2006). Few, if any studies used common instruments and therefore, results were neither replicated nor extended. This lack of replication has been identified as one of the deficits in the area of analysis of discussion boards (Vlake & Martens, 2006).

Table 3.

Categories for Coding Discussion Board Postings

Code	Description
0	Contributions are shallow, reflecting little or no thought about the topic of discussion
2	Contributions reflect limited thoughtfulness, comments are primarily opinions that are not supported by appropriate theory or course material
4	Contributions show thoughtfulness; comments are primarily opinions, however there is limited support from theory and course materials
6	Contributions show thoughtfulness; opinions are supported by appropriate theory and course materials
8	Contributions are extremely thoughtful; opinions are supported with appropriate course material. Other participant comments along with personal experiences are synthesized and incorporated into a well-developed argument.

In this study, we considered several existing instruments in order to build on previous work in this area of study. Among the instruments that the team reviewed were Puntambekar's system (2006), the SOLO Taxonomy (Biggs & Collins, 1982), and the Garrson's Four Cognitive Processing Categories, all of which have been used to categorize content of discussion boards (Mauriano, 2006; Meyer, 2006). The team ultimately chose to use two different classification systems. The first was the coding system developed by Puntambekar (2006, see Table 3), which allows for coding of cognitive demand and also the extent to which the posting is related to theory or course material. The second classification system used in this study was the updated Bloom's taxonomy (Anderson & Krathwohl, 2001), which specifies six levels of cognitive demand: remember, understand, apply, analyze, evaluate, and create.

Procedure

The text of each discussion board conversation was formatted to allow for consistent coding. The initial instructor prompt was listed first, with each response to the prompt listed below in the order in which it was posted. Discussions on non-academic topics such as the first posting in which students introduced themselves, and non-threaded discussions in which students reported on data that they collected in their classroom for a particular task were eliminated. Each of the remaining prompts was numbered for each instructor. Using an online random number generator, the researchers chose six numbers and selected the prompts in each course that corresponded with the random numbers. These six discussions in each online course were analyzed.

Two members of the research team independently assigned a rating to each posting to reflect the

highest coding category evident in the posting using Puntambekar's system and Bloom's taxonomy. The unit of analysis was an entire posting (De Wever, Schellens, Valcke, & Van Keer, 2006). After the independent coding process, the two-person team compared coding results. In instances where the ratings were not the same, the members of the team came to consensus for a final rating. The inter-rater agreement between the teams was 72%.

Results

The results are reported in three separate sections. First, the authors discuss the characteristics of the discussion prompts. Second, they analyze the rigor of the student postings. Finally, they analyze the rigor of the instructor postings.

Characteristics of Discussion Prompts

The three discussion boards included in the study were comprised of 1,273 entries by 88 participants in response to 31 instructor questions. The average level of instructor prompts ranged in level on the Puntambekar rubric from 4.19 to 4.87 (See Table 4). That is, according to the coding rubric, the instructors asked students to provide thoughtful comments but in general, did not specifically ask students to use theory and course material to support their statements. The level of each prompt on the Bloom's revised taxonomy was also coded. The prompts ranged from asking students to apply (Bloom's level 3) to evaluate (Bloom's level 5) the course content. Significant differences were noted in the level of questions that each of the three instructors asked (F (2, 1303)= 52.135, p=.000, η^2=.07). Post hoc tests revealed that the questions posted by Instructor B were at a lower level on the Puntambekar rubric than those posted by Instructor A (p=.000) and Instructor C (p=.000) although the effect size for this difference was small.

Table 4.
Characteristics of Discussion Board Questions

	Instructor A	Instructor B	Instructor C	Total
N questions	11.00	12.00	8.00	31.00
Average rubric level	4.88	4.19	4.87	4.54
Average Bloom's level	4.70	3.48	4.74	4.13

The average code assigned using the Bloom's revised taxonomy was also different among the three instructors (F (2, 1303)=144.246, p=.000, η^2 =.18) with a relatively small effect size. Post hoc tests revealed that, consistent with the coding using Puntambekar's system, the questions posted by Instructor B were at a lower level on the Bloom's taxonomy than those posted by Instructor A (p= .000) and Instructor C (p=.000).

The following are two examples of question prompts posted by instructors:

> One purpose of professional development courses such as this is to bring about "reflection" upon and "growth" in classroom practice,

leading to gains in student achievement. From this module, identify one aspect that caused you to stop and reflect upon your own instruction. As a result of your reflection, what change(s) will you incorporate into your work? How will that benefit your students?

This time, think in terms of content area reading. 1. Consider the "Close-Up Strategies" of context clues, structural analysis, and graphic organizers that are modeled in the videos. 2. Explain why one of these strategies would be essential for students to use as they read in science, social studies, math, or other content areas

Rigor of Student Postings

Student and instructor contributions to the online discussion were identified as either a new comment or a response to a previous comment. New comments were postings that responded to the prompt but did not build on or respond to a previous posting. Responses to previous comments were identified as those that referenced another posting. The overall average rating for student postings was 2.70 on the 8-point coding scale (see Table 5), with the average code for new comments 3.56 and for postings that responded to previous comments 1.49.

In several cases, postings that were offered in response to previous comments were thoughtful. For example, students offered each other resources and advice, as did this student,

"Nora, I have a book that does give you the scope and sequence of phonics instruction. It progresses from consonant sounds to vowel sounds (short then long). Then they move on to vowel digraphs and diphthongs, consonant digraphs, consonant blends, onsets and rimes. I will bring it to class and we can take a look at it."

Other responses extended a previous comment. For example,

"Leora, I do agree with you that automaticity aids comprehension. From my observation, those students who have attained automaticity in decoding words, have a longer focus in reading. On the other hand, the students who are still struggling give up easily. Most often, the struggling students spend such a long time decoding words that they forget what they had read before."

However, the vast majority of the postings in response to another comment were to encourage or support without addressing the content of the course or furthering the concept. The following examples are similar to many of these types of posts,

"Stella, Excellent activity. I'm glad to see that you have found ways to use phonemic awareness with your 4th graders. Good luck!"

and

"Robin, I like the idea of using the word in a sentence. It helps the student own the word."

The greatest percentage of student comments, 42%, was coded at Level 4 of the rubric. This average rating reflected comments that were primarily descriptions of instructional practices with no support of theory or reference back to course material. Thirty-three percent of postings were rated at Level 2 - generally a statement referring to and agreeing with colleagues' comments - and 19% at Level 0 - unrelated or only tangentially related to the question. Of the student postings, 6% were rated at the two highest levels of the rubric. These 68 statements were made by 32 of the 88 students.

Table 5.

Average Ratings of Student and Instructor Comments

	Instructor 1	Instructor 2	Instructor 3	All postings
Student postings				
New comment	4.30	2.89	3.73	3.56
	(N=164)	(N=256)	(N=285)	(N=705)
Response to previous comment	2.00	1.27	1.74	1.49
	(N=53)	(N=342)	(N=77)	(N=473)
All student comments	3.74	1.96	3.30	2.70
	(N=217)	(N=599)	(N=362)	(N=1,178)
Instructor Postings				
New comment	2.00	2.67	4.00	3.40
	(N=2)	(N=6)	(N=12)	(N=20)
Response to previous comment	2.17	1.85	3.53	3.00
	(N=12)	(N=13)	(N=47)	(N=72)
All instructor comments	2.14	2.20	3.67	3.14
	(N=14)	(N=20)	(N=61)	(N=95)

A one-way ANOVA indicated significant differences among the participant conversations in the three instructors' courses (F (2, 1177)=148.88, p=.000, η^2=.20), with a moderate effect size. The Tukey post hoc analysis indicated that the student postings in the course led by Instructor A were significantly higher (p=.000) than those of Instructor B (p=.000) or Instructor C (p=.000) and those of Instructor C were higher than those of Instructor B (p=.000). A significant correlation was observed between the coded level of the prompt and the average coded student posting for the prompt (r=.198, p=.000) indicating that when a prompt was at a higher level of the rubric, students provided responses at higher levels.

Rigor of Instructor Postings

The comments that instructors posted were also coded on the 8-point Puntambekar rubric. The average code for the instructors' comments was 3.14, with a range of 2.14 to 3.67 (see Table 5). A one-way ANOVA indicated significant differences among the three sections of the course (F (2, 94)=11.447, p=.000, η^2=.20), with a moderate effect size. The Tukey post hoc analysis indicated that Instructor C posted comments that were at a higher level on the rubric than did Instructor A (p=.002) or Instructor B (p=.001). The frequency with which Instructor C engaged in the discussion board was higher than that of the other two instructors.

Similar to the student results, the greatest percentage of instructors' comments, 54%, was coded at Level 4 of the rubric. This average rating reflected comments that were primarily related to instructional practices with no support of theory or reference back to course material. Twenty-five percent of postings were rated at Level 2 and 13% at Level 0. Of the instructor postings, 7% were rated at the two highest levels of the rubric.

Examples of instructor posts are included below:

Kelly, I just love your lesson!!! Way to get the children engaged.

Nora has posed several intriguing questions

to the class... any insights? 1.) How are others using word study in their classrooms? 2.) What assessments are you using to determine the direction to go?

Judy, I understand your frustration with helping students make the leap from making sounds to demonstrating it on paper. Any ideas from the esteemed group?

Discussion

Several factors appear to have an influence on the quality of online discussions. Two factors appear to account for a good deal of the variance. First, the characteristics of the discussion prompt set the parameters of the exchanges that follow. Second, it is clear that merely participating is not sufficient to ensure the level of rigor that course instructors expect of graduate students and practicing teachers. In this section, the authors discuss these two areas, discuss the implications of the Puntambekar coding system, and offer recommendations for further research.

Characteristics of Discussion Prompts

In all of the discussion boards that were coded, the most significant finding was that although differences were evident among the level of prompts posed by the instructors, the prompts themselves and the responses to those prompts did not reach high levels of the coding rubric. The majority of prompts requested participants to reflect on classroom use of instructional practices described in the course, but did not explicitly instruct participants to connect these practices back to the course content or relevant theory. Although instructors were given a set of sample prompts that they could use, in the sample of discussion boards analyzed in this study, the instructors did not use the prompts offered by eRead Ohio, instead each instructor developed her own prompts to begin the discussions. Also, the instructors often used the same type of prompt for different discussion topics in the course. For example, one instructor used a prompt that asked the participants to select a student or a small group of students, explain (in one or two bullet points) why they selected these students, describe (in one or two bullet points) the data used to assess their skills (phonemic awareness, phonics, fluency, etc.), plan and implement an activity based upon these data, and briefly outline the activity.

The level of the question that instructors asked was correlated with the level of responses that students produced. Questions that were rated at higher levels on the scoring rubric, in general generated responses that fell at higher levels on the rubric.

Rigor in Postings

The discussion boards were relatively lively in terms of number of postings and interactions between participants. Students reported increased insight into their practice and many described intended changes in practices. However, the vast majority of discussion prompts did not insist that students reflect and comment on course content in their response and few participants referred to course content to support their current practices or as a basis for changing their practice.

In addition to the lack of challenge in the discussion prompts to engage with the course materials, the majority of instructor comments on the discussion boards did not challenge students to provide a more comprehensive or thoughtful answer. In one case in which the instructor asked follow-up questions that challenged the group to consider a topic in greater detail, several participants posted a response to the original question, presumably to complete the assignment, but

nobody posted responses to the follow-up questions. In this sample of discussion boards, the initial question had the greatest impact on participants' thoughtfulness, with little impact of instructors' follow-up questions or postings.

The Need for Modeling by Instructors

In general, the instructors did not model for participants how to create a high-level posting. The majority of the instructor responses encouraged students to continue the discussion at the current level, even though the responses were not as connected to the course content as they could have been. Perhaps the instructors themselves were unaware of the architecture of a strong online discussion board post or perhaps they felt unsure about how to challenge deeper thinking about the content on an online forum.

Although participants were instructed to respond to one another, they were not given specific information about the types of interactions that were expected. Postings that were an initial response to the prompt received higher ratings than did postings in response to previous comments. Participants did not often refer to each other's postings when developing their own response to a prompt except when to praise or congratulate a colleague for a lesson that they thought successful or interesting.

The primary way in which students learned from one another on the discussion boards appeared to be in gaining ideas about new or different instructional practices that they might wish to add to their own repertoire. Students did not spontaneously apply the practices of reflection on instructional theories or challenging assumptions of other participants. The results of this study suggest that if one of the goals of a discussion board is that participants engage with the course content at higher cognitive levels and challenge each other's thinking, that discussion prompts must better facilitate those behaviors.

Contextual Factors Implicated in Results

Several aspects of the course delivery and organization may have led to the observed results. First, the participant groups were teachers who taught at the same school, and therefore, had many opportunities for professional discussions during the work day. In the online posts, a number of participants referred to discussions that they had about the course content in face-to-face discussions. Data collected from other stakeholders, including principals in schools in which courses were offered, indicated that participants were engaging with the course content during discussions and interactions with their peers during the school day, and postings on the discussion board were simply to fulfill a requirement. Also, the courses were offered with pass/fail credit, not with assigned grades. Therefore, participants might have felt lower levels of accountability with regards to the level of postings and interaction on the online discussion boards. The third factor that may have affected participation and engagement in the discussion boards was that participants did not necessarily come to the course voluntarily. It could be that a principal selected the course for the group of teachers and not every teacher may have agreed that this was a valuable experience.

One more point to note is that during the time period from which these data were collected, participants were not informed of the rubric that would be used to analyze their postings. Since the time of this study, the eRead team has provided more in-depth training for instructors on how to facilitate and manage discussion board activities including the expectations that instructors were to interact frequently in the

discussion boards, post timely responses to queries, scaffold meaningful discussions, develop high-quality discussion board prompts and responses, and develop rapport on the discussion board with participants. The team developed a rubric (see Table 6), which is available to instructors and students to inform all participants of expectations with regards to engagement in the online discussion boards.

Table 6.

Rubric for High Quality Online Posting from eRead Ohio Five Essential Components of Reading Instruction Course

	4	3	2	1
Critical thinking	• Rich in content • Full of thought, insight, analysis • Includes probing question or comment/question to extend others' thinking, leading to thoughtful responses	• Substantial information • Evidence that thought, analysis has taken place • Responds to others' postings in thoughtful manner	• Generally competent • Information is thin, commonplace, general knowledge	• Rudimentary and superficial • No analysis or insight displayed
Connections / storytelling	• New ideas or new connections: -To previous or current situations -To real-life situations • Rich in detail	• Clear connections to previous or current situations • Lacks depth or detail	• Connections limited, if any, • Vague generalities ("safe" comments)	• Connections not made • Off topic
Uniqueness / rumination	• New ideas, applications • New connection • Unique personal opinion • Made and developed with depth and detail • References and/or resources to support all comments	• New ideas, applications, or connections • Personal opinion • Lack depth and/or detail • Some references and/or resources mentioned	• Few if any new ideas or connections • Rehash or summary of other postings	• No new ideas • "I agree with..." statement
Timeliness / participation	• All required postings • Early in discussion • Throughout discussion	• All required postings • Some not in time for others to respond	• All required postings • Most at last minute, not allowing for responses from others	• Some, or all, required postings missing
References / resources	• Appropriately cited relevant ideas beyond the assigned readings	• Appropriately referenced class lectures, notes, material or readings	• No citations or references	• Inaccurate citation or misapplied reference

Implications of the Puntambekar System for Coding Online Discussions

The analysis of postings to the online professional development discussion boards provided the course development team with information about the quantity and quality of discussions that were occurring in the courses. The level of discussions among students - focused on instructional practices but not connecting those practices to course theory - was similar to the pattern found by Puntambekar (2006), whose coding system was used in the current study. Similar to Puntambekar's findings, the participants in the current online course answered the initial question posed by the instructor and did not challenge each other to higher levels of analysis or reflection. This study adds to the research in the area of analysis of online discussions by connecting instructor postings with participant engagement in the discussion board, using

a previously-developed coding system. The results of the study can be applied to training for online course instructors and also for course development.

On a larger scale, the methods applied for analysis of online discussions in this study provide an example of how evaluators and educators can use a clear coding system to quickly analyze discussion board activity during a course or after the completion of a course, how instructors can analyze discussion boards as they are facilitating a course, and how participants can monitor themselves. The question remains of how instructors or developers of online courses can leverage teachers' desire to talk about their work to discussions in an online setting. What types of prompts could help teachers connect their practice to theory and examine their practice against the backdrop of theory within the structure of an online discussion forum.

Recommendations for Future Research

Just as with face-to-face discussions, teachers and program developers should probably not be surprised by the results. That is, if instructors want students to get to higher levels of interaction with the course content, they need to model the behaviors expected and explicitly ask them to connect course content to practice. This study became a good reminder to us that, just because course content and delivery enters a new context, it does not mean that the fundamentals of good instruction do not need to be modeled within the vicarious world of online learning.

To that end, course developers and instructors of online courses are provided the following recommendations based on the findings of this study:

- Developers should provide instructors with more explicit directions about effective prompts and give a formula to instructors to follow when writing a prompt.
- Developers should provide models for instructors of how to challenge students to higher levels of thinking and analysis of course content.
- Professional development for instructors should address the expectations regarding questions, student engagement, and instructor behavior on the discussion board, as well as information about level and types of conversations and the types of responses to previous messages that are expected.
- Course providers should monitor instructors' success at generating high-level questions and encouraging high-level student responses.
- The study did not examine student characteristics with regard to the study's findings. It is likely that the time that students have to devote, reasons for taking a course, and students' drive will affect the quality of the posting and these motivational and personal characteristics might be considered in subsequent studies.
- Facilitator's course load could be a factor to consider with regard to their effectiveness in engaging in discussion boards. Instructors who are teaching concurrently many different courses with high numbers of participants might perform differently from those with just one course or courses with few participants.
- Instructors' knowledge of course content or familiarity with the course could influence level of questions. Therefore, instructors must be trained and provided support during the time that they are facilitating a course to ensure that they have the capacity to support learners' engagement in the discussion boards.

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