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Practice of Teaching Community to Promote Peer Review for Quality Assurance

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This article describes a two-year "lesson study" utilizing the peer review system "FD Commons" in a Japanese University. This project is unique because it relied on ongoing class observation guidance conducted by college teachers with extensive experience doing lesson study. This paper reports on how collaboration between faculty developers and professors shaped understanding of common criteria for assessing teaching and learning. Successive trials revealed the following three points: (1) prescriptive comments related to teaching skills and methodology were repeatedly recorded during the same class observation, (2) faculty developers' comments were more descriptive than prescriptive and predictive, and (3) professors indicated more predictive viewpoints based on understanding of lecture content and student ability.

Keywords: faculty development, educational reform in higher education, class observation, communities of practice across discipline networks

Introduction

The Japanese higher education system has expanded very rapidly; unprecedented growth compared to other countries. In the context of universalization in the 1970s, enhancing quality of education was raised as a major political challenge. In 1984, the Provisional Council on Educational Reform, which was formed as the Prime Minister's advisory panel, recommended that the government should make existing systems and laws more flexible. As a means of ensuring academic quality, the Council submitted some proposals including deregulation of the Standards for Establishment of Universities. In response to the recommendations, the Council conducted reviews of the entire higher educational system from three perspectives: (1) sophistication of education and research, (2) individualization of higher education, and (3) activation of university organization (NIAD-UE, 2009).

In the late 1990s, society expressed high expectations for university education and research due to the shift to a knowledge-based society. The major concern, however, was how to secure the quality of university education despite a rapid decline in numbers of the young generation and the diversification of secondary school education. To address this concern, the 1988 Council for Higher Educational Report stated the definition of the role of university education as "cultivating a problem-finding ability in learners". In response to the report, universities tried to develop distinctive education and research by creating a firm management system, forming a president's advisory group, and developing a multi-factorial evaluation system.

In 2004, government policies promoted ongoing university reforms, encouraged faculty development (FD) and restructured undergraduate programs. In the context of higher education reform, universities have provided various institutional programs for developing academic staff members: the development of teaching portfolios, campaigns to raise awareness of information communication technology, strategic use of experts such as educational consultants and teaching fellows, and funding for projects aimed at specific issues. Conditions for improving teaching and learning in education are more desirable today than they have been in a generation. Both teachers and students have recognized that education must be improved. Today's colleges and universities are facing pressure to provide increased accountability, access, and productivity in the face of decreased resources and support from the government. Within this broad context of educational reform in Japan, peer review of teaching provides informed colleague judgment about faculty teaching, used for either fostering improvement or making personnel decisions.

Ongoing Professional Reform and Role of Educational Developer

Education researchers have urged closer attention to how the practice of community comes to be known and shared. Wenger (1999) discussed the fact that establishment of a "community of practice" in professional settings promotes reflective gatherings on individual teaching issues as well as general questions of teaching practice. In Japan and the U.S., several national and local projects involving peer review of teaching might be classified as "communities of practice". These activities are based on some consensus about what constitutes teaching excellence and on providing those conducting the reviews with good evidence on which to base their judgment. Yet relatively little research examines the specific interactions and dynamics by which professional community constitutes a resource for teacher development in teaching practice (Little, 2002).

In Japan, "lesson study (Jyugyo kenkyu)" is a popular professional development approach in elementary and secondary schools whereby teachers collaborate to improve instruction and learning by studying content, instruction, and how students solve problems and reach for understanding (Fernandez & Yoshida, 2004). By engaging in lesson study, teachers feel connected to each other and to a body of knowledge that they generate, share, and continuously refine. It is a highly worthwhile activity, which allows teachers to come together to develop their pedagogical knowledge and skills.

In order to optimize faculty development practices such as lesson study, it is essential to foster scholarly teaching: systematic and critical examination of how learning in each discipline can be improved (Taylor, 2010). According to Swales (1990), engagement in a discipline requires not only shared knowledge of a subject matter but also shared goals, methods of inquiry, and communication styles. In such context, faculty developers understand their role as engaging in collaborative learning processes with colleagues from diverse disciplines and shared interests in their student learning. In other words, they need to craft a synergy between generic approaches for learning experiences and the disciplinary process of inquiry.

In North American universities and colleges, there has been a shift in the role of faculty developers, moving from working to support the teaching needs of individual faculty members toward meeting more multidimensional needs of faculty members (Dawson et al., 2010). Faculty development is driven by strong value commitments, yet there are questions concerning the key goals that faculty developers strive to achieve (Gosling, 2010). Taylor (2010) also raised the important question of whether faculty developers are discipline specialists or engage in work across disciplinary communities. In order to understand the complexity of their roles, the concept of "knowing in community" is a critical dimension.

This concept requires not only knowing the disciplinary community in which they work, but also sharing in the goals, challenges, resources, and problem solving within that community. Through such collaborations, they create opportunities to share and build knowledge with colleagues in the context of where their efforts will have the most impact: embedded in teaching and learning in a discipline.

The word "colleague" suggests not only someone of similar professional status, but in this context, a faculty developer who is qualified by expertise or training to serve as a knowledgeable judge (Lieberman & Miller, 1992). The colleague judgment implies a systematic act, based on appropriate evidence and thought processes. In other words, they provide an impartial evaluation of a colleague's subject matter expertise, the currency and appropriateness of their teaching materials, and professional and ethical behavior.

In previous papers, I reported on system development and our peer review project (Kato et al., 2009; Kato & Ishikawa, 2010). This system for professional development has been developed since 2008 with the goal of realizing pervasive peer review and reuse of reviewers' comments for the assessment of teaching and learning. By analyzing the results of our trials using FD Commons Ver. 3 during spring term 2009, I strove to gain new insights regarding how to conduct lesson study through a peer review system (Kato & Ishikawa, 2010).

In this paper, I report on the ongoing efforts of Tokyo University of Agriculture and Technology's Center for Higher Education to conduct lesson study by use of a peer review system (FD Commons on WEB). This paper will also try to provide new insights regarding ways to organize the community of practice for learning and teaching in higher education by analyzing the data of eleven pilot studies conducted in 2008-2010. Three viewpoints are used (descriptive, predictive, prescriptive) based on qualitative data analysis, along with one more category for behavioral actions and events in educational settings. Within the context of educational reform, I would like to examine the role of faculty developers

as engaging in a collaborative process with colleagues from diverse disciplines through lesson study projects.

Overview of the Peer Review System Development in TUAT

The main objectives of this project were to support the peer review process and to restore and retrieve key concepts using multimedia information for the purpose of constructing an e-teaching portfolio. My colleagues and I developed a class lecture recording application (FD Commons: http://www.tuat.ac.jp/~fd_tools) for reviewers that allows them to multicast from tablet PCs and PDAs to streaming video, images, and text. This project aims to provide teachers with online and offline peer review opportunities that are necessary to and relevant to their teaching and learning improvement as shown in Figure 1. Moreover, the database of reviewer comments is capable of reusing collected comments in order to suggest weak and strong points in class lectures and to design a rubric to evaluate lectures for assessment of teaching/learning in higher education.

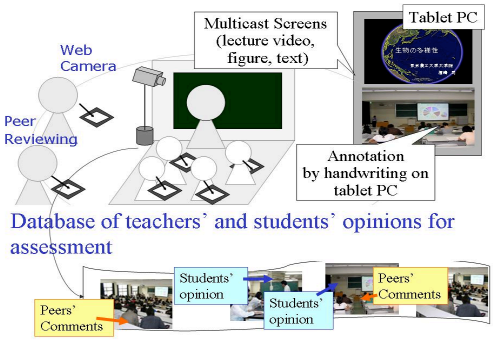

Figure 1. Peer review project overview

The project included design and development of a system (FD Commons Ver. 3) to assist peer reviewers and students in monitoring and reviewing class lectures and to record and retrieve reviewers' comments on video lectures. The following functions are enabled through use of InkML technology and multimedia networking technology (Direct Show).

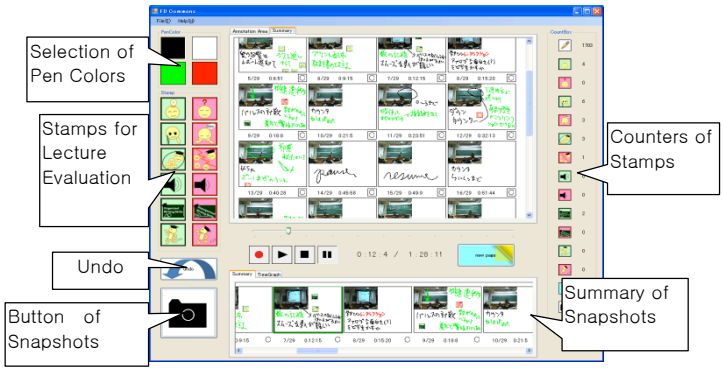

Figure 2. Screenshot of FD Commons (Ver. 3)

The collected annotations are used to suggest weak and strong points in class lectures for the purpose of teaching/learning evaluation. Moreover, they are used to create the rubric used to evaluate the quality of teaching/learning for self-reflection and lesson study (Kato et al., 2009a, 2009b).

In its latest version, the "FD Commons on WEB" has been designed and developed to promote knowledge sharing between reviewers and teachers for peer review (Kato & Ishikawa, 2010). The system was developed using a Web server with PHP and JavaScript, which utilized integrated video streaming and snapshots with annotations for review of lectures, as shown in Figure 3. The data from class lectures

was originally recorded and stored as part of FD Commons Ver. 3, however, the data is currently distributed as part of the next FD Commons on WEB. The system architecture consists of three servers: a www server, a database server, and a streaming server. At the request of a browser client, the streaming server delivers class lecture movies linked to annotation and comments, which are controlled and identified by the metadata on the database server (Figure 3).

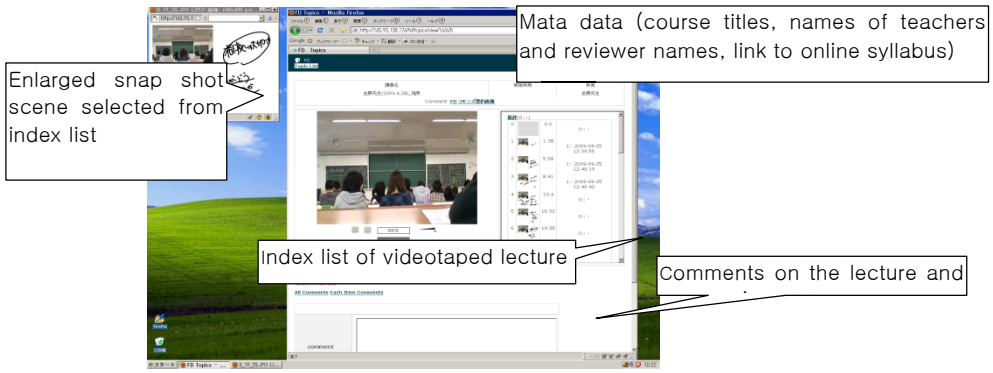

Figure 3. Screenshot of FD Commons on the web

Such convenient representations by networking will support the building of a "Teaching Community", which is a community of educators committed to pedagogical inquiry and innovation who come together to exchange ideas about teaching and learning. Most importantly, by placing a knowledge sharing system on the web, a faculty member takes a crucial step toward making his or her teaching public and available for others to comment on and learn from (Kahn, 2004).

Pilot Study for Lesson Study

This evaluation study continued our ongoing inquiry into how to promote reflective feedback and teachers' collaboration by using FD Commons. That is, the study design was created to focus on how teachers might produce and support instructional improvement across disciplines. To measure the differences between reviewers in use of FD Commons, "snap shots" data was collected from different seven sessions of the same class (Electronics) in the same academic year (2008-2009).

In the first set of trials on July 30, two reviewers (faculty developer and computer science teacher) tended to refine the multicasting functions including streaming video, voice sound, and annotation. Both reviewers used video taken from a camera located in the back of the classroom, in order to view both teacher and students (Figure 4). They started to add annotations at the beginning of the class. A reflection session was held immediately after the class. In this first trial, my colleagues and I found the following two benefits for educational improvement effectiveness: (1) by using FD Commons, the discussion focus can be selected and retained. Discussion usually tends to diverge during reflection sessions after lesson study: (2) reviewers could freely write comments and mark discussion points on the class video by using a pen-based device (Kato et al., 2009).

Figure 4. Class observation with FD Commons

Overall, 30 trials related to eleven subjects were conducted between July 2008 and February 2010, as shown in Table 1. The seven reviewers who participated used FD Commons and had no problems with system operability and accessibility (Figure 5). One teacher was an instructional designer from our Educational Development Center (faculty developer), who had experienced peer review at another university. Another teacher was a biologist from the Faculty of Agriculture. The other five teachers were academic staff specializing in computer science and mechanical engineering at the Faculty of Engineering.

Table 1. *Pilot Study of FD Commons*

	Date	Class Subject (Faculty)	Class Size (level)	Frequency of Observation	Background (teaching experience)
1	Jul. '08	Cognitive Science (Engineering)	5 students (Graduate)	1	Instructional Design (15 Yrs) Media Informatics (1 Yr)
2	Oct.'08 -Feb.'10	Electronics (Engineering)	70 students (Undergraduate)	10	Instructional Design (15 Yrs) Media Informatics (1 Yr) Mechanical Engineering (1 Yr) Computer Science (6 Yrs) Computer Science (4 Yrs)
3	Oct., '08	Cross Cultural Comm (Engineering)	35 students (Undergraduate)	1	Computer Science (6 Yrs) Mechanical Engineering (25 Yrs)
4	Oct., '08	Material Mechanics (Engineering)	75 students (Undergraduate)	1	Instructional Design (15 Yrs) Mechanical Engineering (25 Yrs)
5	Apr., '09	Fundamental Biology (Agriculture)	60 students (Undergraduate)	1	Instructional Design (15 Yrs) Biology (1 Yr)
6	Apr.- June, '09	Plant Physiology (Agriculture)	70 students (Undergraduate)	4	Instructional Design (15 Yrs) Biology (1 Yr)
7	May.- June, '09	Physical Chemistry (Agriculture)	60 students (Undergraduate)	3	Instructional Design (15 Yrs) Biology (1 Yr)
8	Jul., '09	Cell Biology (Agriculture)	100 students (Undergraduate)	1	Instructional Design (15 Yrs) Biology (1 Yr)
9	May, '09	Vegetation Management (Agriculture)	70 students (Undergraduate)	2	Instructional Design (15 Yrs) Physics (3 Yrs) Biology (1 Yr)
10	May.- June, '09	Intro. to Electromagnetics (Engineering)	90 students (Undergraduate)	4	Instructional Design (15 Yrs)
11	June, '09	Engineering of Electronic Property (Engineering)	70 students (Undergraduate)	2	Instructional Design (15 Yrs)

Figure 5. Recording educational events through use of FD Commons

Data Source and Analysis

Five reviewers participated in this class observation repeatedly as shown in Table 2. Reviewer A was an instructional designer from our Educational Development Center (faculty developer), who recognizes the value of both practice-bases and theoretical knowledge of teaching and learning. Reviewer B was a specialist from the same discipline but a lecturer. Reviewers C, D, and E specialized in computer science; Reviewer C had the experience of learning the same subject in his university.

All reviewers were asked to participate in the debriefing class session and complete an organized and detailed summary of the data. To measure the differences between evaluation instruments and reviewers' use of FD Commons, "snap shots" of data from different sessions of the same class (Electronics) were collected from on October 3, 2008 to February 3, 2009 as shown in Table 2.

Table 2. *Class Observation of Electronics (Faculty of Engineering)*

	Date	Reviewer (frequency of class observation)	Background (teaching experience)
1	Oct.3, '08	Reviewer A (the first time) Reviewer B (the first time)	Instructional Design (15 Yrs) Mechanical Engineering (1 Yr)
2	Oct.10, '08	Reviewer A (the second time) Reviewer C (the first time)	Instructional Design (15 Yrs) Computer Science (6 Yrs)
3	Oct.17, '08	Reviewer A (the third time) Reviewer D (the first time)	Instructional Design (15 Yrs) Media Informatics (1 Yr)
4	Nov.14, '08	Reviewer C (the third time)	Computer Science (6 Yrs)
5	Dec.19, '08	Reviewer D (the second time) Reviewer E (the first time)	Media Informatics (1 Yr) Computer Science (4 Yrs)
6	Jan.9, '09	Reviewer D (the third time)	Media Informatics (1 Yr)
7	Feb.3, '09	Reviewer A (the fourth time)	Instructional Design (15 Yrs)

In this analysis, based on the types of comments, each "snap shot" was classified into one of four categories: descriptive, predictive, prescriptive, and behavioral, as shown in Table 3 (Kato, 2012; Otani, 2007). Three categories (descriptive, predictive, and prescriptive) were used for recording educational events and theorization in qualitative data analysis. One more category was closely related to behavior analysis which attempts to understand, describe and predict students' behavior in classroom settings. Based on this behavioral approach, teachers can help students acquire positive behaviors by arranging consequences and measuring behavioral change (Wolfgang, 2001).

Table 3. *Taxonomy of Comment Types in Class Observation*

Categories	Definition and characteristics of categories for reviewers' comments in educational research
Descriptive	Description of objects' phenomena, explanations of processes, and interpretation of students' and teachers' behavior. These comments provide explanations but do not aim to predict with any precision. There are no testable propositions.
Predictive	Forecasting the likelihood of something happening. This approach usually leads to finding out what will happen, given some baseline that is already known. Explains "what is" and "what will be". These comments provide predictions and testable propositions but do not have well-developed justificatory causal explanations.
Prescriptive	Explains "how to do something". The theory gives explicit prescriptions (e.g., methods, techniques, principles of form and function) for educational improvement.
Behavioral	The basic view of behavior analysis is that both good behaviors and bad behaviors are learned as a result of the consequences of preceding behaviors. Behavioral analysis does not assume that there are mental causes for inappropriate behaviors. Variations in behavior are related to events that take place in the real world.

(Adapted from Kato, 2012; Otani, 2007; Sloane, 1992; Wolfgang, 2001)

In previous analysis (Houri et al., 2008; Kato et al., 2008, 2009a, 2009b), Hirayama's categories for qualitative class analysis were utilized (high inference items and low inference items). According to Hirayama's categories for qualitative class analysis, "high inference items" are based on a reviewer's insights and experiences. In contrast, "low inference items" are used to check basic teaching skills, which are used to collect student feedback on the effectiveness of the course and teachers as part of the usual end-of-term questionnaire. This analysis showed how reviewers focus on the aspects of each educational event during review of class lectures from a behavioral approach.

This current study, however, attempts to study how reviewers describe educational events in order to reveal students' understanding and to suggest alternatives for more effective and attractive teaching and learning. To this end, this study utilizes three categories to investigate reviewers' intentions for and contributions to class observation. Figure 6 shows an example of a reviewer's comment, which was classified as "predictive" because it provided predictions and had testable propositions but did not have well-developed justificatory causal explanations.

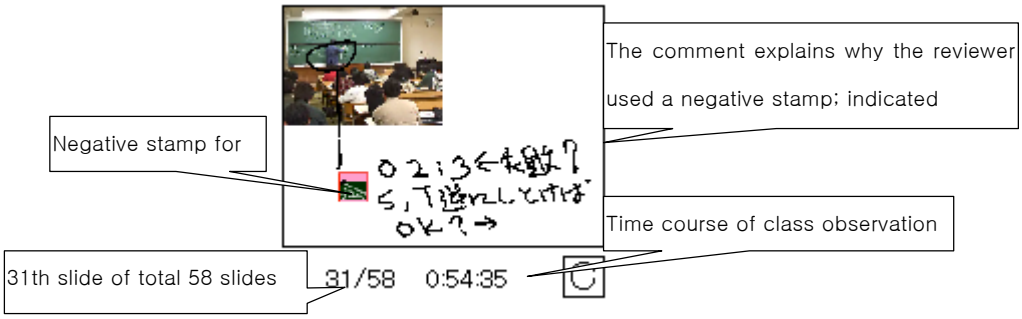

Figure 6. Example of reviewer's comments

Analysis of Faculty Developer Comments

Qualitative data analysis was used to investigate the differences between reviewers' comments across disciplines. Reviewer A was an academic staff member of the Educational Development Center (faculty developer) who participated in four class observations of a total of seven Electronics sessions in 2008-2009, as shown in Table 4. By investigating changes in the reviewer's viewpoint chronologically, in the first class observation, 25.4% of the recorded comments were prescriptive because the lecturer concentrated on writing notes on the blackboard and did not pay attention to students (Oct. 3, 2008). For example, Reviewer A repeatedly wrote the same comment "The lecturer should pay attention to students" nine times out of a total of fifteen comments. However, in the fourth class (Feb. 3, 2009), only 9.3 % of Reviewer A's comments were prescriptive; this is because the lecturer changed his lecture style after considering the reviewer's viewpoint. In order to change the lecturer's teaching style, Reviewer A suggested not only better eye contact, but also an effective lecture style for educational improvement.

Table 4. *Reviewer A's Class Observation Comments by Category*

Date	Descriptive	Predictive	Prescriptive	Behavioral	Other	Total
Oct.3, '08	27 (45.8)	5 (8.5)	15 (25.4)	11 (28.6)	1 (1.7)	59
Oct.10, '08	18 (36.0)	4 (8.0)	6 (1.2)	16 (32.0)	6 (1.2)	50
Oct.17, '08	22 (52.4)	4 (9.5)	5 (11.9)	9 (21.4)	2 (4.8)	42
Feb.3, '09	26 (48.1)	3 (5.5)	5 (9.3)	20 (37.0)	0 (0.0)	54
	93 (45.3)	16 (7.8)	31 (15.2)	56 (27.3)	9 (4.4)	205

Analysis of Professor Comments

The data of Reviewer C, who had the experience of learning the same subject in his university, and Reviewer D, are shown in Tables 5 and 6. Compared to the data of Reviewer A (faculty developer), Reviewers C and D provided more predictive viewpoints based on understanding of lecture content and student ability.

Table 5. *Reviewer C's Class Observation Comments by Category*

Date	Descriptive	Predictive	Prescriptive	Behavioral	Other	Total
Oct.10, '08	24 (57.2)	8 (19.0)	2 (4.8)	8 (19.0)	0 (0.0)	42
Nov,14, '08	16 (27.6)	13 (22.4)	7 (12.1)	20 (34.5)	2 (3.4)	52
	40 (40.0)	21 (21.0)	9 (9.0)	28 (28.0)	2 (2.0)	100

Table 6. *Reviewer D's Class Observation Comments by Category*

Date	Descriptive	Predictive	Prescriptive	Behavioral	Other	Total
Oct.10, '08	15 (40.5)	6 (16.2)	1 (2.7)	11 (29.7)	4 (10.9)	37
Dec.19, '08	11 (44.0)	4 (16.0)	1 (4.0)	8 (32.0)	1 (4.0)	25
Jan.9, '09	12 (41.4)	4 (9.5)	4 (13.8)	8 (27.6)	1 (3.4)	29
	38 (41.8)	14 (15.4)	6 (6.6)	27 (29.6)	6 (6.6)	91

During each class observation, both reviewers wrote fewer comments that merely observed characteristics of teachers and students in the class. Both reviewers tried to provide prescriptive comments for more innovative and attractive class lecture styles, based on their insights and experience in their discipline.

Conclusion

This peer review project for educational improvement has been conducted over two years in collaboration with colleagues from diverse disciplines. As a faculty developer in my university, I have engaged in collaborative learning processes with colleagues from diverse disciplines and shared interests for educational improvement. Swales (1990) indicated that engagement in a discipline requires not only shared knowledge of a subject matter but also shared goals, methods of inquiry, and communication styles. In such context, faculty developers understand their role as engaging in collaborative learning processes with colleagues from diverse disciplines and shared interests in their student learning. I aimed to explore ways to synthesize generic approaches for learning experiences and the disciplinary process of inquiry. Through this process, I attempted to examine the role of the faculty developer as an innovative practitioner in his or her institution by developing across disciplinary networks.

In this study, I reported on ongoing system development, which began in 2008 with successive evaluation studies across disciplines, and examined the effectiveness of peer review projects using FD Commons (Ver. 3) and FD Commons on the WEB.

Chronological data analysis suggests that reviewers write fewer comments that merely indicate characteristics of teachers and students, and instead try to provide prescriptive comments for more innovative and attractive class lecture styles. The recorded data from the system clearly shows strong evidence of how lecturers change their teaching styles in response to reviewers' comments. It also

provided reflective feedback to individual participants, which promoted teacher collaboration efforts, including teaching circles and project groups. From the perspective of teacher development and community of practice, a central interest in teacher collaboration or community resides in its potential for teachers to learn from and with one another.

In addition, this project encouraged participants to use the system as a launching point for discussion and reflection, and as a communication tool for peer review process and collaborative inquiries after class observation. This fosters scholarly teaching: systematic, critical examination of how learning in each discipline can be improved.

As with any other research, however, the limitations of this work should be noted. The first limitation of this study was the small quantity of data being analyzed. Now that we have developed FD Commons on the WEB, I plan to conduct new evaluation studies. Further studies with larger sample sizes would be useful in verifying this study's findings.

For future studies, I am currently developing a database of reviewer annotations using FD Commons on the WEB, as teaching portfolios capable of reusing collected comments to design a rubric to evaluate lectures as an e-teaching portfolio. Through use of FD Commons on the WEB in our institution, I hope to construct a teaching commons, a community of educators and student mentors committed to pedagogical inquiry and innovation.

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