A Case Study of the Relationship Between Socio-Epistemological Teaching Orientations and Instructor Perceptions of Pedagogy in Online Environments

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ABSTRACT

As part of an evaluation of an ongoing initiative to train faculty to teach online, semi-structured interviews were conducted to identify areas of need and faculty satisfaction. The data indicated that the majority of faculty placed a high value on technical and pedagogical support. However, another very surprising finding emerged from the data; a small number of faculty viewed technological tools as a replacement for pedagogy. To unearth why these individuals held this belief, interview data, ethnographic reporting and document analysis were triangulated in a case study. The results indicated that this phenomenon was likely related to teaching and learning orientations, as manifested in course goals, objectives and activities. This paper presents the study's findings and concludes with a discussion of the impact on best practice in online learning environments and directions for further research.

INTRODUCTION

In an effort to accommodate an increasingly diverse student demographic, administrators at the major research university where this research was conducted provided financial and other incentives to encourage the development of a significant online presence. Though common technical resources were provided at the university level, facilitation of online course development was decentralized with autonomy in training and methodology delegated to the individual colleges.

Faculty within the college of education where this study took place were encouraged to offer a number of courses either fully online or in hybrid online/face-to-face formats. Approximately 30% of the courses developed for online/hybrid delivery were new courses. The remainder consisted of courses converted from a traditional face-to-face delivery format. Courses were developed within the following departments: curriculum and instruction, special education, literacy studies, educational leadership and instructional technology.

To assist in course development, faculty were encouraged to attend an intensive, two-phase, 40 hour program, known as the Faculty Academy. In phase one, participants engaged in analysis of the pedagogical basis for exemplary online courses. Hands-on experiences structured to develop skills related to webpage design and use of the course management system, *WebCT Vista*™, constituted phase two.

After the Academy ended, follow-up support was provided to participants, however, no formal mechanisms existed and support varied considerably across the college's various departments. In some cases, follow-up support consisted of more experienced faculty mentoring peers in online course development and delivery strategies. Graduate assistants in the college's computer lab were another resource available to faculty who required assistance with webpage design and importing content into the Vista platform. One department dedicated a graduate assistant to supporting faculty in course development.

A predominantly quantitative survey instrument was used to assess participant satisfaction at the end of the Faculty Academy. The following data were taken from the 2005 evaluation (n=22). On a five point Likert-type scale (1 = poor to 5 = excellent), the mean for overall satisfaction was 4.82 (SD=0.22). Other items related to satisfaction received a similar rating with the lowest score (mean=4.11, SD=0.61) corresponding to the agenda at the opening session. With respect to year after year satisfaction with the program, faculty indicated that they believed the program was evolving to better meet their needs (mean = 4.3, SD=0.34, based five point Likert-type with 1 = much worse to 5 = much better). Qualitative feedback consisted almost entirely of positive comments, with a need for more of the same types of training being the predominant theme.

Despite the high degree of satisfaction reflected in evaluation responses, many faculty voiced frustration with issues related to the development and delivery of online courses after the Academy ended. Anecdotal evidence suggested that this sense of frustration was often related to a lack of technical knowledge required for development of specific content or activities. However, in some instances, the frustration appeared to be related more to the nature of online teaching itself than with any easily definable set of skills associated with development or delivery.

To develop an understanding of what factors might be impacting faculty satisfaction, a semi-structured interview protocol was developed (Appendix A). After obtaining Institutional Review Board approval, 11 faculty who had participated in the Faculty Academy were interviewed. Data analysis revealed several program specific needs that faculty perceived as being important for their continued development and delivery of online courses including: allocation of development time, access to more formal technical support, ongoing faculty collaboration and an institutionally focused research agenda to develop best practice.

While these findings were significant for the Faculty Academy and ongoing support practices within the college, they were representative of the faculty development challenges faced at other institutions (Botsch & Botsch, 2000; Coppola, Hiltz, & Rotter, 2002; Royal, 2005) and therefore not considered surprising. An unexpected finding that emerged was the tendency of four faculty to view technological tools as a replacement for pedagogy in both the course development and delivery phases. From our perspective, this was especially troubling considering the site of the study was a college of education; a setting in which a rich understanding of pedagogy is expected.

To ensure that these findings were not related to prior experience with online teaching, regression analysis was applied to the data. Though limited by a small n, no significant relationship was found to exist between the number of courses previously taught online and the tendency to view technological tools as a replacement for pedagogy ($p = 0.74$, ns).

A mixed methods study was designed and implemented to acquire an understanding what might account for this phenomenon. This paper reviews literature about what is known regarding effective practices for supporting faculty engaged in the development and delivery of online courses. Following that review, the methods and findings of the current investigation are discussed before turning to implications and directions for further research.

LITERATURE REVIEW

This review provides an overview of effective program structures that support faculty in the development and delivery of online courses. Conceptual frameworks for best practice in online pedagogy are also addressed. This information is considered critical in contextualizing this study.

Compared to traditional face-to-face learning, very little is known about pedagogical techniques and best practices in online courses (Hawkins, 2005). In a meta-study online training program, Wolf (2004) concluded that there is no consensus among leading practitioners as to what constitutes best practice for faculty development. Further, she concluded that experts in the field consider the online teaching and learning environment so different from traditional teaching that few if any face to face teacher training strategies are of significant use in online faculty development programs. Research by Ice (2006) demonstrated that training programs based entirely on an hours of contact approach are ineffective.

Much of the lack of consensus related to what constitutes effective support structures can be attributed to the changes that occur in faculty roles when they are asked to teach online (Sax, 2005). Traditionally, the role of faculty in institutions of higher education has been one defined by achievement in teaching, research and service (McKeachie, 1986). With respect to the teaching component, instructors develop a teaching style through years of practice that allows them to teach in a seamless, fluid manner. However, when faculty are asked to develop and deliver online courses, conflicts with traditional teaching styles often arise. Berliner (1988) notes that when interacting with technology many teachers revert to novice status. For the instructor, this reversion can often lead to uncertainty about what constitutes effective practice and subsequent doubts about the general efficacy of technology-mediated learning (Bennett & Lockyer, 2004).

Zotti (2005) suggested that the transition from traditional instruction to online teaching is best accomplished by systematically addressing the needs of faculty. Though few specifics exist in the literature, case studies from the University of Central Florida (Hartman, Dzuiban & Moskal, 2000), the State University of New York (Fredrickson, Pickett, Shea, Pelz & Swan, 2000), Virginia Tech (Moore, 2001) and Colorado State University (Kaminski & Milheim, 2002) provide guidance as to what constitutes high quality faculty support mechanisms.

By grouping the findings of these studies within their respective process-oriented frameworks (Patton, 2002) and applying cross case analysis using analytical induction (Bernard, 2000), it is possible to extract two universal practices. At each of the four institutions, the successful development of online programs was attributed to providing adequate levels of pedagogical guidance and technical support. Though institutional

variations existed, defining technical support is a rather straightforward proposition. As an example, instructional designers frequently assisted faculty with the development of webpages, flash applications, streaming media, etc., to ensure that online courses were well organized and professional in appearance (Brown, 2003).

To date, research in online learning environments has been centered more on technological aspects than applications of pedagogy (Arbaugh, 2005). In traditional face-to-face instruction, a large body of research examining the efficacy of teaching strategies relative to goals exists (Joyce, Weil & Calhoun, 2004). However, similar research in online learning has yet to be undertaken in significant measure (Bonk & Dennen, 2003).

Authors describing the emerging Community of Inquiry (CoI) model of online learning (Anderson, 2003; Garrison, Anderson & Archer, 2000; Garrison, Cleveland-Innes, & Fung, 2004) have suggested that meaningful online learning experiences are a function of the interaction between three elements: (a) participants' projection of social presence, (b) cognitive presence, and (c) the instructor's projection of teaching presence through effective instructional design and facilitation of discourse. Though much refinement and confirmatory work is needed, contemporary research tends to support this model (Arbaugh & Rau, 2007). With respect to pedagogy, it is informative to look at research related to the projection of teaching presence.

Through application of factor analysis to 2036 end-of-course surveys Shea, Swan, Li and Pickett (2005) found that effective instructional design and facilitation of discourse accounted for 70% of the variance in student satisfaction with the instructor. Anderson, Rourke, Garrison and Archer (2001) described indicators that define effective instructional design and organization: (a) setting curriculum, (b) designing methods, (c) establishing time parameters, (d) utilizing the medium effectively, and (e) establishing netiquette. Anderson et al. also described indicators that define effective facilitation of discourse: (a) identifying areas of agreement and disagreement, (b) seeking to reach consensus and understanding, (c) encouraging, acknowledging, and reinforcing student contributions, (d) setting the climate for learning, (e) drawing in participants and prompting discussion, and (f) assessing the efficacy of the process.

Despite direction provided by the CoI framework and associated research, much work is required to develop an understanding of what constitutes best practice in terms of online teaching strategies. Currently, there is a great deal of debate focused on the social (collaborative versus individual) and epistemological (constructivism versus objectivism) aspects of online pedagogy (Arbaugh & Benbunan-Fich, 2006).

Contemporary theory suggests that collaborative learning is the most effective means of facilitating learning in online environments (Harisim, Hiltz, Teles & Turrof, 1995; Hiltz, 2005). Based on Vygotsky's (1978) concept of social mediated practice, collaborative learning posits that individuals construct knowledge through dialogue, group discussion and peer modification (Bouton & Garth, 1983; Language Development and Hypermedia Group, 1992). However, the success of collaborative learning is dependent upon the ability of group members to assist peers in diagnosing and modifying misconceptions (Johnson & Johnson, 1998; Slavin, 1994).

With respect to epistemology, proponents of constructivism argue that knowledge is created through a process of inquiry and discovery in which external stimuli are interpreted in a unique manner by each learner (Schunk, 2000). Therefore, constructivists believe that there is no single version of reality, rather a multitude of realities situated

within each learner (Woolfolk, 2006). As such, constructivist oriented learning is dependent upon learners ability to analyze, synthesize and evaluate information to create meaningful, personalized knowledge (Joyce, Weil & Calhoun, 2004).

Table 1. Teaching Approaches Framework

		Social Dimension	
		Individual	**Group**
Epistemological Dimension	**Objectivist**	Single objective reality.	Single objective reality
			Knowledge is transmitted.
		Knowledge is transmitted. Abstract instruction out of context.	Instructional sequences combined with group activities.
			Working with peers reinforces learning and conceptualizes concepts.
		Emphasis on instructional sequences.	Emphasis on learner - instructor and learner - learner interactions.
		Individual mastery of material.	
		Emphasis on learner - instructor interaction.	
	Constructivist	Multiple realities.	Multiple realities. Knowledge is created.
		Knowledge is created individually.	
			Collaborative construction of knowledge by interacting with peers.
		Engagement with the subject matter.	
			Authentic / meaningful group interactions.
		Authentic tasks in meaningful contexts.	
		Emphasis on learner - content interaction.	Emphasis on learner - content and learner - learner interactions.

(Arbaugh & Benbunan-Fich, 2006, p. 438)

In contrast, objectivism assumes that there is a single reality of which learners display an understanding through declarative, procedural and conditional knowledge (Bloom, Englehart, Furst, Hill & Krathwohl, 1956; Gagné, 1985; Dick & Carey, 1996). Objectivist teaching is premised on the instructor having complete control over the materials, pace and direction of learning (Jonassen, Davidson, Collins, Campbell & Haag, 1995). In this model, learning becomes a sequential process in which individual units of declarative knowledge are assembled into larger declarative, procedural and conditional constructs to define reality (Gagne, Yekovick & Yekovich, 1993) and is not dependent on

how individuals internalize or interpret such information (Carey, 1998). Outside of the instructional design field, this orientation is sometimes referred to as behaviorism or positivism (Brown & Green, 2006).

For research purposes, Arbaugh and Benbunan-Fich (2006) recently developed a 2 X 2 matrix describing the four possible teaching approaches that could result from the intersection of these social and epistemological orientations: objectivist-individual, objectivist-group, constructivist-individual, constructivist-group. Table 1 on the preceding page summarizes the main tenets of each categories.

METHOD

Institutional review board permission was sought and granted for this study. An exploratory mixed methods study using three data points for triangulation was implemented to develop a better understanding of why over one third of the faculty interviewed described technological tools as a replacement for pedagogy. Specifically, interview data, ethnographic observations and document analysis were reviewed in an attempt to answer to following research question: What casual factors underlie the tendency of certain faculty members to view technological tools as a replacement for pedagogy in online courses?

Participants

Participants in this study consisted of 11 instructors who had previously participated in the Faculty Academy. Participants were selected at random and asked to participate in the study. All 11 (representing 50% of all Faculty Academy participants) agreed to participate in the study.

Table 2 depicts the employment status of each instructor as well as the number of online courses taught prior to the interview. Pseudonyms were used to protect the confidentiality of the participants.

Table 2. Participant Characteristics

Subject Name	Total Online Courses Previously Taught	Employment Status
Kathy	8	Professor
Martin	4	Associate Professor
Larry	7	Professor
Nancy	4	Adjunct
David	2	Assistant Professor
Sharon	6	Associate Professor
Stan	8	Professor
Linda	3	Teaching Assistant
Monica	4	Assistant Professor
Jill	5	Assistant Professor
Rich	4	Professor

Design

An exploratory sequential design with data transformation was implemented (Creswell, Plano-Clark, Gutmann & Hanson, 2003). Priority was given to the transformed qualitative components in order to enrich the development of grounded theory. Supporting qualitative data was also examined to increase the validity of the interpretation process (Morse, 1991).

We selected a mixed methods research design for our work, and being guided by a pragmatic paradigm (Morgan, 2007) we sought to capitalize on the strengths of both quantitative and qualitative approaches to data collection. This required following established criteria for generating high quality quantitative and qualitative data. While criteria for judging the quality of quantitative studies are well established, there is less agreement regarding what quality criteria are applicable to qualitative research (Denzin & Lincoln, 2003; Marshall & Rossman, 1989). Searle (2003) argued that triangulation of data sources aimed at enriching understanding through and of multiple perspectives should be the central criteria by which qualitative research is judged. We included multiple forms of qualitative data (interview, ethnographic and document), blended with quantified (transformed document) data, and analyzed these aiming at achieving triangulation.

Interviews. A semi-structured interview protocol was developed (Appendix A), following principles described by Berg (2004) and Patton (2002), to probe the perceptions and needs of faculty engaged in development activities. In-depth probing of responses was conducted on an individualized basis to draw out a more detailed understanding of development and delivery issues that were of concern to faculty. Two interviewers were involved in the interview process to ensure consistency. Interviewers were not in a position that would have created a conflict of interest or bias to be manifested in responses. Interviews lasted approximately 45 minutes each and were audio taped using a portable mp3 recorder. After all interviews were complete, transcriptions were generated for coding. Recordings and transcripts were transferred to a hard drive and CD for archiving.

To develop a rich understanding of the original interview data, archived transcripts were analyzed following suggestions by both Strauss (1987) and Tesch (1990) using an interpretive, iterative approach with emphasis placed on drawing out thematic strands. Both within and cross case analyses were utilized to more fully represent what occurred at both the individual level and as part of a group dynamic (Patton, 2002).

Within and cross case analyses revealed gaps in the original interview data. To fully develop themes and a richer understanding of the data, follow-up interviews were conducted with seven of the original participants. In-depth probing of responses raised in the initial interviews occurred in each of these sessions. Data from these sessions were integrated into the within and cross case analyses following suggestions made by Patton (2002). Cross case analyses are presented where more than one individual expressed a given theme. Within case analyses are presented where themes were unique to a single interviewee. To insure against bias in cross case analysis, NUD*IST N5© software was used to conduct branch and node analyses. Descriptive statistics generated in this process revealed no evidence to suggest bias had been present in cross case analyses.

Ethnographic Reporting. One of the authors of this study was highly involved in both the Faculty Academy initiative and providing follow-up support to faculty. During these processes, the author kept detailed notes of interactions with faculty to better address individual needs. For purposes of this study, notes were reviewed and commentary added to develop what Goodall (2000) described as an autoethnography, excerpts from which are presented below. Though some qualitative theorists are critical of this methodology because of inherent subjectivism (Crotty, 1998) it is considered useful by others (Patton, 2002, Hayano, 1979, Ellis & Bochner, 2000) for its strength in garnering insights into a larger culture or subculture of which the researcher is a participant. In this study, ethnographic data was used in a supporting role during the triangulation process. Used in this fashion, we believe that the inclusion of ethnographic data was inline with Searle's (2003) belief that triangulation of data sources should enrich understanding through the inclusion of multiple perspectives.

Document Analysis. Document analyses consisted of an iterative, thee-step review of activities in online courses developed by instructors who participated in interviews. Two syllabi / courses were evaluated per instructor to guard against anomalous data that might have emerged from review of only a single course.

Course activities were decompressed and evaluated with respect to Arbaugh and Benbunan-Fich's (2006) teaching approach framework. Classification of activities by social dimension (individual versus group) was a straightforward process. However, the epistemological dimension (objectivist versus constructivist) was open to a greater degree of interpretation. To ensure reasonable validity in the coding process, a rubric derived from Bloom's taxonomy (Bloom, 1984) was developed to assess and categorize each activity (Appendix B). Those activities related to displaying knowledge, comprehension or application were classified as objectivist in nature. Activities requiring analysis, synthesis or evaluation were classified as constructivist in nature. In the final step, social and epistemological classifications were overlaid and placed into one of the four respective teaching approaches.

Triangulation. After analyzing each data set in the manner described above, open coding was used to isolate prevalent themes followed by negative case analyses to explore relationships across data sources (Ryan & Bernard, 2003). First, themes isolated from interview and follow-up data were referenced data counts from document analysis. Suspected relationships were then compared with autoethnographic reporting data. Due to the reliance on autoethnographic data, what Strauss and Corbin (1998) described as the interplay between the researchers and the data was given significant weight in the triangulation process. As a result, interpretive conclusions from analyses were then refined to develop grounded theory that can be applied to further research (Glasser, 2000).

RESULTS

Results from analyzing each data set are presented below. Following is a cross case analysis of interview data. Triangulation, observations and conclusions follow in the Discussion and Conclusion section.

Interview Data – Thematic Strands

Four general themes emerged as significant areas of need among participants (n = 11). Technical support was found to be most important to six faculty and pedagogical support was considered most important by three. Of the remaining faculty, one believed allocated time for development was most essential. The final faculty member described a dynamic support structure that incorporated both technology and pedagogy as being essential to the development and delivery process. Analyses are presented below by theme prevalence. Presentation of data for faculty placing the highest value on technical support was given the most weight, as this group contained those individuals who viewed technological tools as a replacement for pedagogy.

Faculty Placing the Highest Value on Pedagogical Support. Among the three faculty (Kathy, Martin, and Larry) who believed pedagogical support to be the most important, the following statement, made by Kathy, was representative of their perceived needs:

> *I've taught in the traditional classroom for over 35 years and now I am trying to learn to teach online. I see some [other instructors] who just post up a PDF with their syllabus on it and some lecture notes. They just want students to do an assignment and submit it. That's not really teaching. That's more like the old correspondence work that's been with us forever. That's not what I want.*
>
> *With the courses that I have up there now, I've had someone right there with me at each phase helping me think through the content and making it so it works for the students. By works, I mean it creates this place that's like a real place where they get together and learn and do things together; where they have interactions. I like that and that's what I think these online classes really should be. That said, I really am not wired to think like that. I've taught in the traditional classroom all these years and I just have a difficult time transitioning. If I didn't have the help making these activities meaningful then I don't think my courses would be very meaningful.*

In response to a follow-up question, she related the importance of pedagogical support to student satisfaction in this way:

> *It's like you are focusing on every detail and thinking three or four steps ahead of the students, but you have to do it before the interactions ever start. In the real classroom I know how to do that; you learn to do that on*

*the spot. I don't know that I could really anticipate that… laying out a
course months before it ever takes place. So, if I want my students to have
those types of experiences and things they like then I need the kind of help
I've had in building my courses so far. I need that type of … forward
thinking and I think my students do too.*

Martin and Larry expressed similar concerns about their ability to translate
traditional face-to-face teaching activities to an asynchronous learning environment. In
all three cases, the term "interaction" was stressed most frequently. In 14 combined
discussion branches referencing pedagogical support, the term (or a synonymous phrase
such as "the learning that occurs between students, the instructor, and the content")
occurred 22 times. The next most prevalent term, "experiences", occurred 9 times in the
14 branches. At all times during the interview these three faculty were very clear on what
they defined as pedagogical support and did not confuse it with other support
mechanisms.

Faculty Placing the Highest Value on Technical Support. Among the six faculty
(Nancy, David, Sharon, Stan, Linda, and Monica) who cited technical support as being
the most important, two subgroups were found to exist. The first consisted of two faculty
(Nancy and David) who were able to clearly distinguish what constituted technical
support and were able to separate this from pedagogical support in much the same
manner as faculty who placed the highest value on pedagogical support. The following
quote, by Nancy, illustrated this orientation:

*Well, in the [Faculty] Academy we had the time where we talked
about pedagogy and we saw the exemplar courses. That really
helped with the strategy part. Then I have the [other faculty] that I
talk with that have done this before, so I have a pretty good idea of
how to set up the course to accomplish the goals I set out. Of
course any tips are always a help though.*

*What I can't do and really have little interest in doing is all of the
content [development]. Dreamweaver and making the video
clips… could I do those things? Maybe a little if I absolutely had
to, but that's not what I want to be doing. I have too many other
things to do. I do, however, like teaching online. The students seem
to be getting much more out of it because they are all in there
discussing and learning from each other in a way that I can't get
them to do in the classroom. But, again, I couldn't make that
happen without the content development [support person]. I have
to have that if I want to make these courses go. That's the most
important thing to me.*

The second group (n = 4) placed the highest value on technical support but failed
to clearly differentiate between pedagogy and technological applications. After citing
technical support as being the most important factor, Sharon was questioned about the
need for pedagogical support. Her response was:

No, I don't really need that. I'm pretty good, not really what you would call an expert, but good enough with understanding how Dreamweaver works and how to set up a chat room and those kind of things. You see, we have a [template] for how each of our courses look so they are all the same. That way students know what to expect and what's expected from them. It's setting all that up that I would like more help with. Like I said I'm pretty good, but it just takes too much time.

When questioned further about the need for pedagogical support, she explained:

If I want an interaction to occur then I know I am going to be using a chat or [teleconferencing]. That's how we get the information across when we want to do that kind of thing. But that's where I would like the technical support. If I could hand that off to someone to set all of that up then that would be the biggest help.

When asked about the nature of the interaction and related strategy that was desired in these types of situations, Sharon responded:

That's what the chat or [teleconferencing] is for. That's what I use to make those things happen. It's no different than if I was there with them [in that] there is information I want to get to them, but its just done a different way here.

Stan explained his perceived need for technical support in this manner:

We have all these things we want to get our students to do, but I sometimes need some input on how the best way is to do that. [In the case of] initiating an investigation, there are these ways to think about setting up the part that gets everyone thinking about the same thing, but that can be done with Dreamweaver or some of the tools inside Vista. Or there are other things like some [other faculty] have been working with where you might stream in video or use the voice over PowerPoints. All of those are options, but even though I am [fairly experienced] with the tools I still can use that higher level of help to make all of those things work the best that they can.

Here, I need to say that yes I can do some of those things. I've been working with [html editors] for several years, but I only know so much. The rest of it I need help with on occasion. I don't really feel like I can always keep up.

When questioned further about how support in the use of technological tools corresponded to instructional strategy, he stated:

> *Right, there is a connection there. That's what I am saying and that I would like to see more help [provided to faculty]. There are all these different approaches out there that can be used and even though I know some of them I would like to know about how others could be used and get that help putting them into my course. An example is [reference to Macromedia Breeze]. I know that's out there but what does it do? How does it change what I am trying to do that is?*

> *From what I understand Breeze is a conference type of tool. Now that would make a difference, because that's a different kind of experience. That's where I need the help, because I really am not sure how to [teach] like that.*

Linda responded to the connection between pedagogical and technical support in this way:

> *I know what is going on in the regular classroom and how those things happen. I've done that all my working life. But this is a new way of teaching... I see these new things out there for helping students interact with each other and oh that is great. What I need though is that somebody there who is going to help me figure out what my class needs. Will something done in [html] be the best or do I need a chat to do something. Those are the things I need help with. What kind of things will those [technical tools] do for my students. What will they learn using them that way and how will they learn? That's where I need the most help.*

Finally, Monica explained the relationship between pedagogy and technology in this manner:

> *The way we teach is changing. It's the difference between being there in front of the class and using these new [technologies] to get the information to the students. Ok, we can see all of this happening, but we or at least I don't know the latest about how all of it works. I'm there with certain types of things like the chats and discussion boards and I've learned how to set up the quizzes and such. But then there are the more complex ways that we give the data to students. I can do some of that but not enough and that's where I need help.*

When asked to elaborate on what influence she believed technology had on pedagogy, Monica responded:

> *Ok, there are several things taking place here. I am used to being able to be up there delivering the information and getting students to think about it. Now, I am still delivering it but there is another level there. That level is the technology that we are using and it changes the way students get the content. That is all a…. different way of learning. That's something I don't really know how to develop. That's why, again, I need someone there to hand my [course materials] off to and have them turn them into web pages. The development of those pages and the skills it takes are what I don't have.*

In 22 combined pedagogical discussion branches, subgroup two explained pedagogy in terms of technology 20 times. Within these discussion branches, the mean nodal occurrence of specific technological applications or technology in general, as a substitute for pedagogical strategies, was 3.1 per branch. In contrast, subgroup one explained pedagogy in terms of technology only once in 11 discussion branches.

Faculty Placing the Highest Value on Development Time – Within Case Reporting. Jill, the faculty member who cited development time as being the most important, said the following:

> *What I need the most is that work time. That set-aside time where I can develop my courses. The College, really the University, hasn't looked at this process enough yet and [determined] what we need. For me it's that time to devote to just working uninterrupted. That has to have some value.*

When asked about the relationship between pedagogy and technology, Jill replied:

> *Yes, there is a relationship there but we have to make sure we don't get too caught up in the technology and let it substitute for the teaching. The [difference between the two] is something that we have to be separate or we make it into a technology class and not a class about the topic we are addressing.*

At all times during the interview, Jill was very clear about what she defined as pedagogical and technical support with no confusion expressed between the natures of the two. The most prominently occurring theme was the need for development time, which was referenced nine times during the interview. The instructor acting as facilitator was the second most common theme and occurred six times during the interview.

Faculty Placing the Highest Value on a Dynamic Course Development Process - Within Case Reporting. When asked to describe what he believed was most important for the development and delivery of online courses, the final interview participant, Rich, said the following:

> *There really isn't one thing that I can point to as being the most important. The whole thing is a combination you know. Like in [a class currently being taught] we use one thing to get the students thinking and then another, like the forum, to get them to talk about what is going on. And then there might be this other thing, like where they present their findings of [a mini-study] at another point. There we have just three different things that we are doing and look at how many ways they can be done.*
>
> *Now do we have enough support in any of those areas? Not really. What I need for instance is the know-how that comes from being in the student seat and understanding how this or that [strategy or tool] might be perceived. I haven't been there and I don't really get that, but I know that if strategy A doesn't work then we look at theory and go to strategy B. In that process we use technology A, B, C or whatever to make it work. And for both of those areas we need the folks that can make it happen.*
>
> *Those folks also need to understand and be able to show us what is changing. If the college can do that for us then we are good at every step of this dynamic cycle that keeps feeding back on itself and changing, keeps evolving. And we need all of [those types of support] to keep evolving too.*

Even though Rich viewed support as being dynamic and frequently referred to interactions between technology and pedagogy, there were no instances where one type of support was confused with the other. During the interview, the interaction theme occurred 17 times.

Cross Case Analysis of Themes. Though faculty differed in what they viewed as being most significant in terms of support, the majority (n = 7 of 11) were able to clearly differentiate between the pedagogical and technical aspects of online course development.

However, subgroup B of those who placed highest value on technical support, failed in virtually all instances to differentiate between pedagogy and the application of technologies to the course development process. The 20 times in 22 discussion branches that pedagogy was explained in terms of technology were quite striking. The same was true for the 3.1 times per branch that specific technological applications were used to illustrate what these faculty perceived to be teaching strategies in online courses. However, this situation is best understood by examining the interview transcripts.

Despite multiple levels of probing for clarification, Sharon, Stan, Linda and Monica provided very little insight into the strategies they used in online teaching, focusing instead on technical aspects of course development. An example of this can be seen when Stan was asked to elaborate on his need for technical support and as part of his response stated:

> *[In the case of] initiating an investigation, there are these ways to think about setting up the part that gets everyone thinking about the same thing, but that can be done with Dreamweaver or some of the tools inside Vista.*

Instead of discussing what teaching strategies he might wish to use in structuring the investigation and relating this to a need for technical expertise in developing the media, Stan viewed the technology as being the means by which to initiate the investigation. To clarify this position, Stan was asked to provide more detail about the connection between technical tools and teaching strategies. Part of his answer to this line of questioning was even more revealing:

> *From what I understand Breeze is a conference type of tool. Now that would make a difference, because that's a different kind of experience. That's where I need the help, because I really am not sure how to [teach] like that.*

Despite having had more than a decade of teaching experience in the traditional classroom Stan viewed the use of a conferencing tool as creating a type of learning experience that he would not have been familiar with. The possibility that Breeze would allow for facilitation of a virtual classroom discussion was overshadowed by Stan's conception of the tool being a new form of teaching, rather than a modality.

In a similar fashion, Linda viewed pedagogy as being dictated by the technology:

> *What I need though is that somebody there who is going to help me figure out what my class needs. Will something done in [html] be the best or do I need a chat to do something.*

Monica's perception was slightly different but also indicated that she believed pedagogy was subordinate to technology when she stated:

> *I am used to being able to be up there delivering the information and getting students to think about it. Now, I am still delivering it but there is another level there. That level is the technology that we are using and it changes the way students get the content. That is all a…. different way of learning.*

Ethnographic Reporting

Over the course of 18 months, one of the researchers worked closely with Stan and Monica, providing technical support and pedagogical guidance. Interactions with Linda were mainly consultative in nature. With respect to Sharon, only limited non-participatory interactions occurred. However, regardless of the level of interaction, it was frequently apparent that all of these individuals experienced high levels of frustration and uncertainty in the development process. In retrospect, the researcher felt certain this resulted from confusion between what constituted technological and pedagogical applications.

One of the best illustrations of Monica's confusion was found in an activity where students were asked to analyze video segments. From the researchers perspective, this was a rather straightforward activity involving presentation of advanced organizers followed by the video clips and then asking students to become involved in a threaded discussion.

However, Monica expressed her belief that this was not the same as what might occur in the face to face classroom. From her perspective, the act of moving from viewing the video clips to participating in threaded discussions involved two invisible layers of technology. Despite repeated attempts at getting her to clarify this belief, the researcher was unsuccessful in understanding what she perceived the extra layers to be.

Stan's case was somewhat less complicated. During the course development process he discussed how a certain activity might be facilitated online. For one of his courses a mouse-over, image map activity in which students could view how different levels of input would produce variable outputs was developed. Stan viewed the activity and was very satisfied. Later, when discussing how to facilitate another activity online, it was clear that a similar image map strategy could be used. Stan responded that he didn't see how that was possible because the image map had previously been used to produce a very different outcome. During the development process, several similar misunderstandings arose. From the researcher's perspective, it appeared as if Stan viewed a specific technology as being related to a single specific outcome. As a result, he had difficulty understanding how a given technology might facilitate a variety of desired outcomes.

During consultations with Linda, an orientation very similar to Stan's emerged. Linda used a set of voice-over *PowerPoint*™ designed to convey declarative knowledge that had been developed by a colleague. Later, Linda began working on a thematically similar module in which she wanted to review materials that were procedural in nature. The researchers suggested that because Linda had previously had a satisfactory experience with voice-over *PowerPoints*™ that she might consider using them again for this activity. After some reflection, she countered that that strategy had been used for a different type of activity and wondered how it could be changed for use with what she was currently working on.

As previously noted, course development interactions with Sharon were limited. However, during the Faculty Academy the researcher observed her talking about course construction in a very concrete manner related to template usage. Essentially, Sharon seemed to believe that content could only be presented in one fashion and that students would benefit from this highly focused delivery strategy. She stated her opinion that the inclusion of technologies other than those contained in the template she was familiar with

would negatively impact her desired goals and objectives. Significantly, the template Sharon was using was approximately five years old and did not include many new technologies that have been demonstrated to produce enhanced learning outcomes.

In the development process, the researcher also had interactions, of varying degrees, with interview participants who were classified outside of high technical support subgroup B. Though in some instances these individuals occasionally expressed varying degrees of uncertainty regarding the choice of technologies to facilitate an outcome, they did not display a belief that a direct relationship existed between a given technology and a desired outcome as was the case with Stan, Monica and Sharon. Nor did they perceive the existence of invisible layers of technology impacting pedagogy as was the case with Linda.

Document Analysis

Activities for two courses per instructor were coded and classified using a four-part, socio-epistemological framework developed by Arbuagh and Benbunan-Fich (2006). The findings are displayed in table 3 below in both count and percentage forms. An asterisk proceeds the name of individuals identified as being in subgroup B. Means for activity types, between subgroup B (Sharon, Stan, Linda and Monica) and all other instructors are presented in Table 4.

Table 3. Socio-epistemological Classification of course Activities by Instructor

	Total Activities	Objectivist - Individual	Objectivist - Group	Constructivist - Individual	Constructivist - Group
Kathy	16	3 (18.75%)	2 (12.50%)	5 (31.25%)	6 (37.50%)
Martin	26	2 (7.69%)	4 (15.39%)	10 (38.46%)	10 (38.46%)
Larry	64	18 (28.13%)	12 (18.75%)	12 (18.75%)	22 (34.37%)
Nancy	32	12 (37.50%)	8 (25.00%)	2 (6.25%)	10 (31.25%)
David	44	20(45.45%)	0 (0.00%)	2 (4.55%)	22 (50.00%)
*Sharon	30	24 (80.00%)	2 (6.67%)	4 (13.33%)	0 (0.00%)
*Stan	20	18 (90.00%)	0 (0.00%)	2 (10.00%)	0 (0.00%)
*Linda	84	60 (71.43%)	6 (7.14%)	12 (14.29%)	6 (7.14%)
*Monica	60	38 (63.33%)	10 (16.67%)	6 (10.00%	6 (10.00%)
Jill	18	0 (0.00%)	0 (0.00%)	12 (66.67%)	6 (33.33%)
Rich	62	32 (51.61%)	4 (6.45%)	8 (12.90%)	18 (29.04%)

Table 4. Activity Type Means for Subgroup B versus All Other Instructors

	Objectivist - Individual	Objectivist - Group	Constructivist - Individual	Constructivist - Group
Subgroup B	76.19% (SD=11.45)	7.62% (SD=6.85)	11.91% (SD=2.23)	4.28% (SD=5.08)
All Others	27.02% (SD=19.27)	11.15% (SD=9.49)	25.55% (SD=22.02)	36.28% (SD=6.88)

DISCUSSION AND CONCLUSIONS

Analysis of interview data revealed the existence of four instructors (subgroup B) who viewed technological tools as a replacement for pedagogy in online courses. When asked to describe the interaction between pedagogy and technology, these individuals indicated they believed various technologies would dictate how learning activities are structured in online learning environments; a belief not detected among other interviewees.

Review of ethnographic data supported this finding. During the course design process, there were several instances in which each of these faculty members expressed confusion related to how a given technology could be applied to more than a single learning outcome. For these individuals, the application of a given technology was not considered to be a tactical tool for creating online learning environments. Rather, they perceived the technology being utilized as conceptually synonymous with pedagogical strategies.

As all four members of subgroup B believed technical support to be the most important factor for the continued development and delivery of online courses, it was initially hypothesized that a relation might exist between this perceived need and the belief that pedagogy is a function of technology. However, two other faculty members who placed a high value on technical support were quite clear in making a distinction between the respective roles of pedagogy and technology in online learning.

Analysis of course content provided insight into a possible relationship between subgroup B's unique perception and socio-epistemological factors. Of all course activities, an average of 88.10% of those developed by subgroup B were individual. In contrast, the means for all other instructors were relatively balanced between individual (52.57%) and collaborative (47.43%) activities. With respect to Arbaugh and Benbunan-Fich's (2006) Teaching Approaches Framework, an average of 76.19% of subgroup B's activities were classified as objectivist-individual as compared to a mean of 27.02% for all other instructors.

Based on these findings, we hypothesize that a relationship may exist between objectivist-individual socio-epistemological orientations and the ability to discriminate between technological applications and pedagogy in online learning environments. However, research involving larger numbers of participants, across multiple programs and institutions is required for purposes of generalization.

In Arbaugh and Benbunan-Fich's (2006) examination of the relationship between teaching approaches and online learning outcomes, the means for students' perceived learning and delivery medium satisfaction were lower for the courses in which an objectivist-individual approach was used than for any of the other three socio-epistemological classifications. If the findings of our study were to be supported through further research, we believe it is quite possible that student perceptions of learning and satisfaction may be influenced by the application of technology and misunderstanding of pedagogy by faculty with an objectivist-individual socio-epistemological orientation.

Based on the above findings, we believe much more research is needed regarding teaching orientations, personal traits and the construction of online learning environments; a call echoed in the literature by Hiltz and Goldman (2005). Specifically, systematic inquiry involving the relationship between teaching orientations, the use of

technology, pedagogical applications, perceived learning and student satisfaction needs to be undertaken. From our perspective, the need to do so is imperative. When properly designed, online learning environments provide learners with an optimal means through which personally meaningful and applicable knowledge can be constructed. However, much of the ability to do so is dependent upon the ability of instructors to develop and facilitate these environments. Therefore, if a relationship exists between certain socio-epistemological orientations and practices that influence learning outcomes, further research could provide direction for identification of individuals who would be more or less successful online instructors.

Contributors

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Philip Ice is an Instructor/Instructional Technologist for the College of Human Resources and Education's Department of Curriculum & Instruction/Literacy Studies program at West Virginia University. His research interests include immediacy behaviors, pedagogy and multimedia applications in asynchronous learning networks. Philip is especially interested in the intersection of these elements as they relate to the Community of Inquiry model.

Reagan Curtis is an Assistant Professor of Educational Psychology in the College of Human Resources and Education's Department of Technology, Learning and Culture at West Virginia University. A research and evaluation methodologist, his research agenda is diverse including online course development and delivery, cognitive development in mathematics, and gender issues in science learning among other areas.

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APPENDIX A

Interview Guide

Good morning/afternoon/evening. The goal of this study is to examine some of your observations related to the development and delivery of online courses that you have been involved with and try to discover what is or is not currently working in the process. The information generated by the study will be used for improvement of future program and may be used in future research, including possible related publications. With your permission, I would like to audiotape this interview.

Before we begin, I would like to notify you of the following:

- Your participation is entirely voluntary. You may halt the interview at any time and/or choose not to answer certain questions.
- Your responses will remain anonymous. Complete confidentiality will be maintained. At no time will your identity be revealed either by the procedures of the study or during reporting of the results.
- No negative consequence will result for choosing not to participate.

Please feel free to tell us what you really think and feel; this will be the most helpful in trying to find out how to improve things for students and faculty members in the future.

Thank you for your participation in this research.

[Note code number and start recording.]

1. Which course or courses have you developed and taught online?

(probe for each one: 1.when developed 2.full or hybrid 3.how many times previously offered before online offering 4.first offered online 5.how many repeats, if any.)

2. How would you describe your experience developing the course(focus on one course)?

(probe for: 1.Tools utilized – why included / excluded 2.Faculty Academy 3.Other support mechanisms – including approximate quantities of time 4.Positive and Negative experiences 5. Collaboration with other faculty – including approximate quantities of time 6. Ways to improve the development process 7.What type of research needed at the department / college level 8.What type of support mechanisms needed / desired)

3) How would you describe your experience teaching the course?

(probe for: 1.pedagogical differences between aln and f2f 2.positive / negative experiences with tools used 3. difficulties interacting with students 4.overall satisfaction 5. in-house technical support – approximate quantities of time and issues)

4. How effective, in your experience, is online learning as opposed to f2f?

(probe for: 1. Quality of discussion 2. Quality of products 3. Quality of interaction 4. other concerns)

5. Many faculty have found that to be most effective instructing on line, they need to devise new kinds of assignments or activities. Are there any kinds of innovative assignments or class activities that you have devised that worked particularly well?

(Probe for instructional decisions when moving a class from f2f to ALN. Probe other responses as needed.)

6. What do you believe you need to teach more effectively online?

(probe for: 1. issues at institutional, college and department level. 2. probe for issues related to relinquishing autonomy 3. ongoing vs. consolidated support mechanisms)

7. These are all of the questions that I have. What else would you like to add?

(probe as needed)

Thank you for participating.

Final Project Rubric

Knowledge: Activity asks students to recall information or observations. Key words include - list, define, tell, describe, identify, show, label, collect, examine, tabulate, quote, name, who, when and where.

Comprehension: Activity asks students to: 1. translate knowledge into new context, 2. interpret facts, compare, contrast, order, group or infer causation. Key words include - summarize, describe, interpret, contrast, predict, associate, distinguish, estimate, differentiate, discuss and extend.

Application: Activity asks students to: 1. use methods, concepts, theories in new situations, 2.solve problems using required skills or knowledge. Key words include - apply, demonstrate, calculate, complete, illustrate, show, solve, examine, modify, relate, change and classify.

Analysis: Activity asks students to: 1. identify patterns, 2. organize components, 3. recognize hidden meanings. Key words include - analyze, separate, order, explain, connect, classify, arrange, divide, compare, select, explain and infer.

Synthesis: Activity asks students to: 1. use old ideas to create new ones, 2. generalize based on a set of existing facts, 3. connect knowledge from different sources, 4. predict or draw conclusions. Key words include - combine, integrate, modify, rearrange, substitute, plan, create, design, invent, compose, formulate, prepare, generalize and hypothesize.

Evaluation: Activity asks students to: 1. compare and discriminate between ideas, 2. assess value of theories, 3. defend choices using arguments that are reasoned and supported, 4.verify value of evidence through presentation of supported arguments, 5. identify and be able to respond to subjective arguments. Key words include - assess, decide, rank, grade, test, measure, recommend, convince, select, judge, explain, discriminate, support, conclude, compare, summarize and evaluate.