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Online Learning Journals as an Instructional and Self-Assessment Tool for Epistemological Growth

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Abstract

This study looked at the instructional and assessment effects of using learning journals in three distance asynchronous computer conferencing courses (n=18, n=16, n=17). The instructor used a design-research methodology: each iteration of the course involved modifications to how learning journals were used based on analyses of the responses and results from the preceding course. Modifications included: a) use of orienting questions; b) question content, c) journal assessment and d) amount of scaffolding. Protocols were analyzed with a view to characterizing students' epistemic cognition from two perspectives: belief mode (rationalist epistemology, self analysis, norms of inquiry to defend competing beliefs) and design mode (knowledge building epistemology, collective responsibility, norms of inquiry to support idea improvement and explanatory coherence). Changes in metacognitive reflection and learning journal activity were related to measures of learning. As a pedagogical tool, learning journals with directed questions (scaffolding) encouraged self-awareness of learning and epistemological reflection.

Theoretical Background

Journaling offers a context for making internal mental dialogue explicit. It involves self-analysis and reflection on events, discussions and ideas. This process can be structured or free flowing, individual or shared, and can often deal with metacognitive issues as well as content (Andrusyszyn & Davie, 1997). Kerka (1996) believes that journaling can "provide tangible evidence of mental processes" (p. 3). Journals can aid in the 'making of meaning' through allowing the connection of past to current experiences. Because journaling is a combination of writing and reflection, it is a tool that is suited for both instructional and assessment purposes in online learning environments (Hansen, 2005). Connell (2000) examined two graduate courses in which learning journals were used. Students reported that learning journals promoted a deeper level of understanding of both

the course content and of their own thinking and understanding. This deeper level has also been observed in student online journals used in other computer conferencing environments (e.g., Heflich & Putney, 2001).

Journaling involves self-analysis and reflection on events or discussions (Andrusyszyn & Davie, 1997). Self-analysis is a significant focus in graduate studies because an important part of graduate learning involves the development of epistemic cognition. Research on epistemic cognition has shown a relationship between epistemic beliefs and academic performance (Schommer & Walker, 1995); and between a rationalist epistemology and skill in argumentation (Kuhn, 1991).

We take the position that an important part of graduate learning involves the development of a rationalist epistemology. Such a perspective has been shown to proceed developmentally from earlier objectivist conceptions, to subjectivist and finally to rationalist conceptions of cognition, although the extent of individual trajectories and timing vary widely (Baxter Magolda, 1999; Kuhn, Cheney, & Weinstock, 2000; Perry, 1970). An important, but less examined, part of schooling adds the requirement of community-level cognition that is essential to collective cognitive responsibility for community knowledge, a central tenet of knowledge building. Knowledge building also involves enculturation of students in the process of knowledge creation and work in design mode. For it is in design mode that ideas are examined for the purpose of improving their explanatory power and usefulness, asking questions such as: What is this idea good for? What does it do and fail to do? How could this idea be improved? (Bereiter & Scardamalia, 2003). From a design-mode perspective problems in understanding can serve as guides to conceptual breakthroughs.

Rationalist epistemology identifies justifiable norms of inquiry that enable decisions to be made between competing beliefs and positions. As one student commented:

> *For me it is now perfectly clear why we have learning journals and I think that they should be an integral part of any graduate level course. Here is our place to "make sense of things" to investigate our own learning and see where the holes lie. In my early confused weeks it helped a lot to write down the various things I couldn't understand and why I couldn't understand them. It also helped to write my own metacognitive thoughts because once they are down in words it was a way of tackling them.*(Jane, Course 3)

Another significant goal of graduate learning is developing an "innovative voice"—to become an independent researcher (e.g., Baxter Magolda, 2001) capable of generating, understanding, and integrating ideas. To support this growth, it is important to find opportunities for students to take agency over their learning. Self-assessment can provide just such an opportunity. Research suggests self-assessment can be an important component of the instructional process and plays a central role in scaffolding student learning and idea improvement (Chan & van Aalst, 2004; Gipps, 2002; Shepard, 2000). Graduate students' experiences of the academy will influence their scholarly identity (Anderson, 1996; Anderson & Louis, 1994; Hodgson & Simoni, 1995; Weidman & Stein, 2003) and using a process of ongoing reflection as an assessment tool can allow students an opportunity to develop a personal voice and perspective towards the material and ideas they are studying. As well, assignments like learning journals that sample learning over time provide a more thorough picture of change (Chan & van Aalst, 2004). Lee, Chan, and van Aalst (2006) have also demonstrated the value of journaling in a

knowledge building/Knowledge Forum® context in which students reflect on learning, not only through self analysis of their personal change but also analysis of group change (also see Niu and Van Aalst in this special issue).

Assessments are typically framed within belief-mode epistemology with a focus on content that is believed or ought to be believed, and with issues of agreement, disagreement, and warrant for or against propositions, weight of evidence, arguments and counter arguments. Education has historically equipped students to think in belief mode and hence, to also test and assess in this mode. Students are expected to examine concepts and consider what they and their peers believe, invoking the use of evidence and logic to help them take a critical stance toward these beliefs and to evaluate truth claims. Design-mode epistemology, by comparison, focuses on idea generation and improvement; in particular, the adequacy and improvability of ideas, and whether ideas are really leading to a resolution of problems in a field (Bereiter & Scardamalia, 2003).

Overall, design-mode work is guided by anticipation that a better idea will be forthcoming. The goal of design-mode thinking is not consensus but rather “inference to the best explanation” (Lipton, 2004).

While design-mode thinking is essential for advancing beyond what is known, belief-mode thinking is required to check the soundness of assumptions, beliefs to be taken into account, and the reliability of data. Each mode of thinking thus plays an important role in graduate student development. However, design-mode thinking has not traditionally been a focus in education at any level (Bereiter & Scardamalia, 2003). In this paper, we examine students’ learning journal entries for evidence of epistemological growth in both belief and design mode[1]. Because belief-mode thinking is traditionally part of education, particularly higher education, one might find such growth even in the relatively short time span of a university course. However, design-mode thinking requires an entirely different kind of enculturation and may be harder to observe. One interesting question for this paper is therefore whether using learning journals can also encourage design-mode thinking, and under what instructional conditions.

Methods

Data were collected in three graduate distance education courses taught over two consecutive years (n=12, n=15, n=17) with a mixture of Master's and Doctoral students, many of whom were taking most of their courses online. In each case the majority of the students were at the Master’s level and female. Some lived close to the university but preferred the convenience of this online method. Participants in all three courses ranged in age from early 20s to mid-50s.

Procedures

Each learning journal took the form of a note in the conference to which students added weekly from weeks 2-13 during the course. These notes were individually authored but part of the shared database and so available to the whole class. The questions were designed to encourage weekly reflection on course content and discussion participation. The courses were conducted by asynchronous computer conferencing using Web Knowledge Forum, a collaborative conferencing system developed at OISE/UT. Knowledge Forum differs from typical conferencing systems in that later versions have features such as scaffolds, annotations and “rise-above” or summary note capabilities, and allow lateral linking and reference to be created between notes in different topic

views.

Design-research methodology (Bereiter, 2002a; Brown, 1992; Collins, 1992) was used, with focus on continual improvements within and across the three courses. Changes across courses related to the following main issues and are summarized in Table 1: a) mandatory use of the learning journal questions; b) explicitness of the connection between the learning journal questions and the course content; c) instructor- or self-evaluation of online learning journals and d) level of support and scaffolding provided during each course to support the journaling process. Each of these changes was identified by students as affecting their level of participation and engagement.

a) Use of journal questions

In the first course only two of the 18 students spontaneously used the learning journal questions until prompted during weeks 7 and 13. In week 7, participants were specifically asked to use the questions and this prompted 10 participants to respond. As well, 2 participants did not use the questions at all during the course, which seriously affected the role of their contributions in the analyses. The sporadic use of the questions by participants also limited the opportunity to accurately assign student's entries to epistemological levels. Hence, for the second and third course, the use of these questions became a course requirement. Additionally, in the second and third courses, the learning journals were one of the course assignments and learning journal questions were introduced on a weekly basis.

b) Question content

For the first course offering, the learning journal questions had been based on all twelve of Scardamalia's (2002) Knowledge Building principles. This proved too ambitious in terms of producing measurable effects over a short 13-week course. It was decided to concentrate on fewer principles for the second course, specifically those that seemed to correlate well with Kuhn's et al. (2000) and Moshman's (1998) epistemological frameworks, particularly questions related to idea improvement. Additionally, results from the first course revealed that the set of reflection questions used were inadequate in identifying belief-mode epistemological levels as students focused mostly on content. Therefore, for the second course, the questions focused upon the discussion group activity for that week and were designed to elicit metacognitive reflection, with efforts to tap design-mode thinking, for example, "Reread your theory of learning (the pre-test). Pick and discuss one idea that has evolved;" and, *"Reread your learning journal. How, if at all, has this journal helped you? Could it help you more?"* In the third course, reflection questions were designed to take into consideration the content of the discussions from each week, as well as being related to the course theme of increasing progressive discourse.

c) Form of assessment

At the conclusion of the first course, the learning journals were assessed summatively by the course instructor. After discussion with the students however, it became evident that this external judgment contradicted the goals of the journals, that of giving the students greater sense of voice and ownership in their learning. Accordingly, the journals were self-assessed in the second and third offerings of the course. For example, in the second

course students were asked to review a rubric and use this as a guide in arriving at a self-assessment mark. In this rubric, to self-rate at the highest level a student would need to consider that their *"Entries were regular and characterized primarily as very reflective (i.e., reacting to ideas from the course materials, elaborating ideas from readings and from others' contributions, and contemplating or extending ideas from readings and from others' contributions). As well, entries monitor the learner's own growth in understanding".* In the third course students were given the rubric as a starting point, with the option for students to modify the rubric if desired. Students did not modify the rubric but rather used it as initially presented as a frame in which to justify their journal self-rating.

d) Amount of scaffolding

In the first two courses the questions themselves constituted the scaffolds for the journals. However, for the third course, students were introduced to the course theme of progressive discourse (Bereiter, 2002b) and encouraged to use scaffolds in the form of Discourse for Inquiry (DFI) cards that were adapted from classroom materials originally developed by Woodruff and Brett (1999) to help students take a more advanced approach to face-to-face collaborative discussion. The purpose of these DFI cards was to scaffold students in developing productive norms and discourse structures for design-mode thinking in the online course discussions. One card particularly relevant for the focus of this paper was the "managing problem solving" card highlighting Bereiter's six commitments to progressive discourse: a focus on conceptual artifacts; improvability as a positive attribute of conceptual artifacts; common understanding given priority over agreement; commitment to expand the factual base; selective criticism based on knowledge-advancement goals; and nonsectarianism (2002, pp. 87-88). These cards were for students to use as reminders of ways to conduct the online discussion. In addition, as part of the Knowledge Forum software, there were online scaffolds that students used to tag relevant aspects of their contributions.

Table 1 offers a summary of design research changes to the learning journal assignment over three graduate courses.

Table 1. ***Design Research Modifications by Course***

Modifications in each iteration	*Graduate Course 1*	*Graduate Course 2*	*Graduate Course 3*
Choice	Choice of whether to use questions	Question use mandatory	Question use mandatory
Question content	Response to one of a set of pre-developed questions	Self-evaluation of learning journals on a four-level rubric	Response to one weekly question linked to scaffolds and course content
Evaluation	Instructor evaluation of learning journals	Self-evaluation of learning journals on a four-level rubric	Self-evaluation of learning journals and option to modify rubric as desired
Scaffolds		Suggestions in course materials and videos about approaching learning journals	Training and use of scaffolds focused explicitly on supporting progressive discourse

Data Sources

All data came from the learning journal notes within each course database, and the pre- and post-essays. Participation and interaction patterns were generated from the data captured automatically from the Analytical Toolkit (Burtis, 1998) a quantitative research tool developed in conjunction with Web Knowledge Forum at OISE/UT. It extracts such summary data as number of notes read and written as well as who read and/or referenced others' notes, and these can be extracted at the individual or at the class level. Additionally, learning journal entries were coded using NVivo, for the presence of metacognitive activity. A pre- and post-test of a set of questions about students' epistemology of learning was also used to capture changes in levels of epistemological understanding as well as how students constructed justifications of that understanding. Questions did not point participants directly to the need for continual idea improvement, but they provided scope to engage in such efforts, for example, *"What do you currently understand learning to be—for yourself as a learner and for your students if you teach?" and "What role does knowledge play in learning?"*

Results

In the first part of the results section we present two analyses to examine whether learning journals supported deeper understanding (Sanders, 2001) and idea improvement, with evidence of work in design-mode. The first analysis compares online activity between students who displayed high versus low participation and interactivity as measured by the Analytic Toolkit performance data, and the second examines changes in metacognitive activity within the learning journals. Level of interactivity (high versus low) was assessed through tracking data derived from the Analytic Toolkit. Specifically, high participation rates were calculated based on a total per person of the number of notes read, written, linked, and revised. These totals were ranked and the classes divided into two groups based on that ranking, high and low.

In the second section we will look at how learning journals can help students make connections between new ideas and what they already know (Kerka, 1996), through examining descriptions of epistemological changes within the learning journals: these are examples where students strive for coherence in their views of knowledge. In the third section we identify issues related to student ownership and voice (Kerka, 1996) through examining significant issues raised by students within the journals, particularly whether journals should be instructor or self-assessed; whether the format should involve scaffolded or open formats and the question of privacy.

1. Do learning journals show evidence of deeper understanding?

The performance data collected by the Analytic Toolkit gives a *quantitative* indicator of participation and interactivity. In previous research, for example, Chan and van Aalst (2003) studied knowledge building portfolios where students identified collective knowledge advances showing the community's best work and progress. They found measures of participation (number of notes read, written, linked, revised) correlated with portfolio scores and conceptual understanding. In another study, Zhang, Scardamalia, Lamon, Messina, and Reeve (2007), identified a strong relationship between the presence of extensive writing and reading, and a number of quantitative indicators of participation including build-on notes, rise-above notes (summaries and higher-order syntheses), referencing, the use of scaffolds with knowledge building, as measured by independent analyses of the note content for levels of knowledge advancement.

Analysis 1: Online activity

High scores on participation and interaction in this study included linking to other's notes, reading large amounts of the database, revising own notes and building on other's ideas. Results indicated that participants with high overall participation and interaction rating were more likely to use sophisticated justification, such as dialectical reflection. Additionally, these students were more metacognitive within the learning journals, were more collaborative in the course, and were more often rated as *Evaluativist* in the post-essay (the most sophisticated level of belief-mode epistemological understanding in Kuhn' et al. (2000) model). Of particular note, students who showed signs of development in their level of epistemological understanding also showed increased sophistication in justifications from pre to post-essay. For example, in answering the question "What role does knowledge play in learning?" one participant starts with a conventional framing of knowledge in her pre-essay,

> *As a teacher, I feel it is important to be knowledgeable about different kinds of learning. How do I go about ensuring that I am attempting to meet the needs of all learners? I include different kinds of material for different purposes remaining specific on the context in my lessons. Appropriate context is important if comprehension and learning are to occur. I have to know the strengths and weaknesses of my students so that I can build on those strengths and work at improving the areas of concern. I need to know the curriculum, understand its philosophical underpinnings, and connect my students with information and knowledge that allow them to explore ideas, acquire and synthesize information, and solve problems.* (Karen, Course 2)

However, by her post-essay, we see an important shift both in how she is thinking about knowledge and in deriving coherence from several different sources:

> *Knowledge is acquired. It is based on experiences. Experiences are acquired through activities which lead to new knowledge, to knowledge building and to further understandings (Bereiter, 2002a). Through metacognition in the 'process of thinking about thinking', new strategies for thinking are developed resulting in 'deliberate, planful, and goal-directed thinking applied to one's thoughts to accomplish cognitive tasks (Hacker). Knowledge building as viewed by Bereiter most appeals to my sense of what 'teaching' of knowledge entails and the role that it plays in learning as it accompanies knowledge building. Ideally, knowledge building contributes to new knowledge in learning through process, through collaboration, through reasoning, and to ever deeper processing of information. I find it noteworthy to include that John Dewey spoke, some 100 years ago, in his work, to the idea of pedagogical evolution in leading to knowledge building.* (Karen, Course 2)

From a design-mode perspective, there was some indication of shifts in conceptual understanding among students in the first and second courses that could be characterized as idea improvement, but often the improvement was presented in the form of a retrospective analysis - a recounting of what was learned and a statement of intention to chart a new learning direction or a new educational mission. However, we did not detect work in design mode with our scoring scheme (e.g., students identifying the limits of an idea to accomplish some needed change, addressing design constraints in an effort to define a better way, and so forth). The scoring scheme reflects the difference between elaborating beliefs (for example, beliefs about the importance and usefulness of knowledge building) versus improving an idea (how knowledge building itself can be improved). More generally, results suggest participants did not see themselves as agents

of educational change. Their goals were mostly focused on reconciling different views of given information—a belief-mode advance—rather than developing new knowledge, a marker of design mode and knowledge building. Thus while there was considerable use of metacognition and advances in use of sophisticated justification, there was little evidence of design-mode epistemology.

Analysis 2: Shifts in metacognitive activity over time

Typically, across all courses, students who were metacognitive were also rated high in participation and were metacognitive with or without the questions. A student reflects,

> *In discussing metacognitive experiences I realized that this learning journal encouraged metacognitive activity. The thinking about learning about thinking about learning….is helping me learn about thinking about learning :-) The journal exercise has also led me to some goal setting for the week to come.* (Sue, Course 2)

In contrast, students who seemed less self-reflective about their learning (many fewer metacognitive examples were coded for these students) showed greater metacognition when using the scaffolded questions that appeared to support their metacognitive reflection, a position supported by comments such as the following:

> *I do enjoy using the learning journal as a place to store my thoughts about the week and to encourage reflection. The questions posted help me to move in directions that I might not have thought of. Without the questions, I would probably tend to do more of a summary of the readings rather than use it for application and understanding.* (Katherine, Course 2)

Students rated as having a high activity level also tended to ask themselves metacognitive questions when designing their own learning journal questions later in the course. By contrast students who were rated low in participation and interaction tended to display metacognitive activity only when prompted. Only one of the low activity rated students asked themselves reflective questions during those last few journal entries. A student rated as having low relative activity within the second course said,

> *My first experience with these kinds of reflective journals for assessment was in the previous course I took with [instructor]. I must admit they are hard to get used to and, although they are a great tool to engage in metacognition, they are hard for me to do on a regular basis. I know many others in the course love working on them and find them very useful, but my feelings are a little more mixed.* (Laurent, Course 2)

However for another student who received very high relative activity ratings, the purpose and value seemed crystal clear,

> *I feel that I did a lot of metacognitive thinking about my own learning and this was one of the main points of writing a learning journal (wasn't it?) - to monitor our own progress and to clearly identify what issues we could clear up and which ones we couldn't. Also to "rise above" by trying to integrate our learning from various weeks. These are my impressions of why we should be writing learning journals.* (Jane, Course 2)

From a knowledge building perspective we do not see attention to community knowledge and collective responsibility but rather to self-analysis of personal learning (more in

keeping with rationalist than knowledge building epistemology, as indicated above).

2. Did learning journals help students make connections between new ideas and what they already know?

A tangible benefit of the learning journals was the degree to which they supported dialectical reflection consistent with the rational constructivist thinking believed to be necessary at the graduate school level. In the examples below, we can see the use of dialectical reflection to highlight changes in epistemological views. Almost 100% of participants made such comments at some point during their course. With respect to the relative nature of knowledge, a participant discovers that,

> *Sue didn't need what I did, she did just fine with gray. I think there are advantages in both ways of thinking but my point is that I didn't realize until now that I can only think in black and white. So I have some learning to do.* (Manon, Course 2)

From a design-mode thinking perspective, this student recognizes the need for learning, but is not identifying ideas to be improved. There is, for example, no elaboration of an idea that might extend beyond black-and-white analysis. Another participant recognized that knowledge was not finite:

> *I think one of the biggest personal revelations during the course so far is that there is no "end point" so to speak regarding knowledge. It is always growing, changing, evolving, and old concepts are continually revisited and tested. It is truly dynamic, and I think that's why the pursuit of knowledge is so exciting.* (Ruth, Course 2)

Again, from a design-mode perspective Ruth recognizes knowledge as involving continual change, but there is no suggestion that the author sees herself as an agent in that change. Change is, in this sense, a "primitive" - something that occurs without presumed need of explanation. Ohlsson (1991) noted that this is how students who lack an understanding of evolution treat the concept - they report that it occurs and that it is important, but indicate no need to understand or explain it further.

The next participant came to realize the socially constructed nature of knowledge and hence the importance of others to her learning,

> *This week I began to develop more of an appreciation for the social aspects of learning. This occurred on a personal as well as theoretical level. I began to see the impact of society and the environment on learning in "general" and also began to appreciate the effects of these factors on my own learning. I realized that what I would take away from this course/experience was directly related to the others in the class, my interactions with them and their online contributions. As someone who generally saw my "textbook" as my greatest resource, this was a big leap!* (Sue, Course 2)

The student suggests a shift from the "textbook" as her absolute "greatest" resource for learning and from a "repository of knowledge" to some "big leap." But what was that big leap and in what sense would it represent an improvement over her earlier ideas? From a design-mode perspective, there is no attempt to deal with the challenges of textbook learning and how one might actually improve upon it. Yet the textbook itself can be seen as a social artifact and hence she was already at some level "socially interacting", something she recognizes later in the course:

> *Previously, I hadn't recognized that the artifacts which I used, even while working independently, were representations of distributed intelligence … therefore linking me with this web and rendering my independence merely relative and, ultimately, an illusion. I have begun to recognize the subtle and often invisible contributions of others to my so called independent work and learning.* (Sue, Course 2)

In the third course we see other kinds of connections being made between existing and new knowledge. The following excerpts are from a student in the third course, showing important changes of the sort made by other students. Her first comment illustrates the understanding of knowledge as something to be shared rather than just individually constructed

> *At this point in civilization has all the knowledge already been created by someone at some point of time. Are we now just realizing that we have to somehow pull all that knowledge together, is the internet just the tool to do that for us? ... my personal goals for this course are to get a greater understanding of what knowledge is and how it can be shared. I would also like to improve my writing skills and learn to work better in a group.* (Chloe, Course 3).

Her next excerpt recognition that knowledge building is work with ideas that can be improved over time:

> *Yes I think my personal learning goals for this course have changed. I have doing a lot of work with Adam and learning quite a bit from him. We have had many discussions or should I say dialogs having just read Belinda's note. Through these discussions I have come to realize that most if not all of my contributions have been opinions and not ideas and as such they have not contributed to knowledge building.* (Chloe, Course 3)

This insight seems to then impact her behaviour in the course and she begins to display agency by taking action to engage in more progressive discourse/design-mode activity. She starts to address entries towards the whole class rather than to a particular person and also begins to explicitly use the Discourse for Inquiry cards to help her engage more collaboratively. As she explains here:

> *Other changes that I have to make to my contributions are not so small or easy for me at least to make. I have the "Discourse for Inquiry" cards in front of me at all times and I am really trying to incorporate them into my contributions but I fear I am falling short. I asked Adam if he used them during one of our discussions and he said no as the concepts are so ingrained into him that he doesn't need them any longer. I can only hope that one day I can say the same thing but right now I need them and would be happy even to get to the point where I can say that I am contributing to knowledge building and the advancement of knowledge instead of just knowledge sharing.* (Chloe, Course 3)

3. Did learning journals provide a context for student ownership and development of student voice?

The evidence for the journals providing a location for student ownership and the development of student voice came from their reflections on three particular issues. The first was whether the learning journals should be instructor or self-assessed; the second

was the issue of whether scaffolded or open-format questions should be provided; and the third was whether journals should be private or public.

Instructor Assessment vs. Self-Assessment

For the first course, learning journals were instructor assessed. In course feedback students pointed out that in spite of discussion about constructivism and the focus on student agency for learning, grading was done exclusively by faculty. As this seemed contradictory to the goal of graduate student agency, a self-assessment component in the form of the learning journal assignment was added for the second course. Students were required to send an e-mail to the instructor at course end with a self-assigned grade related to a small rubric along with a brief justification. In addition to the actual grading of the overall journals, many of the questions also encouraged students to self-assess. We believe that this is a valuable skill is required by all students who will be lifelong learners. It has also been associated with the higher levels of epistemological development (Baxter Magolda, 1999; Perry, 1970). One student shows her astonishment concerning the self-assessed nature of the learning journals,

> *We even have a chance at self-assessment in this course through our Learning Journals… what amazing power in the hands of students! What a change from a traditional classroom.* (Sue, Course 2)

Another student expresses the value of metacognitive reflection afforded by the journals cogently,

> *The learning journal is a good knowledge building device/exercise that tracks reflections and a good way to assess my learning and theoretical growth to date. The inclusion of this assessment tool has forced me to sit down and record my thoughts, which I believe to be paramount for complex individual learning to occur. The journal is a good record of discoveries and a place to return to during and after the course to reflect on what I said, I have learned, and confirm the validity of my reflections as the course progresses and thereafter.* (Bev, Course 2)

For some students, the journals allowed them to examine aspects of their own thinking that were challenging, and in the third course, only two of 17 students, each of whom had low participation levels, expressed difficulty with the process of self-assessment:

> *I have always found self-evaluation difficult. I tend to be a perfectionist and I really do find looking at myself difficult. I often seek right/wrong or black/white answers, so I find reflection difficult, I can't tell if I am "right" in a reflection. Also, it is difficult to assess, should I be looking at what I perceived or what I actually did?)*(Anne, Course 3

Thus while self-assessment can be helpful, there is considerable variability in how comfortable students are with that process.

Scaffolded or Open Format

There was much discussion about whether the journals should be scaffolded using questions or just left open to the student's own decisions about content. A student who showed high participation in online discussion reflects on the advantages of having no

preset questions,

> *In rereading this journal, I found that the content was more valid for me when I took an open-reflection approach. As I reread the journal, however, I found that this open approach tended to be more content driven, and not as personal, or reflective as when I took a more holistic approach. Despite the benefits of content recap and synopsis, I did notice a lack of introspection with this approach.* (Mike, course 2)

He then reflects on having questions provided,

> *The guidance that was provided throughout this course in our learning journals concentrated primarily on "reflection", and as such, has huge benefits that I would not have otherwise reaped. When I took this introspective approach, however, I did miss the content-synopsis that would come with a more open and free flowing approach to this journal.* (Mike, Course 2)

One who participated very little in the discussions said

> *I do enjoy using the learning journal as a place to store my thoughts about the week and to encourage reflection. The questions posted help me to move in directions that I might not have thought of. Without the questions, I would probably tend to do more of a summary of the readings rather than use it for application and understanding.* (Manon, Course 2)

In the third course, a student with high participation levels who wrote entries before reflection questions were begun in week 3 noted:

> *The reflective journal was something that I thought could be tweaked a little. I found earlier on that my entries were not in-depth and personal enough, so I struggled with them. After [instructor] changed them and gave us the theme/questions, this helped me remain focused and on track.* (Jeff, Course 3)

This student was the only one in the third course to comment on the issue of scaffolded as opposed to open format questions, likely because it was a consistent strategy in place from the beginning of the course.

Overall, it appeared that having questions to respond to is most useful either to orient students new to the journaling process, or as a scaffold for those who might otherwise be less metacognitive. It did appear as if questions were occasionally actually demotivating to the most independent and active students and while, for research purposes it was helpful to have everyone respond to similar questions, instructionally, it might be better to scaffold using questions initially, but relax the requirement as the course proceeds.

Private or public and the nature of journals

Perhaps the most contentious issue was whether the journal should be public for all students in the course to see or private to be shared just with the instructor and TA. This issue is also reflected in other research on journaling (e.g., Hansen, 2005; Kerka, 1996; Wickstrom, 2003). Interestingly, while one of the cited problems of public writing is that it may change what students will say because of the audience, this may not necessarily be negative, as the public nature of the online journals allows modeling of interesting styles

of journaling; the opportunity for peer feedback on entries and a deeper understanding of different ways others are understanding the ideas in the course. Whether the public element works positively would seem to be largely dependent upon the learning environment and collaborative tone set for the course by the instructor. In the present study there seemed to be a fairly evident split between students who had high versus low relative activity as to how they felt about other's having access to their journals. Students with high levels of activity were eager to share their journals and seemed to learn much from reading others journals. One student states,

> *Reading other people's journals has also been a learning experience. Even though we all read the same articles, answer the same questions and use the same "folders"...our experiences are so unique and varied.* (Jane, Course 2)

By contrast, students who had a relatively low activity rating typically preferred more privacy. For instance, one student said,

> *An issue that I've faced with the format for the journals is that they are public; I'd prefer them to be private or maybe just shared with [the instructor] and to have the option of posting to a public forum if one wishes.* (Katherine, Course 2)

Another student framed her reluctance to make her journal public another way

> *If I could choose, I would prefer having my learning journal not published. Since it's named as "journal", I have difficulties sharing my journal with others. Therefore, it always took me a long time to think of what I could write. I just could not write down everything that came to me easily when thinking of the fact that they would be read by others.* (Christine, Course 3)

The second of these entries suggests that journals are by nature private, and it may be that ultimately, comfort with a public venue may hinge on each student's understanding of the learning journal purpose, an understanding that is influenced by prior experience. In course 3, six out of 17 students preferred journals to be private, though two of these students conceded the usefulness of public journals, especially at the beginning of the course, and enjoyed being able to read others' journals. One student explicitly stated that she did not mind others reading her journal, but felt uncomfortable commenting on others' journals.

Additionally, in the third course, two students (with high activity ratings) had prior experiences with online journaling in other courses by the same instructor. One student already kept a personal weblog to which she posted regular entries. Two other students voluntarily chose to weblog making their journals public to a broader audience. Another student in this course stated how the public nature of the journals allowed her own conception of the purpose of journals to change:

> *I know I was using it more as a journal when I started, but after reading Belinda's log, where I could see her working through various concepts, the light came on. Ah, this is what this journal is for. So, I attempted to do the same thing. It was an inner monologue or debate - looking at issues from different perspectives and trying to come to some sort of conclusion.* (Megan, Course 3)

It seems clear that those students who arrive in online classes already using personal

Weblogs find the public nature of journals much less controversial. It appears to be those students who are unused to such forms of public discourse for whom it is most challenging. For these students a clear explication from the beginning of the course of differences between personal and public in relation to course ideas and understanding may well be of assistance in making them feel more comfortable.

Conclusions and Educational Importance

Much success has been reported about the adoption of online journaling (Admiraal et al., 1999; Andrusyszyn & Davie, 1997; Graybeal, 1987), and more recently, online weblogs show potential similarities and an alternative technical structure for such journaling. In our research, students' learning journals were accessible to all within the conference. While not enjoyed by all students, those with higher activity levels preferred this method. Further, it was clear that the learning journals encouraged explicit recording of students' conceptual and metacognitive growth. While there was not much discussion by students concerning the self-assessment of their learning journals within the journals themselves, other communications with the instructor (mainly e-mail) suggested to the instructor that the range of self assigned grades was linked to their actual reflective performance in a way that was probably more accurate, and more useful from a learning perspective than if they had been instructor-assessed. Student commentaries indicate that the purpose of the journal needs to be well publicized, and explained in a variety of ways to help students become comfortable with the process. Further, while not required by some students, questions that scaffold metacognition should be available.

Instructionally, online journals have a number of advantages. First, they are inherently flexible and can be integrated anywhere in a course. Second, they are also open-ended and can be designed with whatever degree of structure suits the particular instructional context in which they are being used. Third, they can be framed to both direct and assess current understanding using common questions that students respond to at particular times. Fourth, they can easily be instructor-assessed or student-assessed by collaboratively developing a rubric or other criteria to apply to the journals. Finally, learning journals support student voice and ownership by encouraging the integration of course ideas with student's existing understanding through a process of sustained reflection. With such explicit support they can also provide a location for both students and instructors to monitor design-mode thinking.

Evidence of work in design mode was all-but-absent in journal entries. This suggests that students see themselves as learners of educational innovations rather than designers of next-generation educational methods and environments. Follow-up research will be required to determine whether making design mode more explicit and engaging students directly in collective knowledge construction in design mode may lead to greater awareness of knowledge building epistemology and educational innovation based on it.

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- [1] TLearning journals is a term used in this paper to identify graduate student online journals used to document aspects of their learning during particular courses.↑