

Research Note

“Evidence for Learning” as Expressed by Undergraduate Biology Students in Learning Journals

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Learning Journals are widely used in educational contexts to encourage students to reflect on their learning (Stephens & Winterbottom, 2010). Researchers from the faculties of science and education at the University of British Columbia are interested in exploring the ways in which Biology students represent that learning in their writing. These researchers are collaborating to investigate the potential for using Learning Journals as a means to gain insight into students' perceptions of their own learning. This will be completed by identifying the kind of “evidence” that students use to determine what they have learned.

Context

As a means of assessment in higher education, Learning Journals are thought to stimulate critical thinking and provide opportunities for students to reflect on their learning (Holly, 1989; November, 1996). Journals have the capacity to capture the *immediacy* of students' perceptions of their learning since they are written close to the events being recorded, thereby providing a source of data that is rarely obtainable using end-of-semester data collection techniques (Wagner, 1999). Journals can reflect the ups and downs of a semester and provide insights into processes of learning over time (Candy, 1991). They therefore have the capacity to inform researchers' understanding regarding possibly misaligned expectations between students and professors about what constitutes “learning” (Wagner, 1999).

P. Kalas, a Biology instructor, wondered about a possible misalignment between her own and students' expectations regarding what comprised learning. She heard poorly performing students exclaiming “I learned so much today!” at the end of class. Likewise, students sometimes expressed bewilderment at achieving poorly on a test: “I studied so hard. I was ready. I knew everything.” At other times, as the instructor introduced a new topic, students would insist “Oh, we've already done that” regardless of their subsequent performance. Motivational theories (e.g., Bandura, 1993; Weiner, 1985), common in science education, provide insight into student's bewilderment regarding high self-confidence and low performance, but offer less for situations where students persist in expressing confidence in the face of poor performance.

In order to develop effective ways of working with these students, we wondered if taking a discourse analysis perspective (Wood & Kroger, 2000) would provide different kinds of insight

into students’ perceptions of their own learning. In particular, if we could identify regularities in the evidence students use to self-assess and compare those with professorial expectations for learning, then we might adapt teaching practices accordingly. The study was therefore developed as a first step to explore: *What kinds of ‘evidence’ do students use to self-assess and determine what they have learned?*

Method and Results

37 students in an elective, upper level biology course participated in the study. As part of their regular coursework, the students completed Learning Journals in the form of short answer responses to a number of prompts (see Figure 1) at five different points during a 13 week course.

Data was collected from participants’ journals after the course was finished; we selected the responses from two cells in the first column (factual knowledge) to answer our research question (the cells corresponding to “Brief description” and “How do you know?”). In keeping with a discourse analytic approach, we refrained from treating the students’ responses as if they were unproblematic representations of thinking. Furthermore, we considered the ways the questions had been presented to students by the instructor in order to account for features of dialogue. For

	Factual knowledge “Facts” that you did not know/understand and that you now know/understand	Concepts and Connections Links among facts and ideas, applications, implications, and general principles that have become apparent to you	Skills Tasks that you are getting better at accomplishing, practical tips and tricks that you are picking up
Brief description of one or two pieces of knowledge or skills developed since your last Learning Journal form	<i>(Response used as data)</i>		
Activities, media and resources (in and out of class) that you used to develop this knowledge/skills			
How is this knowledge useful/helpful/applicable? What can/will you do with it?			
How do you know you have acquired this knowledge/developed this skill? (Please describe or refer to, and attach evidence).	<i>(Response used as data)</i>		

Figure 1. Student Learning Journal Prompt

example, the questions assumed that knowledge was accessible in the form of discrete “facts;” therefore, any representation of discrete facts was seen as a response to the way the question had been asked. Preliminary analysis of regularities within the 186 responses for “How do you know?” has revealed two distinct areas of interest. First, students provided recognizable indicators of their perceptions of learning through the *ways* they construct their written responses. For example, student #26 during week eight described *how* she knew: “I know I have acquired this knowledge because during class in an exercise my partner and I thought of an experiment.” She then followed up by displaying evidence for that claim by outlining exactly what the experiment involved. Framing the response in this way allowed for accountability, as her explanation provided enough information that the professor could judge the appropriateness of the experiment given as evidence. Second, a number of different forms of evidence for learning are invoked, including claims or “proof” of memorization. In the eighth week, student #13 remarked that “I can describe it from memory. For example...”. Anecdotal reports of usage were demonstrated by student #11 in week thirteen: “My best friend is a lawyer and we were talking about...” Lastly, recognition of personal change was present, as in the third week by student #26: “In the past I always thought that... but now I know...”

Discussion

The process of collaborating across faculties highlighted the strengths of combining divergent approaches to research. We have had to face and discuss our assumptions and have experienced what we felt were significant breakthroughs in understanding simply by needing to explain our positions to one who is “outside” our own field of expertise. For example, the use of Bloom’s taxonomy is a common research approach to biology education (Chiou, Liang & Tsai, 2012; Crowe, Dirks & Wenderoth, 2008; Ziegler & Montplaisir, 2012) but we struggled to find regularities within our data based on Bloom’s levels of cognitive processing. Our latest analysis involves a relatively novel use of the “Dimensions of Knowledge” found in a revision of Bloom’s (Anderson & Krathwohl, 2001) with interesting patterns emerging.

Although the above results show promise for capturing students’ perceptions of learning via the evidence they provide, the approach has a number of limitations. First, the data is based on the writing of relatively few students, all within one class. Second, the participants represent a particular subset of students, since the course is a specialized topic and an elective in the fourth year. Third, the way the data was collected constrains the making of certain kinds of analytic claims within discourse analysis. A future study is planned to address further these ideas and others.

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