What is the Value of Course-Specific Learning Goals?

By Beth Simon and Jared Taylor

The authors examined student and faculty opinions regarding the use of detailed learning goals in three courses. Students reported the use of learning goals to be very positive, aiding them with studying, in lectures, and in determining the important material to learn. Likewise, faculty indicated that using learning goals was a positive experience, especially for communicating course material to students and other faculty and for creating course assessments.

Extensive research has demonstrated that experts in a subject have a mental organizational structure for knowledge that novices lack (Ross 2006; Ericsson 2006). Experts recognize patterns and classify material on the basis of this organizational system, but the organizational system is deeply ingrained and rarely consciously recognized. The subconscious nature of this organization impacts the ability of instructors to recognize that an explanation they find compelling may be incoherent to students. Many studies have provided examples of instructors and students perceiving an explanation profoundly differently, with resulting negative consequences for student learning. Examples have been shown in lecture-scenario studies (Hrepic, Zollman, and Rebello 2007) and in studies of note taking (Bonner and

Holliday 2006; Kiewra 1985). We hypothesized that these problems in teaching might be addressed by having explicit learning goals or objectives for lectures. Such goals would provide learners (students) with organizational scaffolding, and thus help students understand the perspective being taken by the instructor.

A range of work has discussed both the results and impact of learning goals (as we will refer to them) for programmatic assessment (Marsh 2007; Adam 2004; Harden 2002). However, in this work, we explored the impact of learning goals on the individual student in a course and, to a lesser degree, on the instructors teaching the courses. We studied three courses in which instructors had detailed, course-specific learning goals that were integrated into their classes. To explore the general hypothesis that

specific, course-level learning goals improved the student's interaction with the course, we looked specifically at the following questions:

- Did students perceive learning goals as being valuable in the course?
- What did students report about how they used learning goals and how was this different across several instructors and courses?
- Did the instructors perceive the value of learning goals both for themselves and their students?

As discussed in this article, our results indicate that explicit learning goals provide a valuable aid to guide students in their learning. These results give instructors a glimpse into how students use learning goals and suggest best practices for the use of learning goals.

The setting for this study was three courses in which the three instructors used learning goals on a daily basis in their classrooms. These courses are part of the computer science and microbiology and immunology departments at the University of British Columbia (UBC). The three classes were the fall 2007 (Course A) and spring 2008 (Course B) offerings of a computing literacy course and an upper-level microbiology course (Course C). Both departments have been granted funding through the UBC Carl Wieman Science Education Initiative to (1) establish what students should learn, (2) scientifically measure what students are actually learning, (3) adapt instructional methods and pedagogical research to achieve desired learning outcomes, and (4) disseminate and adopt what works. Two of the three professors involved in the study had attended workshops at UBC on creating learning goals, and all three were independently interested in considering the impacts of learning goals on student learning. The instructors all considered the development of the learning goals to be an ongoing process, and they continue to invest time and effort to improve and refine them.

The three 13-week courses each had between 57 and 75 learning goals that reflected single-lecture or multiple-lecture content. Examples of learning goals from these three classes are shown in Table 1. In general, each of the goals completed the sentence, "At the end of this lecture/topic students will be able to . . ." The goals are primarily written in this form so that students are able to identify whether they can accomplish what is described, even if they have not yet mastered the terminology of the subject. Vague terms such as *understand* are (usually) absent. Instead, specifics on how a student would operationally demonstrate a requisite level of understanding are used. The instructors began to use learning goals of their own accord,

although the spring computing course inherited and adopted some of the learning goals from the fall course (39 of 75 spring learning goals were repeated from fall). All three instructors presented learning goals as part of their lectures, two always presented them at the beginning of the lecture (Course A and Course C), and one presented them at the beginning of each unit (Course B).

Study methods

In the last week of the term, we asked students (during class) to complete up to five copies of the sentence, "For me, the use of learning goals in this course is . . ." Students were given examples to help them feel more comfortable about what they were being asked to do. These examples were "helpful because . . ." and "not something I've really noticed." We performed interviews with the three instructors to characterize the differences in development, intent, and use of learning goals for the courses.

We collected 597 responses (225 from Course A, 252 from Course B, 120 from Course C) from 186 students (59 in Course A, 76 in Course B, 51 in Course C). Of the 597 responses,

44 were not included in this analysis because they were clearly describing the value of the class, not the value of learning goals. A content analysis–based coding process was developed for the responses from Course A. We organized the codes into a number of categories such as Study, Exams, Lecture, Focus, Guide, General Positive, and Negative (see Table 2). We also grouped some related code categories into larger groupings: Knowing What I Need to Know and Comprehension. All positive comments fit within one or more of the first six categories. We independently coded the data in an iterative process by which categories were refined. We achieved an average intercoder reliability of 95% (29 out of 553 student comments lacked complete coding agreement; Course A = 97%, Course B = 93%, Course C = 95%). The three instructors were not involved in the coding or the analysis of the comments.

Results and discussion

We analyzed responses across the classes first by the total number of comments in each of the coding categories and then by the percentage of students who made a comment that

Class	Learning goals
Course A and B	After the web unit/HTML lab you will be able to: • Briefly describe the parts of a web search engine. • Explain how a search engine finds and indexes web pages. • Predict how and whether a page will be found by a web crawler, given the link structure around the page and which pages the crawler already knows. • Construct HTML to present the structure and visual appearance you intend for an HTML web page.
Course C	• Comment on the strengths and weaknesses of classification systems used to organize diversity in the world around us. • Describe the relationships between point mutation and gene transfer in the context of evolution. • Evaluate the concept of microbial species using comparative genomics.

TABLE 1

Examples of learning goals.

Percentages of students and valuations.
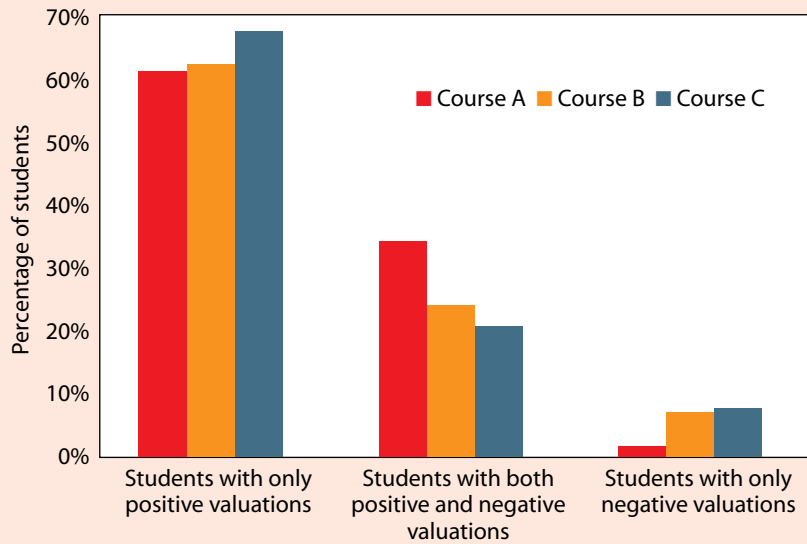
fell into a category. Learning goals were seen as very valuable by nearly all students in total and consistently in the three classes. Of the 553 total comments, 471 were positive (Course A, 85%; Course B, 84%; Course C, 88%). Figure 1 shows that less than 10% of the students in each class made only negative comments, and nearly two-thirds made only positive comments. The fact that 85% of the comments were positive also indicated that those students who made mixed comments gave significantly more positive than negative comments. Of the negative comments, the majority fell into the categories of finding the learning goals unhelpful or used unclear wording (Figure 2). Students also provided some recommendations to make learning

TABLE 2

Examples of codes.

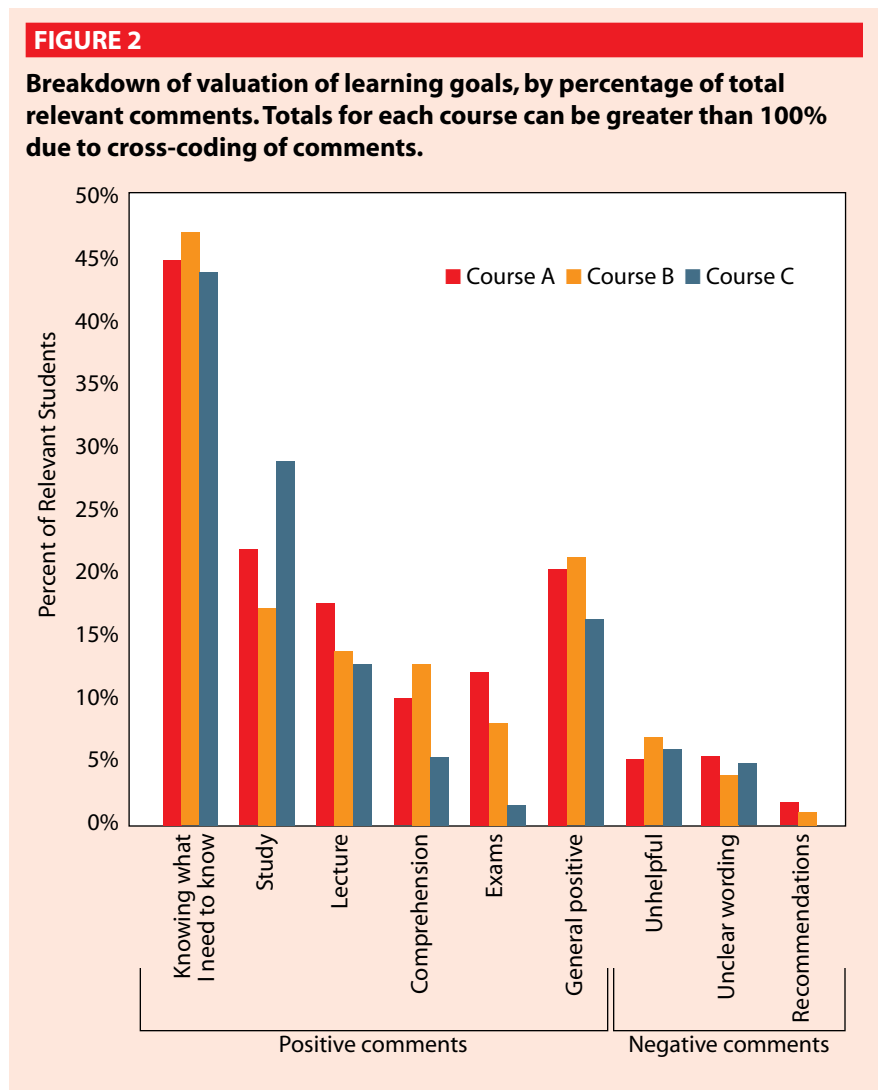| Groupings	Codes	Example
	Study, Prepare, Review	"improves my studying habits" (Course A)
	Exam, Test, Quiz	"important for exam review" (Course B)
	Lecture, Class, Course	"helpful to connect lectures" (Course C)
Knowing What I Need to Know	Focus	"helpful because it tells me what I need to focus on" (Course A)
	Implied focus	"a good thing to highlight important concepts" (Course B)
	Summary, Outline	"a good outline of the topics" (Course C)
	Guide	"useful because it guides me through the progression of the class throughout the term" (Course A)
	Organize	"helpful for organizing my notes with similar topics" (Course B)
	Track	"good for keeping me on track" (Course A)
	Preview, Introduction, Expectation	"gives an idea what the lecture will be about" (Course C)
Comprehension	Understand	"well-organized and helpful in understanding the material during lectures" (Course A)
	Learn	"nice because they are a list of all the new things I can say I've learned in this class" (Course B)
	General positive	"a good idea" (Course C)
	Negative	"sometimes confusing when I don't know what the learning goal(s) is/are referring to" (Course A)

goals more effective (by improving wording, for example).

What is the perceived value of learning goals?

We identified the most commonly listed values of goals by examining the distribution of comments across the six categories (Figure 2). There was striking similarity among the three courses. The most frequently mentioned value for learning goals was that it helped students "know what I need to know" for a course. The next most common valuations referred to lecture or study. Notably, valuation for exams is not terribly prevalent (though reference to "study" implies preparation for exams). The exam category was the only category that was noticeably different between the courses. We believe this is due to the Course A instructor making an explicit and repeated promise that all exam questions would come from learning goals, and that the Course C instructor had not yet given an exam at the time of the survey.

Knowing What I Need to Know

The dominant value identified was clearly Knowing What I Need to Know. Students were very specific as to the ways that learning goals helped them: "focus," "guided me," "kept me on track," "summarized," and "outlined the course." Overall, we found that these comments indicated that students valued additional information or structure, which allowed them to organize the information more effectively and be more expertlike in their approach to the class. The comments indicated that students appreciated that instructors were being explicit about what was of the most importance in the class, and that learning goals helped them narrow down and carefully apply their efforts to those topics, skills, or concepts. This supports our hypothesis that students struggle to see the organization and relative importance of material in courses, and explicit

FIGURE 2

Breakdown of valuation of learning goals, by percentage of total relevant comments. Totals for each course can be greater than 100% due to cross-coding of comments.

learning goals help them recognize this structure and approach their learning more effectively.

Many comments were about how students valued applying Knowing What I Need to Know. Of the comments in that category, 53% were also coded in the Lecture, Exam, or Study categories. The percentages of the cross-coded comments for each course are shown in Figure 3. This shows that students most commonly mentioned learning goals as helping them know what they needed to know in the lecture setting. Learning goals are often seen by students as helping them get more out of a lecture by focusing and guiding their attention. In Course A and Course C, learning goals were always shown at the beginning

of every lecture period, whereas in Course B learning goals were shown at the beginning of a unit or topic area. There is no obvious impact of this difference.

Instructor impressions

We interviewed the instructors to examine their views of learning goals, both for themselves and for their students. By comparing notes and interview recordings, we identified several broad themes, most notably communication with students and other instructors, structured learning, and assessment development.

The most common point made by the instructors was that learning goals enhanced communication, both with students and other fac-

ulty members. <mark>The instructors felt that the learning goals provided a method to very clearly outline for students the important concepts and material for the class. The learning goals also provided a very easy way for instructors to communicate with other instructors about what is covered in a course, something that is needed when organizing material in a sequence of classes. For example,</mark> Course A instructor commented:

> "The learning goals are kind of a contract between me and the students so we can all know what the foundation is that we should be building a class on and they can call me out and say does this have anything to do with learning goals? . . . It's a shared structure by which I and students and other instructors can know what the course is about."

Course B instructor commented:

> "When learning goals weren't a primary focus, it was hard to establish expectations . . . even when I really emphasize things verbally, [the students] miss these sorts of things. But to have something written down that you can point to and say that here are my expectations and here is what we are intending to give you as a skill set when you walk out of the class . . . it gives instructors greater confidence in interacting with students and other faculty members."

Course C instructor commented:

> "I would emphasize the need to share our learning goals with one another [other faculty] and to communicate what is being taught. Learning goals are a parsed way to look at what a course is about and what the core concepts are."

FIGURE 3

Comments coded both as Knowing What I Need to Know and either Lecture, Study, or Exams.
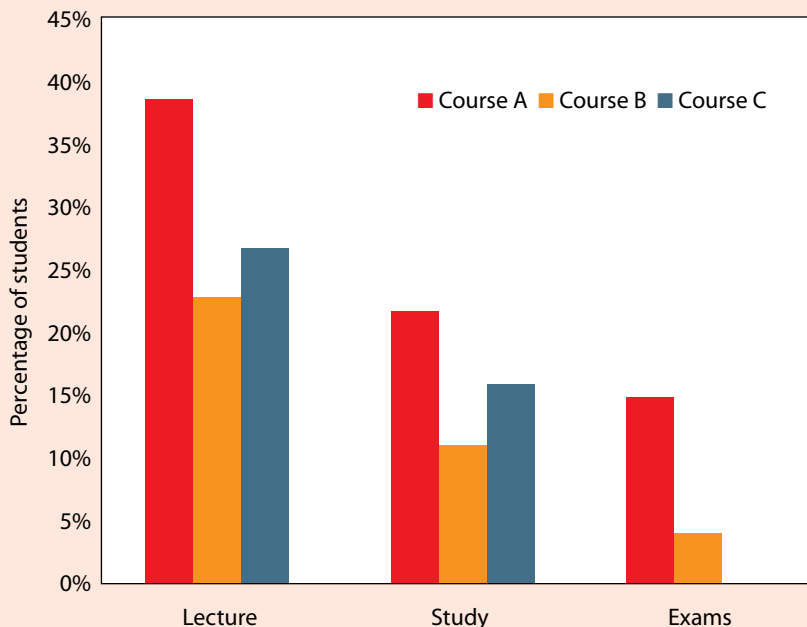
The instructors also commented on what they perceived to be the value of using learning goals from a student's point of view: providing structure for learning. This was closely related to the ideas they expressed about how communication was enhanced with students. The instructors observed that students were able to both use the learning goals to determine the important material in the course and use the learning goals as a measuring stick to gauge their own progress. This seems very similar to the students' comments coded as "on track."

Course A instructor commented:

> "It's a question of organization as in knowing what I am doing and the students knowing what I am doing as well . . . They had a goal for what to learn. They didn't just learn as much as they could in this course, but they had something to work towards and measure themselves against."

Course C instructor commented:

> "A learning goal primes [the students] to think about the information and organize it . . . We can tell students that these learning goals are important in structuring your knowledge . . . Students are hungry for anything that structures their learning."

Finally, the instructors mentioned that the learning goals streamlined the process of writing exam questions and improved assessment. Course A instructor commented:

> "[Learning goals] will save you time in the end, because instructors will want to put together a high-quality exam, and you will put together a high-quality exam much more easily with the learning goals. Everyone I have talked to that uses learning goals has talked about this. Your exam writes itself . . . I can check to see if each question ad-

dresses a learning goal and if it doesn't I will throw it out."

Course B instructor commented:

"The learning goals were not the primary source for exam questions, but one notch down. They would drive the initial structure of the exam, and then I would fill in the remainder."

Summary

Returning to our original research questions, we found that students overwhelmingly found value in the use of detailed, course-specific learning goals. Specifically, students found that the learning goals helped them determine what they needed to know. Student responses were consistent across all three courses in two very different academic disciplines.

Upon repeated reading and coding of the comments, a general sentiment of the students emerged. Students expressed relief and gratitude at being given clear direction as to how to focus their efforts, most notably in the lectures, and also in organizing their studying, reviewing, and preparing for exams. Interviews indicated that instructors found learning goals helpful in keeping their lecture preparations on track. This corresponded to student responses that indicated that daily, explicit presentation of learning goals made the instructor's organization and focus more clear. Students found learning goals to be a clear, valuable form of communication from the instructor that was missing in their other courses. As one student stated, learning goals are "useful in that they show me what the prof wants us to learn" (Course A).

Although the instructors were not explicitly directed in their development of goals for this study, we found that their respective student populations valued learning goals similarly. This suggests that what is important is the detailed nature and student-orientation of their goals, which were similar across the three instructors.

Students of a discipline may lack the intellectual scaffolding and organizational structure taken for granted by experts instructing them. The primary value students expressed regarding learning goals in this study is that they provided them with structure in their efforts to know what it is they need to know. The fact that many students indicated that learning goals helped them scaffold their lecture experience provides hope that learning goals reduce some of the well-known difficulties students have in understanding lecture and in taking notes and therefore support more effective learning.

We urge others to consider developing learning goals at the course level that complete the sentence, "By the end of today, students will be able to . . ." and to report both on the content of those goals and their valuation by students. We are encouraged by the positive, shared valuation by students across one computing and one microbiology class and are interested to see if others (and their students) find similar value. Exemplar learning goals of this style can be found at the University of British Columbia's Carl Wieman Science Education Initiative website (*http://cwsei.ubc.ca*). ■

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