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ABSTRACT

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Title:

Reflective Self-Regulation as a Facilitative Factor in Learning from Case-Based Instruction

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Abstract

This exploratory study integrated information from quantitative and qualitative data sources to highlight how different students responded to, and learned from, case-based instruction. Fifty-eight first-year veterinary students, enrolled in a biochemistry laboratory course which utilized case studies as one of the primary methods of instruction, participated in the study. Quantitative data, gathered from students' pre-course performances on two learning inventories, were used to classify students according to their initial levels of self-regulation. By identifying those students who fell at both ends of the inventory scales, comparisons could be made between different types of learners. Nine students, representing high and low self-regulators, were interviewed at three different times during the semester to explore initial and changing responses to case-based instruction. Using a constant comparative method of anaylsis, an analytical framework was developed which identified critical factors which seemed to facilitate, or limit, students' ability to learn from this method.

Introduction

Case-based instruction has long been established as an effective teaching method in schools of law and business and is increasingly being used in other professional fields as well, including: medicine, political science, journalism (Knirk, 1991), teacher education (Kagan, 1993; J. Shulman, 1992), architecture (Schon, 1983, 1987), educational psychology and measurement (Silverman, Welty, & Lyon, 1992), and instructional design (Romiszowski, Mulder, & Pieter, 1990). Although case-based instruction is not new, J. Shulman (1992) states that a body of theory and research has yet to be developed which explains why "they are so unusually effective" (p. xv). It is not that the value of case studies has not been debated; indeed, there is a large literature base which discusses the perceived benefits and challenges of the case method of instruction. However, when Masoner (1988) recently reviewed any literature that could be construed as an evaluation of case methods, he found mostly "anecdotal evidence, unpublished studies, and a small assortment of unrelated and non-cumulative published studies" (summarized in Kleinfeld, 1991, p. 3). Furthermore, the little research that has been done in this area has mainly been concerned with the relative impact of case-based instruction on the class as a whole, as compared to other, more traditional methods (lecture, expository texts), and has been almost entirely quantitative in nature (Beckman, 1972; Masoner, 1988; L. Shulman, 1992).

To date, very little work has been done which carefully examines how individual learners respond to, and/or learn from, case-based methods of instruction (Knirk, 1991). The possibility that individual learning needs may not "match up" with the specific characteristics and demands of this method seems to be downplayed, if not completely ignored. The general implication in the literature is that cases are more motivating for *all* learners, that they promote better transfer in *all* learners, and that they can transform *all* learners into better problem solvers and critical thinkers (e.g., L. Shulman, 1992). Only a few educators have suggested that case-based instruction does not "work" for all learners (Cossom, 1991; Welty, Silverman, Lyons, 1990). Cossom (1991, p. 151) states that, "clearly (case-based instruction) is not a teaching/learning method that appeals to all students, nor is it one that draws neutral responses." He cites Daloz in postulating that "students at different levels of moral and cognitive development will have varying degrees of comfort with ambiguity, lack of a "right" response, and multiplicity of views" (p. 150), qualities inherent in a case-based approach.

It is fairly well-acknowledged that students approach learning in a wide variety of ways; they come to school with different amounts and kinds of background knowledge; they have reached different levels of cognitive development; they hold varying degrees of motivation for the content to be learned (Paris & Byrnes, 1989). We cannot begin to assume that, left to their own devices, all students will respond similarly to, or benefit equally from, any single instructional method, including case-based instruction. It would be beneficial to understand *how* students learn from cases; to identify specific learner characteristics and particular learning strategies that facilitate, or limit, learning from this approach.

The three main purposes of this study were:

1) to examine students' initial responses toward, and strategies for learning from, case-based instruction
2) to describe how those responses and strategies changed over the course of a semester in which case-based instruction was utilized
3) to compare the initial and changing responses and strategies of different types of learners as they progressed through a case-based course

This study is based on the assumption that responses toward, and subsequent performance in, a case-based course depends highly on one's level of self-regulation—defined here as the ability (and propensity) to implement, monitor, and evaluate various learning strategies for the express purpose of facilitating knowledge growth. Although highly self-regulated learners may have no prior knowledge of the specific content being taught (e.g., biochemistry), or previous experience with the specific instructional methods being used (e.g., case studies), their ability to activate, alter, and sustain appropriate learning practices predicts that they would achieve academic success in familiar, as well as new, learning contexts (Zimmerman, 1990). By observing how highly self-regulated students approach case-based instruction, specific facilitating attributes, attitudes, and approaches might be identified. Conversely, by observing the manner in which low self-regulators approach case studies, we might pinpoint potential debilitating responses and/or ineffective strategies which limit learning. Ultimately, it is hoped that we might identify *enabling* instructional conditions and strategies which enhance the performance of all kinds of learners in a

case-based learning environment. It is hoped that information gained from less regulated students will indicate not just the limiting factors which might be minimized, but also the supportive factors which might be maximized in subsequent learning situations. By examining how different students' responses and strategies promote, or limit, their ability to learn from cases, instructional methods for facilitating and enhancing case-based learning, for all students, might be identified.

The assumption that self-regulation skills are a facilitative factor in learning from any instructional method (including case-based instruction) is well-grounded in the literature (e.g., Lindner & Harris, 1993; Weinstein, 1988; Zimmerman, 1990). According to the definition above, students with high levels of self regulation possess the attributes and skills that would be likely to enhance performance in a case-based course. Self-regulated students are aware of important learning variables and possess the necessary knowledge (of self, of learning strategies, and of task requirements) to take control of their own learning environments (Palincsar & Brown, 1989). Furthermore, they are motivated to do so.

However, the assumption that self-regulation skills can be *enhanced* through involvement in case-based instruction is also suggested by research. Although students with low levels of self-regulation may not have the skills or strategies needed to perform well *initially* in this environment, specific pedagogical features of case-based instruction are thought to facilitate the development of these skills. For example, in a review of programs designed to teach higher order cognitive skills, Resnick noted that the most successful programs were those which employed "cooperative problem solving and meaning-construction activities" (summarized in Resnick & Klopfer, 1989, p. 8). Such small and large group problem solving activities are *central* to the case approach; the effective case teacher operates not as a knowledge-dispensor but as a model, coach, and facilitator. Furthermore, case-based discussions provide opportunities for each student to serve as a monitor and reflector for the others, thus facilitating the growth of metacognitive monitoring and reflection. By involving students in the "disciplined and productive mental work" (p. 10) of case-based instruction, it is believed that students can learn how to learn.

Based on the assumptions stated above, it is expected that the following phenomena would be observed in a case-based learning environment:

1. Initially, high self-regulated students would be more comfortable with the case approach and would utilize more effective strategies to analyze cases than low self-regulators.
2. Low self-regulated students' performance would improve over time, with sustained involvement and continued practice.

How can we gauge the progress that learners make in regards to becoming self-regulated? Is self-regulation a characteristic that students either have or don't have? Or is self-regulation a skill, likened, perhaps, to expertise, that evolves slowly over time? If it *is* developmental, how can we assess whether students are, indeed, becoming more self-regulated in their learning? Unlike many learning theorists today, Ridley (1990) believes that *all* behavior is, to some degree, self-regulated. Thus Ridley proposes a self-regulation continuum which ranges from "unreflectively automatic self-regulated" on the low end to "reflectively intentional self-regulated" on the high end. This continuum provides a model for describing how learners with different levels of self-regulation might respond to new, and potentially uncomfortable, academic situations. Ridley's continuum also offers a viable means for gauging changes in learners' levels of self-regulation. For example, if students become less automatic and more thoughtful in their approach to cases (i.e., they make some movement along the continuum), this might be a reasonable indicator that they are making progress in the development of "reflectively intentional" self-regulation habits.

Theoretical Framework

This exploratory study was designed to seek "interpretive outcomes" (Peshkin, 1993), that is, insights that might begin to clarify the complex processes involved in students' learning from case-based instruction. To this end, both qualitative and quantitative methods were used. Quantitative methods, nested within a larger interpretive, or qualitative, framework, were employed primarily as a means to classify students according to their initial levels of self-regulation. An overarching interpretive framework (e.g., Eisner, 1991; Erickson, 1986) guided the search for patterns of responses to case-based instruction. According to Dillon (1989), qualitative research has been used "as a means of answering previously unanswered questions concerning how . . students learn" (p. 227). In this study, interpretive inquiry offered a realistic means for more clearly defining how different students respond to, and learn from, case-based instruction.

Students' perceptions of learning in a case-based course were examined with the express purpose of describing case-based instruction from the point of view of the students. Phenomenology provided a useful theoretical framework for exploring students' responses to, and learning from, this type of instruction. Kuh (1993) states that "it is impossible to understand the human experience without taking into account the complicated, mutually shaping events, actions, and motivations of the individual . . . under study" (p. 278). This particular theoretical framework enables a researcher to tap into individual perceptions regarding learning from cases using the techniques of questioning, focusing, reflecting, and intuiting (Van Manen, 1990). In this way, the structures of meaning embedded in students' experiences of case-based instruction could be explored.

Methods

Description of the site, course, and participants

The site. A professional school of veterinary medicine, located at a large midwestern university, is one of only 27, nationwide, which grants the degree of Doctor of Veterinary Medicine (DVM). The four year program typically limits enrollment to 60 students per class. The school catalog states that "each prospective student is required to complete a prescribed preprofessional curriculum for two or more collegiate years before admission to the school." Other criteria for admission (e.g., academic performance, maturity, and motivation), once considered to be quite stringent, have been relaxed in recent years to boost declining enrollments, resulting in a more heterogeneous student population.

The course. A required freshman course, "Systemic Physiology II (Biochemistry)," provided the context for this study. The course (VPH 442) is described in the syllabus as "an introduction to biomedical principles and their application to veterinary medicine." The lab portion of the course focused on the application of principles learned in lecture to hypothetical paper-patients who mimicked real-life disorders. Two sections of the lab were offered by the same instructor during the spring semester in which the study took place. Although students were specifically assigned to one of the two labs, they typically attended the lab which was most convenient for them during any specific week. Therefore, the total number of students in any one lab fluctuated between 15 and 45 students.

VPH 442 was designed so that students received approximately two hours of both lab and lecture each week throughout the 16 week semester. Biochemical case studies were used as one of the primary methods of instruction and as an evaluation tool in both lab sections of the course. Case study presentations followed a fairly typical pattern: students were presented with a limited description of an animal in distress. Some of the animal's symptoms were described, accompanied by appropriate illustrations and diagrams, and then students were asked to analyze the patient's condition and to make tentative diagnoses and recommendations for action. Students worked in groups and were encouraged to ask questions, to check available resources, and to consult with the instructor before arriving at preliminary conclusions. All case investigations concluded with a large group discussion in which student recommendations were considered in light of supporting (or negating) lab and clinical data.

Participants. Students: Sixty-one first-year veterinarian students were enrolled in the biochemistry lab course during the time of the study. Data sets from three students were incomplete, leaving a total of 58 students who completed the study. Of these 58 participants, 66% were female ($n = 38$). Ages ranged from 20 to 40 years ($M = 24.22$, $SD = 3.99$). Although the majority of students ($n = 36$) had completed a bachelor of science degree prior to entering this program, their levels of education ranged from two years of post-secondary education ($n = 15$) to a masters degree. Most students in this program had a background in either biological science or agriculture, although other fields were also represented. In addition, several students had previous job experience in fields as diverse as accounting, management, and dentistry.

The teacher: Marie McDonnell (not her real name) is a 34-year-old practicing veterinarian, as well as a graduate student in the School of Education. Besides working 1/2 time at a small animal clinic at the time of the study, Marie also had a graduate teaching assistantship which required her to spend approximately 20 hrs/week designing and teaching the biochemistry lab. Six of the other 8 core teachers in the freshmen curriculum were also DVMs, but only 2 had ever practiced. This put Marie in a unique position within the school; although she was technically a student, she had more practical experience than most of the professors. Marie had been teaching this particular lab for two years, gradually increasing her use of case studies until they had come to represent the primary instructional method. According to previous course evaluations, students liked the case approach.

Data Sources

Information from quantitative and qualitative data sources was integrated to highlight how different students responded to, and learned from, case-based instruction. Quantitative data were gathered from students' performances on two individual learning inventories administered at the beginning of the semester, as well as from GPAs and final course grades. These data sources provided the means to classify students so as to compare the responses of different types of learners to case-based instruction. Qualitative data were gathered from periodic student interviews and three written case analyses with additional evidence provided from classroom observations, teacher handouts, and course evaluation forms. These data sources were instrumental in *understanding* the responses of these different learners as they participated in a case-based biochemistry laboratory. In addition, all data gathered at the beginning, middle, and end of the semester were compared to identify how students' responses and strategies changed over the course of the semester.

Measurement Tools

Two self-report learning inventories, based in the self-regulation literature (MSLQ and SRLI), were used to assess the strategies students used to facilitate their learning. These strategies included: cognitive (rehearsal, organization, and elaboration), metacognitive (monitoring, evaluating, and reflecting over one's learning), motivational (interest, value, and confidence for learning specific course content), contextual (awareness of task requirements), and environmental control (time and resource management).

The Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich, Smith, Garcia, & McKeachie, 1991) is a self-report questionnaire designed to assess college students' motivational beliefs and their use of different learning strategies for a specific college course. The 81 item, Likert-type survey is divided into 15 subscales that ask students to respond to items regarding motivation, cognitive and metacognitive strategy use, and management of outside resources, using a 7 point response format (1 = not at all true of me; 7 = very true of me). The motivation section consists of six subscales (31 items) that assess students' goals and value beliefs for a course, beliefs about their skill to succeed, and anxiety about tests. The cognitive and metacognitive strategy section includes five subscales (31 items) assessing student use of cognitive and metacognitive strategies such as rehearsal, elaboration, and organization. The resource management section includes four subscales (19 items) concerning management of outside resources.

The second measurement tool, the Self-Regulated Learning Inventory, (SRLI) (Lindner, & Harris, 1992) is comprised of 75 self-report items categorized into five subscales including: Metacognition, Learning Strategies, Motivation, Contextual Sensitivity, and Environment Control. The items are presented randomly on a single test using a 5 point Likert format.

Data collection and analyses

Quantitative. All students were administered the two self-report learning inventories during the first week of the 1994 spring semester. The results of these inventories were used to classify students into one of three categories representing each student's level of self-regulatory skills: high, medium, or low. Because it is difficult to capture the dynamics of self-regulated learning with a self-report instrument (P. Pintrich, informal presentation, November 16, 1993) it was considered advantageous to use two separate measures of self-regulated learning with each serving as a check on the other. Students who scored relatively high (or low) on both scales might be more reliably classified as high (or low) self-regulators. In an effort to achieve a more observable contrast between different types of students, those who fell within the "medium" category were not evaluated further in this study, although they participated in the same class activities and completed the same course assignments as the other students.

Qualitative. In order to gain an understanding of students' perceptions of their learning experiences in a case-based course, it was essential to utilize methods that tapped those perceptions. Thus, *phenomenological interviews* (Kuh, 1993, p. 278) "whereby the inquirer gains access to the meanings individuals attach to their own experience(s) using a semi-structured interview guide" constituted one of two primary data sources. In order to hear individual, as well as collective voices, four students were selected, purposively (Patton, 1990), from both the high and the low self-regulated groups to be interviewed at three different times during the semester. Purposive sampling helped to ensure that representative perceptions would be obtained regarding learning from case-based instruction. One additional student (Roslyn), who fell within the "middle" range of self-regulators, was also included in the interview sample as it was expected that her perspective, as an "older" student with many years of clinical experience, may be particularly

informative. Alt' igh Roslyn achieved the 5th highest score on the MSLQ, her score was average on the SRLI. For all subsequent analyses, this student's data were combined with that of the high self-regulators.

Phenomenological interviews were used to assess students' responses toward the case method as well as their strategies for learning from this type of instruction. Interviews were semi-structured, beginning with open ended statements ("Tell me about Biochemistry Lab."), and concluding with a few direct questions ("What do you do when you are given a case study to analyze?"; "How do you feel when you are asked to analyze a case study?"). Based on the work of Pintrich and his colleagues (e.g., Garcia & Pintrich, 1994; Pintrich et al., 1991) which suggests that students' performances are differentially affected by the motivational subcomponents of interest/enjoyment ("How *interesting* is this instruction to you?"; "How do you *like* this type of instruction?"), value/importance ("How *valuable* is this instruction in terms of your future work?"), and efficacy ("How *confident* do you feel learning from this type of instruction?"), additional questions addressed these components.

Students' written case analyses constituted the second primary data source. During the 3rd, 8th, and 16th weeks of the semester, all students were given a written case study and asked to list: 1) the potential problems or issues presented in the case, 2) prioritized differential diagnoses, and 3) possible ways of handling the case. Besides a simple count of the number of problems and differential diagnoses listed, the content of students' written responses were examined to identify strategies employed by students' in their case analyses. The first level of coding identified the number and variety of cognitive strategies (e.g., underlining, highlighting, mnemonics, etc.) used by each student. Students' analyses were then searched for any indications of the use of metacognitive strategies, particularly those indicative of reflecting on, monitoring, and evaluating one's own work (e.g., self-questioning, using tentative words, writing notes to oneself, etc.).

Over the course of the semester, 27 interviews were conducted and 63 written case analyses were examined (3 analyses completed by each of the 10 high and 11 low classified students). All of the interview and case responses were read and coded, using a constant comparative method of analysis (Glaser & Strauss, 1967). Reliability was established by having an independent reviewer classify a random sample (20%) of interview statements using the coding criteria described in the next section. Judgments of students' analyses, in terms of accuracy and thoroughness, were made by the instructor.

By reading and rereading interview transcriptions and case analyses and then comparing findings across data sources, across time, and across students, an analysis framework was gradually developed and refined. Beginning with transcriptions of the first set of interviews, a search for significant meanings was undertaken. As students' first case analyses were examined, key linkages were sought to connect similar, emerging themes. In addition, attention was paid to negative cases which suggested opposing explanations. Subsequent readings of initial interviews and case analyses, combined with readings of additional interviews and analyses, facilitated the gradual development of an interpretive model of students' responses to, and strategies for learning from, case-based instruction. As similar patterns began to emerge from each main data source, secondary data sources were examined (e.g., field notes from classroom observations, teacher case documents, and student course evaluations) in an effort to cross-validate assertions. Finally, an analytic framework was created which integrated evidence from all sources.

Results and Discussion

This section of the paper discusses results from both quantitative and qualitative data sources with the main focus being on results related to the defined purposes of this study. After addressing the first two purposes regarding initial and changing responses toward, and strategies for learning from, case-based instruction, an analysis framework is presented as a means of interpreting these results. Due to space limitations, an abbreviated version of some results is provided; a more detailed explanation is available from the first author.

Quantitative

Initial analysis of students' scores on the two learning inventories identified 9 high and 11 low self-regulators. Selection criterion required students' scores on both scales to be greater than .5 standard deviations above, or below, the mean. In addition, students chosen to be interviewed were those who had scores on the metacognitive and self-regulation subscales (Self-Regulation Subscale-MSLQ; Metacognitive

Subscale-SRLI) that were greater than, or equal to, .5 standard deviations above, or below, the class mean. As mentioned previously, an additional student from the "middle" group was included with the 9 high self-regulators for subsequent analyses.

Selection criterion resulted in the following sample of high and low students: All high students were female; 4 of the 11 low students were female. The average age of the high students was 25.2 years compared to an average age of 23.6 years for the low students. Average GPAs were 3.186 for the high group; 3.107 for the low group. Table 1 presents a compilation of specific demographic information for students in each of the high and low groups, as well as their scores on the two learning inventories. Group averages for the high and low students are also included. Although all names are pseudonyms, the demographic information is accurate. Results from additional descriptive and correlational analyses of the survey data are not reported here, however, descriptive analyses based on student interview or case-analyses data are integrated within the qualitative results.

Table 1
Demographic Information for Students Classified as High and Low Self-Regulators

Group (H; L)	Student	Sex	Age	MSLQ Score	SRLI Score	Yrs of school (post HS)	# of Prior Courses	GPA	Related Experience
H*	Marci	F	22	486	333	3	1	4.00	BS-Biology; worked 4 yrs in small animal clinic
H*	Winnie	F	26	495	317	5	0	2.52	BS-Biology; Dressage instructor
H*	Sharon	F	24	478	304	4	2	2.94	BS-Animal Science; 5 yrs with small animal vet; 2 yrs equine emer. referral service
H	Deidra	F	23	446	287	4	1	3.08	No experience listed
H*	Mallry	F	23	450	318	4	3	3.61	Pre-Vet; worked in Animal Control
H	Tami	F	27	451	334	5	1	3.16	BS-Zoology
H	Lucy	F	27	452	278	4	1	3.43	BS-Industrial Mngmnt; Pre-Vet
H	Cyndy	F	27	443	293	9	1	3.46	MS-Zoology
H	Linda	F	21	462	289	2	2	2.86	Pre-Vet; Equestrian Team
H**	Roslyn	F	32	467	272	4	1	2.80	13 yrs in Vet Clinic; 3.5 yrs in small animal ICU
H-Ave		*All F*	*25*	*463*	*302.5*	*4.4*	*1.3*	*3.18*	
L	Jon	M	23	369	241	4	2	2.80	BS-Animal Science
L*	Ronald	M	23	340	227	4	0	3.06	BS-Biology; Raises snakes
L	Mick	M	25	395	228	6	2	3.63	BS-Accounting
L	Ira	F	25	360	196	2	1	3.17	AS-Science
L	Candy	F	26	389	230	4	2	3.18	BS-Biology
L*	Deena	F	22	367	233	4	2	2.71	BS-Animal Bioscience; Pre-Vet
L	Carl	M	22	388	247	4	1	3.08	BS-Biology; Pre-Vet
L*	Chrissy	F	22	396	239	4	1	3.53	BS-Eng/Chem Double Major
L	Matt	M	25	382	229	3	1	3.26	Biology Club
L*	George	M	21	379	215	2	0	2.60	Pre-Vet; Swine, cattle experience
L	Marvin	M	26	363	246	4	2	3.16	BS-Medical Technology
L-Ave		*4 F*	*24*	*375.3*	*230.1*	*3.72*	*1.27*	*3.11*	

* Students who were interviewed
** Student who scored at high/med level; included with high students for all analyses
MSLQ M = 415.25, SD = 35.42; SRLI M = 264.55, SD = 29.51

Qualitative—Responses toward case-based instruction

Initial and changing responses toward case-based instruction were tapped by asking probing questions during three successive interviews which were specifically related to: 1) students' interest in using cases, 2) the perceived value of using cases, and 3) students' confidence for learning from this method. Students' initial and subsequent responses to these questions are summarized below, along with a comparison between responses made by high and low students, when possible.

Initial responses. Interest: In describing their initial reactions to the use of cases in the biochemistry lab, almost all students interviewed (both high and low) indicated that they thought that cases would make the class more interesting and more fun. Some likened it to a game, or a puzzle, mentioning the challenging, enjoyable aspects of cases. Others described how their motivation was positively affected and how it had spilled over into other coursework. Most students simply indicated that case-based instruction was more interesting than their other classes and provided a nice change of pace. Only Deena qualified her comments by stating, "They're good, but only to a certain degree."

Value: All 9 students claimed that cases were "real-life" and had some practical benefits. Although 3 of the 4 low students noted that cases would help them remember more, they judged that this would not affect other coursework or career goals. This stands in contrast to the 5 high students who all mentioned that the case method was very valuable to their future careers, as well as to other coursework. Not only did these high students value the practicality of case-based instruction, but they also noted some global benefits such as learning the "problem-solving" approach and integrating their knowledge.

Confidence: All of the students expressed some concern regarding their ability, at this point in their careers, to accurately diagnose the cases they were given ("Well, I have no idea what it could possibly be because I only know 2 diseases and that's all!"). They used words such as: scared, frustrated, nervous, and intimidated. However, all but one low student mentioned that this lack of knowledge would result in increased effort ("I probably put more effort into understanding what we learn in this class because . . . I know that it will definitely be useful."). Additionally, everyone but Roslyn (who had a lot of previous experience in a vet clinic) expressed feelings of discouragement due to a lack of knowledge that they judged was essential to "solve" the cases.

Changing responses Interest: Even though some low students were "burned out" by the end of the semester, most of their frustration seemed to be related to outside sources (other tests, deadlines, etc.), rather than to the course itself. Low students seemed to be especially sensitive to these other factors. Course evaluations support the conclusion that most students still enjoyed the course at the end of the semester. On a scale from 1-10 the average course rating was 8.9. Unsolicited comments mentioned enjoying the case-study approach and having fun in the class: "Truly enjoyed labs. They made my others relevant." ; "I greatly enjoyed the lab!!! It was the only class in our freshman curriculum which makes you think logically about cases you will see as a clinician."

Value: As the semester went on, there seemed to be a shift in emphasis regarding which aspect of the case approach was valued most. Low students, particularly, moved from a focus on practical benefits (change of pace, ability to remember more facts) to more overarching benefits (application of knowledge, learning the problem-solving approach). The process, rather than the product, began to take on increased value.

Confidence: As students became more comfortable with the problem-solving approach, as their knowledge base increased, and as their experience with cases increased, they became more confident of their case analyses. However, the primary factor influencing students' confidence levels seemed to be the amount of prior knowledge and previous experience they had. "If I had a broader repertoire of possibilities, I would have felt more confident." However, some high students actually became motivated by their lack of knowledge: "It's like a kid with with a new video game!"

Students from both groups seemed to redefine success during the semester and adjusted their judgments of confidence to match. Students began to emphasize "coming close" rather than naming a specific disease that may have caused the presenting problems. If diagnoses were "in the ballpark" students judged that they had been successful ("I knew this, this, and this, but being able to list one specific problem, no, I don't know enough diseases or technical names to write anything down. But it comes close.").

By Time 3, "scared" and "nervous" feelings were no longer mentioned, yet all four low students became particularly frustrated by their lack of knowledge, by the specific case, or by the tediousness of the work. These students were more apt to complain about other responsibilities, other course requirements, and other external factors (time and length of lab) that contributed to their levels of stress.

Summary of Initial and Changing Responses. When the initial and changing responses of high and low students are compared, an interesting difference is noted. For the most part, high students started with,

and maintained, a positive attitude toward the use of case studies throughout the semester. Sensitivities were noted only in response to the type of case being analyzed. In contrast, low students started with a rather narrow view of the value of cases and were less confident of their initial analysis skills. By mid-semester, however, most of these students had gained in confidence and had broadened their view of the value of case-based instruction. Yet by the end of the semester, other pressures appeared to overcome some of these students and their motivation and confidence for learning from this method decreased. It is encouraging to note, however, that two of these students (George, and to some extent, Chrissy), continued to make progress in becoming more comfortable with, and strategic in, their approach to the case method.

Qualitative—Strategies used in case-based learning

Students' initial and changing strategies for learning from cases were garnered from two sources: 1) written case analyses and 2) students' responses to interview questions regarding what they did when they were given a case. Both cognitive (e.g., underlining, using mnemonics, organizing information) and metacognitive (e.g., writing notes or parenthetical comments to oneself, asking rhetorical questions, using tentative words) strategy use were examined. Although a detailed explanation of this aspect of the study is not reported here, Table 2 outlines the different types of strategies that were used by high and low students in each of their case analyses.

Table 2
Number of Students Using Cognitive and Metacognitive Strategies on Each Case Analysis

Cognitive Strategy	**Case 1**	**Case 2**	**Case 3**
Underlines, Circles, Highlights High/Low	8/6	5/6	8/6
Uses Indicators High/Low	6/1	4/4	2/0
Organizes Information High/Low	0/1	6/7	2/0
Uses Mnemonics High/Low	3/3	3/3	2/1
Summarizes High/Low	0/0	1/5	1/1
Metacognitive Strategy	**Case 1**	**Case 2**	**Case 3**
Asks Rhetorical Questions High/Low	4/4	3/5	8/8
Writes Notes to Self High/Low	7/5	5/5	6/0
Uses Tentative Words High/Low	8/7	4/7	3/4
Looks for Links High/Low	7/5	5/4	3/2
Uses Evidence High/Low	9/10	2/3	4/5
Considers Context High/Low	3/1	1/1	8/7
Looks at Big Picture High/Low	2/2	2/0	1/0
Uses "I" Statements High/Low	5/5	1/1	7/4
Uses Technical Words High/Low	7/6	9/11	8/8
Is Complete and Thorough High/Low	2/0	7/3	2/4

Analysis Framework.

A search for commonalties across cases revealed two general orientations to case-based instruction, which were loosely coded as limiting and facilitative. Based on a modification of Ridley's (1990) description of a self-regulated learning continuum (from automatic to purposeful), interview statements and case-analyses strategies were identified which seemed to represent both ends of this continuum. Statements of an "automatic" nature were considered to be indicative of a limiting approach to case-based learning, whereas statements of a more "purposeful" nature were thought to represent a facilitative approach.

Limiting factors, identified from interview comments, included such things as: setting product goals for the course ("I'd like to basically keep up with the course"), using automatic or habitual strategies with very little thought ("That's how I've always done it"), holding a narrow view of what constitutes professional knowledge and expertise ("I felt nervous about doing the case and also what the teacher might think if I wrote the totally wrong thing"), excusing one's performance because of limited resources ("I wasn't given enough information"), and being highly sensitive to contextual and environmental influences ("Classes tend to run over time, and it's kinda hard to get motivated to do much of anything except go home").

Facilitating factors, identified from interview statements, consisted of: setting process goals for the course ("I'd like to learn as much as possible how to approach cases"), being aware of how one learns ("I like to be able to see something, to visualize the problem"), recognizing one's automatic responses to novel and/or difficult learning situations, and then implementing alternative strategies, if necessary, in order to be successful ("You gotta tell yourself that you're not a senior"), holding a wide view of the meaning of knowledge and expertise ("The first time I tried to get too specific instead of doing a more general approach to it"), and drawing on available personal resources in order to master a valued learning goal ("I try to think of what we'd done in other classes; things I learned before that could help me"). Besides prior knowledge and experience, personal resources also included facilitating factors such as: openness to emotional challenges, persistence at difficult tasks, and increased or sustained motivation ("You want to try because it's like playing a game to see if you can win").

Interview transcriptions were searched thoroughly for specific comments which seemed to represent either of these orientations to case-based instruction. These comments were then classified according to the components of the facilitative-limiting framework described above and depicted in Table 3 (i.e., process vs product goals; reflective vs automatic responses; wide vs narrow lens; professional vs student view; hardly or highly sensitive to contextual factors; and reference to available vs limited resources). A total of 480 comments were classified into these 6 categories. To ensure that consistency was maintained within categories, a second judge classified a random selection of comments (20%) from each category. The following reliabilities were reported for each category: Process/Product = 90%; Reflective/Automatic = 86%; Wide/Narrow Lens = 81%; Professional/Student = 92%; Contextual Sensitivity = 100%; Available/Limited Resources = 93%, for an overall interrater reliability of 90%. Disagreements were resolved, in most cases, by providing additional contextual information for specific comments or by discussing discrepancies and then making a mutual decision regarding final classification.

Table 3
Students' Approaches to Case-Based Instruction

	Facilitative	Limiting
Type of Goals	**Process** •Learn the approach •Integrate information •Gain global knowledge	**Product** •Pass the course •Get a grade •Learn the right answers
Level of Self-Awareness	**Reflective** •Plans—thinks then acts •Monitors—adjusts actions •Evaluates—approach & product	**Automatic** •First reactions •Habit •Unaware of own learning habits
Range of Lens	**Wide** •Values general diagnosis •Values shared expertise •Criteria for success self-imposed	**Narrow** •Values specific answer •Acquiesces to authority •Criteria imposed by others
Point of View	**Professional** •Open to emotional challenges •Willing to change	**Student** •Self-protection •Survival over development
Contextual Sensitivity	**Not sensitive to:** •Knowing the "answer" •Task difficulty •Environmental factors •Other pressures	**Sensitive to:** •Getting a grade •Type of case •Time of day, length of case •Other pressures
Resources	**Available** •Prior knowledge •Previous experience •Increased motivation and effort	**Limited** •Knowledge •Experience •Ability

Qualitative—Comparison of responses and strategies of different types of learners

In order to compare the initial and changing responses and strategies of different types of learners as they progressed through the course (purpose #3), student interview responses were mapped onto the framework presented in Table 3 and then compared across time and across groups. Table 4 presents a separate matrix for each of the three case analyses in which each student's case approach is defined in terms of its facilitative and limiting features. This is followed by a more general matrix in Table 5 which summarizes the information from the first three matrices. Each matrix was completed by coding students' interview comments in terms of the previously identified categories.

Table 4
Interview Content Analysis-Time 1

Student	Classification (high vs low)	Process vs Product Goals	Reflective vs Automatic Responses	Wide vs Narrow Lens	Professional vs Student View	Contextual Sensitivity	Available vs Limited Resources
Sharon	H	Process	Balanced	NEI*	Professional	Insensitive	Available
Marci	H	Balanced	Balanced	Balanced	Professional	NEI	Limited
Mallry	H	Process	Balanced	Wide	Professional	Sensitive	Balanced
Winnie	H	Process	Balanced	Balanced	Professional	Sensitive	Balanced
Roslyn	H	Balanced	Balanced	Wide	Balanced	NEI	Available
H-Gp		Process	Balanced	Balanced	Professional	Mixed	Available
Deena	L	Product	Automatic	Narrow	Layman	Sensitive	Limited
Chrissy	L	Product	Balanced	NEI	Layman	Sensitive	Balanced
Ronald	L	Product	Balanced	Narrow	Layman	Sensitive	Limited
George	L	Balanced	Reflective	Narrow	Professional	Sensitive	Limited
L-Gp		Product	Mixed	Narrow	Layman	Sensitive	Limited

*NEI=Not Enough Information Available

Interview Content Analysis-Time 2

Student	Classification (high vs low)	Process vs Product Goals	Reflective vs Automatic Responses	Wide vs Narrow Lens	Professional vs Student View	Contextual Sensitivity	Available vs Limited Resources
Sharon	H	Balanced	Reflective	Wide	Professional	Sensitive	Balanced
Marci	H	Balanced	Reflective	Wide	Professional	Insensitive	Available
Mallry	H	NEI	Automatic	Wide	Professional	Insensitive	Balanced
Winnie	H	Process	Reflective	Balanced	Professional	Insensitive	Limited
Roslyn	H	Balanced	Reflective	Wide	NEI	Insensitive	Available
H-Gp		Balanced	Reflective	Wide	Professional	Insensitive	Available
Deena	L	NEI	Automatic	Narrow	NEI	Sensitive	NEI
Chrissy	L	Product	Reflective	Narrow	Professional	Sensitive	Limited
Ronald	L	Process	Balanced	Narrow	Balanced	Insensitive	Balanced
George	L	Process	Reflective	Balanced	Professional	Insensitive	Available
L-Gp		Process	Reflective	Narrow	Professional	Mixed	Mixed

*NEI=Not Enough Information Available

Interview Content Analysis-Time 3

Student	Classification (high vs low)	Process vs Product Goals	Reflective vs Automatic Responses	Wide vs Narrow Lens	Professional vs Student View	Contextual Sensitivity	Available vs Limited Resources
Sharon	H	Process	Reflective	Wide	Professional	Balanced	Available
Marci	H	Process	Reflective	Wide	Professional	Insensitive	Balanced
Mallry	H	Process	Balanced	Wide	Professional	Insensitive	Limited
Winnie	H	Process	Reflective	Wide	Professional	Insensitive	Limited
Roslyn	H	Process	Reflective	Wide	Professional	Insensitive	Available
H-Gp		Process	Reflective	Wide	Professional	Insensitive	Mixed
Deena	L	Process	Automatic	NEI	NEI	Sensitive	NEI
Chrissy	L	Product	Reflective	Narrow	Balanced	NEI	Balanced
Ronald	L	Balanced	Automatic	Balanced	Layman	Sensitive	Limited
George	L	Process	Reflective	NEI	Professional	Sensitive	Balanced
L-Gp		Process	Mixed	Mixed	Mixed	Sensitive	Balanced

*NEI=Not Enough Information Available

To complete the coding process, a number of decisions were necessary. For example, students were credited with using a certain approach even if only one representative statement was made during an entire interview. If both facilitative and limiting statements were made regarding a single category (e.g., goals, range of view, etc.), students were classified as having a "balanced" approach, even though the number of statements representing each type of approach may not have been equal. Based on the rationale that even one statement indicated use of a particular approach, it was judged important to acknowledge even isolated uses of facilitative or limiting strategies. Furthermore, it would not be expected that students would make radical changes in their learning orientations in a short time period, but would change over time as new strategies gradually replaced old, less effective ones. Thus, it is likely we would see an overlap in orientations for a period of time as well as some occasional regression to more familiar patterns under stressful conditions. Additionally, change would be expected to be uneven; that is, some categories would show changes before others. The intent of these summary matrices was simply to get a rough idea of how students' approaches to case-based instruction may have changed over the course of the semester.

Group comparisons. Besides defining each student's approach in the categories presented, Table 4 also include a "group" entry which indicates the most common approach used by students in each of the high and low groups. Group entries were determined using simple guidelines. If more than half the students in the group used a particular approach, the group entry names that approach as representative of the group. If responses did not cluster within a category, the word "mixed" is used, indicating more variation among group members. The "balanced" rating, used previously to indicate that both approaches had been used by a student, was most often used as evidence to support a facilitative group entry. Although "summarizing" the approaches of individuals is not always easy or necessary, it was attempted here in order to make a comparison between different types of learners and their approaches to case-based instruction. As such, these group entries provide some insight into the similarities and differences between groups at three different times in the semester. By comparing these summaries across time, we begin to see how groups, as well as individuals, changed from the beginning to the end of the semester.

Summary matrix. A final summary matrix (See Table 5) was created by assigning a point value to each approach, so that a ready comparison could be made across time and across students. The use of a facilitative approach (e.g., process goals, reflective responses, wide lens, etc.) was assigned 2 points; a balanced approach received 1 point, and a limiting approach (e.g., product goals, automatic responses, narrow lens, etc.) received 0 points. This table allows us to see, at a glance, where the different groups of students started, and where they ended, the semester. For example, by the end of the semester all of the high students had adopted process goals, held professional views of learning from cases, and had broadened their conception of knowledge to include respecting others' opinions and valuing general, as opposed to specific, answers. One area that showed little change was that of accessing available personal resources.

Some high students still expressed concern over their lack of knowledge and seemed unable to draw on previous experiences.

Table 5
Interview Content Analysis-Summary of Time 1-2-3
(Facilitative approach = 2 pts.; Balanced approach = 1 pt.; Limiting approach = 0 pts.)

Student	Classification (high vs low)	Process vs Product Goals	Reflective vs Automatic Responses	Wide vs Narrow Lens	Professional vs Student View	Contextual Sensitivity	Available vs Limited Resources
Sharon	H	2—1—2	1—2—2	x*—2—2	2—2—2	2—0—1	2—1—2
Marci	H	1—1—2	1—2—2	1—2—2	2—2—2	x—2—2	0—2—1
Mallry	H	2—x—2	1—0—1	2—2—2	2—2—2	1—2—2	1—1—0
Winnie	H	2—2—2	1—2—2	1—1—2	2—2—2	0—2—2	1—0—0
Roslyn	H	1—1—2	1—2—2	2—2—2	1—x—2	x—2—2	2—2—2
Summary		1.6-1.3-2	1—1.6-1.8	1.5-1.8-2	1.8—2—2	1—1.6—1.8	1.2-1.2-1
Deena	L	0—x—2	0—0—0	0—0—x	0—x—x	0—0—0	0—x—x
Chrissy	L	0—0—0	1—2—2	x—0—0	0—2—1	0—0—x	1—0—1
Ronald	L	0—2—1	1—1—0	0—0—1	0—1—0	0—2—0	0—1—0
George	L	1—2—2	2—2—2	0—1—x	2—2—2	0—2—0	0—2—1
Summary		.25-1.3-1.3	1—1.3—1	0—.3—.5	.5—1.3—1	0—1—0	.3—1—.7

*x=Not Enough Information Available

The pattern of change for low students was different from that of high students. Whereas the high students seemed to make fairly steady progress toward the use of facilitative strategies, low students demonstrated much more back and forth movement. Overall, the low students demonstrated a limiting approach to the first case, yet described using a more facilitative approach for the second case. There are a number of possible reasons for this difference including changing orientations, format of the case (length of case, species involved, questions asked), increased competency with specific analysis procedures, and semester timing. At the time of the third interview, however, some low students were observed to rely on automatic, familiar responses rather than employing these more facilitative strategies. Again, there are a number of possible reasons including increased pressures from external sources (assignment deadlines, impending final exams) and the specific type of case presented. This third case was formatted somewhat differently and may have frustrated students who had been learning to analyze cases by applying a standard procedure. By providing much more information about the context of the problem (the barnyard setting) but no lab results, students had to ask more questions and determine additional tests needed before they could complete their analyses. This additional demand, at this time in the semester, may have shaken students' confidence and increased their frustration causing them to rely on more familiar strategies. Having to deal with a number of new factors at one time may have caused these students to return to what was familiar as a way of preventing cognitive, or stress, overload.

As a group, low students made promising gains in terms of the goals they established for this case-based course. Three out of the four low students included some mention of process goals in their second and third interviews, while only one student had started the semester with a process goal. This in itself is noteworthy and suggests that case-based instruction may be beneficial in helping students focus more on the learning process as opposed to the products of learning (grades, facts, task completion).

The individual learners. Table 5 also enables us to see how particular individuals responded to the case approach and to identify characteristics of those who appeared to make, or not make, gains along the self-regulated continuum. A closer look at these discrepant cases may point to specific factors which may have facilitated or limited learning for these particular learners. I provide a brief view of just a few students to illustrate the range of differences noted.

Like the other low students, Ronald started out with a fairly limited case approach, yet had showed progress in every area, but one, by the time of the 2nd interview. However, Ronald became so flustered with the third case that his performance suffered in almost every area. He recognized that having a systematic approach was important but admitted that he had not been able to be systematic under conditions which included an unfamiliar animal, time constraints, and a different case format. It is encouraging to note, however, that Ronald did not regress to pre-course levels in every area. He still mentioned some process goals and satisfaction with achieving a general diagnosis. Given a reduction of other stresses, Ronald still judged that he could be successful in future case analyses. "If I didn't have any major tasks pending I can probably do one now very confidently provided I had the resources."

Although Deena came to recognize the value of the case *process*, she demonstrated very little change in any of the other areas. Deena was never completely sold on the case method, but more importantly, was never thrilled about being part of this study. Although Deena expressed initial interest and motivation for the course, this was quickly lost when outside pressures mounted. During the first interview Deena indicated that the case method may actually hurt her study habits as she would not have as many notes from which to study. She valued traditional teaching methods (lecture and textbook assignments) and wished that the teacher would include some of these ("I don't think that you can learn just from cases. Pure lecture is important in clarifying certain concepts"). This particular response is not unexpected. In the veterinarian educational literature, Herron, Wolf, and DiBrito (1990) suggest that students may resist a problem-solving approach if they judge that it will require more effort and/or time to achieve the same results as those achieved through traditional didactic approaches. According to Ridley (1990), how a student responds to new academic demands, in terms of feeling either challenged or stressed, depends on that student's particular orientation to self-regulation. In Deena's case, her "limiting" approach, as defined here, seems to have added to her feelings of being stressed.

Deena took the opportunity during the 2nd and 3rd interviews to voice her frustration and anger over having to do extra work for this study. Because the interviews required even more of her time, these were typically much shorter than with other students, and some useful information was not obtained. It is probably fair to say that we still do not know how Deena learned from cases, only how she responded to case-based instruction given these particular circumstances. What we *have* learned from Deena's comments is how important it is to make course assignments relevant and meaningful (students did not get credit for these cases), and to provide individual feedback after each (students only participated in a general discussion of each case following their analyses). Deena's criticisms can help us identify those aspects of a case-based learning experience which may be most meaningful to the participants.

Roslyn's experiences in this course stand in sharp contrast to those of Deena. Roslyn's prior clinical work, as well as her strong facilitative attitude, made case-based learning a natural for her. Despite suffering from frustrations with other courses, a lack of knowledge about specific types of cases, and a certain amount of fatigue at the end of the day, Roslyn never lost sight of the value of the case method for her career. She recognized her limitations as a learner and initiated strategies to overcome them ("My initial response was, 'Oh my, it's a large animal again.' But I just said, 'Use the steps' and so that's what I did."). Roslyn seemed to make continual movement forward along the self-regulated continuum; once a facilitative approach was adopted, there was never any indication that it had been set aside.

Sharon started out as one of the strongest learners. Her initial approach included powerful strategies such as trying to see the big picture and trying to relate new information to old. As luck would have it, the first case study involved problems that Sharon was somewhat familiar with. Her confidence and motivation were high and her analysis was strong. Although Sharon's interview comments continued to indicate great value in the method, she struggled as other pressures began to accumulate and when later cases were not as familiar. Sharon demonstrated remarkable persistence during our interviews but her last two case analyses were weak and sketchy. It is interesting to speculate that perhaps Sharon is our best example of what a self-regulated learner does when pressures become overwhelming. Sharon's motivation and persistence in the course remained high; her performance on these two optional case analyses, which provided no credit or individual instructor feedback, received much less attention. Sharon chose to use her time and effort to perform well where it was most important to do so.

General Discussion. These examples illustrate only a few of the many unique experiences that students had in this case-based course. What can we learn from such a wide range of responses? What general

factors, if any, can be seen operating throughout? Of the six facilitating and limiting variables detailed earlier, the one that seems consistently influential is the type of goals students set for themselves in this particular course. This finding supports other research in the area of self-regulation which indicates that learning and performance goals may exert different effects on self-regulatory activities (reported in Schunk, 1994). In this study, students who focused on learning the approach tended not to get as frustrated by their lack of knowledge or by not achieving a single "right" answer. Every new case gave them the opportunity to practice their approach and to refine their skills. Students who adopted process goals for themselves (as opposed to just recognizing the value of the approach, as in Deena's case) remained interested, motivated, and confident in their ability to learn in this course.

On the other hand, those who adopted product goals were mainly concerned with learning more of the facts which they judged would help them problem-solve in the future. These students seemed more easily frustrated, restless, and less confident in their skills. Their overall experience in the course was tempered by this concern for doing better, knowing more, and appearing competent. This seemingly negative influence was most noticeable, not so much in terms of case analyses performances or course grades, but moreso in students' levels of comfort with, and interest in, the course as a whole and in the specific tasks at hand.

It is interesting to note that neither initial levels of self-regulation, nor number and types of strategies used, were highly related to teacher ratings of students' case analyses. There are many possible explanations for this including: students' lack of motivation for completing these specific cases; inability, on our part, to adequately discern students' use of cognitive and metacognitive strategies; varying levels of students' prior knowledge; and teacher's use of grading criteria which focused on accuracy of diagnoses (product goal) as well as analysis procedures (process goal). Zimmerman (1994) has suggested that perceived value plays a critical role in one's willingness to self-regulate. In this study, students' approaches appeared to be highly influenced by the perceived value of the course, its methods, and its specific tasks. Whereas Deena saw some value in the course, she saw little value in the method and no value in the specific tasks she was asked to complete. Other students may not have valued the specific tasks, but their strong value for the course and its methods appeared influential in maintaining their motivation and effort throughout the semester. A high value on the case approach, as mentioned above, seemed especially influential in students' development and/or use of case analysis and self-regulation skills.

Conclusions and Implications

Although case-based instruction is widely heralded as being a powerful teaching method, Sykes and Bird (1992) lament that these is no research literature that explores the nature of learning through cases. One of the goals of this study was to further our understanding of how students learn from case-based instruction. By examining students' initial and changing responses toward, and strategies for learning from, case-based instruction it was anticipated that specific learner and instructional factors which facilitate, or limit, case-based learning might be identified. By comparing the responses and strategies of different types of learners, defined by levels of self-regulation, a wide range of responses could be illustrated. Students who represented opposing ends of the self-regulation continuum would be expected, at least initially, to demonstrate different levels of comfort with, and strategies for learning from, a case approach. Examining changes in these students' responses and strategies over the course of a semester provided the means to investigate the assumption, stated earlier, that the case method of instruction might provide a viable means for fostering "reflectively intentional" self-regulation in low-regulated learners.

As expected, high self-regulated learners initially demonstrated more comfort with the case approach, as well as more powerful strategies in analyzing cases, than low self-regulators. However, initial strategy use was commonly tied to established patterns of strategy use, which for high self-regulators, tended to include higher level strategies, such as organizing and elaborating on information. Comfort seemed to be related, primarily, to the type of course goals students set. By focusing on process goals, high self-regulated students emphasized the strategies needed to analyze a case, as opposed to the facts needed to make a correct diagnosis. Schunk (1994) indicates that process goals enable students to experience a sense of self-efficacy for skill improvement and tend to engage them in activities that enhance learning (e.g., effort expenditure, persistence, use of effective strategies). As students made progress in their case-analysis approach, their interest, motivation, and confidence increased, or was sustained, for future case analyses.

In contrast, low self-regulators started the course with product goals which focused their attention on getting a grade, completing a task, or learning specific facts. These types of goals did not allow these students to consider the importance of the processes or strategies underlying successful task completion. Students seemed more concerned with getting the "right" answer, pleasing the teacher, or appearing competent. Schunk (1994) suggests that product goals may not result in a sense of self-efficacy for learning, and thus can not sustain self-regulation. However, as the course progressed, promising changes in students' orientations were noted. By the time of the second interview, these students were beginning to adopt process goals, to be more reflective, and to utilize a more professional outlook. If the study had ended at this point, we might have judged that the case method had successfully fostered the development of these specific self-regulation skills.

What happened in the remaining weeks of the semester, however, highlights the importance of contextual factors in facilitating, or limiting, students' use of these particular self-regulation strategies. Although there has been a great deal of previous research (cf., Weinstein, 1988) which has demonstrated that self-regulatory processes can be enhanced through instructional intervention, it has not been successfully demonstrated that these changes are sustained over time (Schunk, 1994). Results from this study suggest that outside pressures in students' lives may increase their sensitivity to other instructional factors (type of case, time of day, length of lab) and impede their use of self-regulation skills. This finding indicates that, although the case method of instruction may hold promise for facilitating the development of self-regulation in low-regulated students, the potential influence of contextual factors needs to be examined. In addition, the interaction between learner and contextual factors is an area which could benefit from future research.

By being aware of the effect that contextual factors may have on students' use of self-regulatory strategies, teachers may be able to alter, or eliminate, potentially troublesome factors before they are encountered. For example, teachers can help students establish process learning goals at the beginning of a course by emphasizing the strategies underlying successful case analysis. By basing grading criteria on students' ability to demonstrate use of specific learning strategies rather than bottom line diagnoses, teachers can shift students' emphasis to more process-oriented goals. Furthermore, if teachers can give students more choices in terms of types of assignments, types of cases to be analyzed (make small and large animal cases available), flexible due dates, working individually or in groups, accessing available resources, etc., students may be more capable of using self-regulation strategies. At the very least, teachers can verbally acknowledge the pressures students are encountering and thus raise levels of awareness (as a first step in the self-regulation process) and establish a supportive learning environment. Following this, teachers might model their own strategies for dealing with similar pressures.

Lindner and Harris (1993, p. 4) lament that "whether and under what conditions learners will be self-regulating turns out to be a complicated matter." By utilizing an interpretive approach with a small number of students, this study was able to examine, in depth, how high and low self-regulated learners responded to a specific instructional environment. An analysis of students' interview responses and case analysis strategies enabled us to identify some of those conditions which might have facilitated, or limited, students' use of self-regulated learning strategies. The critical factors which seemed to be operating in this study were presented in the form of a facilitative-limiting framework outlining two general orientations to case-based instruction. Within this framework, additional factors were identified which seemed particularly influential in determining students' overall experience in this case-based course. Future research should be directed toward verifying the structure, as well as further defining the individual components, of this framework. Following refinement and verification, this framework may provide other researchers and educators with a viable means for charting students' progress in the development of self-regulation skills. Given the current high interest among school practitioners in fostering self-regulation among students (Schunk, 1994), techniques for initiating, supporting, and gauging the development of self-regulations skills will be both useful and necessary.

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