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ABSTRACT

An important mandate of higher education is to provide students with the skills and strategies required to become self-regulating lifelong learners. This paper analyzes and interprets data gathered from two instructional settings both of which have been structured to promote self-regulated or self-directed learning. It includes an interpretation of a series of discussions with medical students regarding their impressions about what makes the problem-based learning (PBL) environment successful and juxtaposes this with experiences related to promoting self-regulated learning through the strategic content learning (SCL) approach. The practice of PBL and SCL are examined in order to provide insight into how a collaborative learning environment can be orchestrated so as to simultaneously promote self-regulation, lifelong learning, and mastery of the core curriculum. The findings are interpreted using a theoretical framework based on notions of learning in a community and implications for the way in which participants learn to orchestrate and contribute to a community of learners oriented toward self-regulated learning and practice are discussed. Findings indicate that building a community of learners who are involved in strategic self-regulation requires careful orchestration on the part of the instructor. Contains 27 references. (JRH)

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Promoting Self-Regulation: Examining the Relationships Between Problem-Based Learning in Medicine and the Strategic Content Learning Approach

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U.S. DEPARTMENT OF EDUCATION

An important mandate of higher education is to provide students with the skills and strategies required to become self-regulating, lifelong learners. Medical education has been faced with the challenge of preparing future practitioners with a breadth and depth of current medical knowledge. At the same time, it strives to produce strategic physicians who can, in a rapidly changing and developing field, maintain and further develop this competency over a lifetime (Mann & Kaufman, 1995). To meet this mandate, curriculum innovations such as problem-based learning (PBL) have been integrated and implemented into medical education programs throughout North America.

This paper analyzes and interprets data gathered from two instructional settings both of which have been structured to promote self-regulated or self-directed learning. It includes an interpretation of a series of discussions with medical students regarding their impressions about what makes the PBL environment successful, and juxtaposes this with my experiences learning to promote self-regulated learning through the Strategic Content Learning (SCL) approach (Butler, 1996). Examining PBL and SCL practice provides insight into how a collaborative learning environment can be orchestrated so as to simultaneously promote self regulation, lifelong learning, and mastery of core curriculum. Furthermore, using a theoretical framework based on notions of learning in a community to interpret these findings, resulted in a number of implications for the way in which participants (tutors and students) learn to orchestrate and contribute to a community of learners oriented toward self-regulated learning and practice. The argument I make is that building a community of learners who are involved in strategic self-regulation requires careful orchestration on the part of the instructor.

Rationale

Self regulating students set goals, develop and adapt diverse methods to strive toward those goals, are motivationally engaged in this process and have metacognitive awareness about their learning decisions, processes and the products those processes create (Butler & Winne, 1995; Winne & Perry, 1994; Zimmerman, 1989). Students who engage in critical thinking, problem solving and strategic learning may be described as being

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productively self-regulating because they are able to analyze the task before them, decide what they are required to do, make plans for approaching that task, monitor their progress, incorporate feedback from a variety of sources, and make changes in their approach when they are not successful. These are the kinds of marketable *skills* that can be acquired in higher education, along with a breadth of content knowledge.

In a computerized era, characterized by rapid advancement of knowledge in all fields, higher education is faced with the challenge of covering a vast amount of content in a relatively short amount of time (Ryan, 1993). Furthermore, industry, business and professional bodies are looking for graduates who posses the skills and strategies required for critical thinking and problem solving. The importance of strategic approaches to learning is further warranted by the fact that much of the content students learn will be redundant by the time they graduate. In this climate, it has been suggested that higher education should not merely teach students curriculum content, it should provide a means for students to develop adaptable strategies with which to pursue knowledge and solve problems; thereby producing productively self-regulating learners (Butler & Winne, 1995; Hadwin & Winne, 1995).

The types of skills and strategies, necessary for critical thinking and problem solving "on the job" have frequently been taught independently from regular degree courses in workshops and study skills courses, or neglected altogether. When courses and programs attempt to teach students the tactics and strategies required for self-regulation outside meaningful course content, the transferability and strategic use of these tactics is jeopardized (Hadwin & Winne, 1995; Ryan, 1993). If students are to learn how to engage in self-regulated learning, they must be given the opportunity to learn to become strategic (set goals and to adopt, evaluate and adapt learning tactics to meet those goals) in relevant contexts. It is precisely the strategic use of learning tactics that contributes to self-regulation (Butler, 1994). When study skills are taught as prescribed methods for learning rather than being developed and adapted by students to meet their own learning goals, they become more content for students to learn instead of flexible strategic processes (Ryan, 1993). Problem-based learning (PBL) and Strategic Content Learning (SCL) (Butler, 1994) are alternative instructional approaches that embrace this philosophy—they strive to produce independent, self-regulating, lifelong learners within the context of relevant course content.

Overview of the Problem-based Learning and Strategic Content Learning Approaches

PBL is a curriculum innovation characterized by the use of case studies as a vehicle through which small groups of students learn problem-solving skills while simultaneously directing their own acquisition of basic content knowledge (Albanese & Mitchell, 1993). Students become actively involved in directing their own learning by collaborating to work through challenging patient cases in the way that physicians problem solve to reach diagnoses and treatments. Upon presentation of a case students decide how to identify major problems, gaps in their knowledge, and strategies for resolving those gaps in knowledge. Thus, they learn to guide their own learning while determining a diagnosis and treatment direction. PBL focuses on changing the instructional environment from lecturing to guided problem-solving—it is an instructional alternative to didactic content instruction. Thus, faculty tutors guide the problem solving process and content acquisition, rather than teaching through lectures (Vasconez, Donnelly, Mayo, & Schwartz, 1993).

Over the past ten years, PBL has been integrated into medical curricula in a number of ways. Vernon (1995) described four predominant structures of PBL in American medical programs. The first is a *uniform PBL curricula* in which PBL is the method of instruction for all of the content areas. In this system, problem-based learning is the primary mode of instruction with very little exposure to lecturing. The second is a *PBL track program* which differs from the uniform PBL curricula only in that students self-select to participate in PBL rather than in traditional medical instruction. Third is a *non-departmental PBL course* in which PBL is used to bring clinical relevance to the basic science principles learned in a traditional format. And the fourth structure is a *departmental PBL course* which is similar to the non-departmental PBL courses but does not have an interdisciplinary emphasis. The content covered is restricted to that of a particular course curriculum, rather than integrating material across the basic sciences and clinical domains. These various alternatives to the implementation of PBL reflect different levels of integrating self-regulating study skill development within the regular course content. Yet, they all strive to structure the learning environment so as to encourage students to take responsibility for setting learning goals and experimenting with ways to meet those goals in a group setting.

Strategic Content Learning (SCL) is an instructional approach which supports individual students have been supported to identify their goals and develop, evaluate and adapt strategies to meet those goals within genuine learning tasks (Butler, 1994). Genuine learning tasks refer to tasks that are part of a student's regular course syllabus and for which students have some accountability or grade investment. Butler's model focuses on the learner by supporting students to approach tasks in a problem solving manner and generate appropriate strategies themselves, as opposed to teaching specific strategies. SCL instructors scaffold support as they collaborate with each individual to analyze tasks, identify goals, evaluate or generate approaches, implement and adapt strategies, and monitor progress. Throughout the instructional interaction, students are encouraged to monitor effectiveness, consider strengths and weaknesses, and define areas requiring improvement. In other words, students are supported to engage in metacognitive activities such as reflecting on their progress and developing cognitive strategies during their interactions with genuine course materials. The role of the tutor in providing scaffolded support drives the SCL approach. The SCL approach focuses on changing the role of the instructor from individual content area tutoring to supporting individuals while they develop and test their own learning strategies.

Both SCL and PBL adapt the learning environment so as to facilitate the development of self-regulation. however they have approached this task differently. PBL has been implemented as a small group alternative to didactically driven content instruction, while SCL has been implemented as an alternative approach to individual strategy instruction. Nevertheless, both PBL and SCL lend themselves nicely to a common goal—encouraging students to take control of their own learning and learning processes within the context of content learning. By considering these two approaches, this paper provides insight into how instruction can be orchestrated to assist students in gaining content expertise as well as preparing them with the strategies for critical thinking and problem solving that are necessary to succeed in the communities where they will practice. Furthermore, a theoretical framework based on notions of learning in a community is adopted to interpret findings and propose ways in which students and tutors can be encouraged to become active participants in self-regulated learning and practice.

Research Focus

The data analyzed and interpreted in this paper were derived from two settings and across two periods of time. My involvement in both settings contributed to my research questions and to the focus of this paper. During my discussions with medical students regarding their study activities in a problem-based learning course (first setting), a number of comments were made about the disparity between methods of delivering PBL, the influence of tutors in directing those delivery methods, and the perceived quality and usefulness of PBL for individual students. These issues were not part of the research study I was involved with, but they continued to intrigue me. I was interested in these comments for two reasons: (a) it seemed that the experiences of these students could provide insight for improving the delivery of PBL; and (b) I was curious as to what factors contributed to the disparity in PBL engagement—there seemed to be a distinct difference between "going through the motions of PBL" and really engaging in PBL.

A year later, while reflecting on my own practice as a strategic content learning tutor (second setting), I began to draw some links between the struggles I was having changing my own practice, and the comments medical students made about their experiences and perceptions about the PBL process. Since PBL and SCL share a similar goal—promoting strategic self-regulated learning, I decided to re-visit the comments students made about the PBL process. My intent was to use my knowledge about self-regulated learning and my reflections as I learned to implement the SCL approach to reconsider the questions that intrigued me about the PBL data—how do different types of PBL delivery influence student engagement, and what is the role of instructors in shaping the PBL process. I was interested in how interpretations of these two data sources could be used to guide improvements in PBL practice and instruction. As I worked with the data, I realized that I was really addressing larger questions about promoting self-regulated learning and practice in the context of a community of learners. The applications of these findings go beyond either PBL or SCL; they have theoretical and practical implications for restructuring instruction in higher education to promote collaborative knowledge acquisition and strategic, lifelong learning.

RESEARCH DESIGN

Setting and Procedure

First setting. In 1994, I participated in a research project in a faculty of Medicine, developing a questionnaire to assess learning tactics used by medical students in both traditional and problem-based (PBL) classes (Woodhouse, Delva, Haines, & Hadwin, 1995). The department had implemented a non-departmental PBL course curriculum (joint PBL and "traditional" program). At the time the data was collected it was in its third year of implementation and still experiencing growing pains. We were interested in investigating the effect of PBL on approaches to learning and the kinds of learning activities students engaged in. PBL is intended to foster deeper approaches to learning, self-regulation, lifelong learning, improved problem-solving and critical thinking skills, all of which should be reflected in the types of learning activities students engage. I conducted a series of interviews and focus groups in which students were encouraged to talk about the "ways they went about learning" in both their traditional and problem-based courses. This data was transcribed and analyzed for the purposes of questionnaire development.

I conducted the interviews and focus groups with 29 medical students representing each year of the medical program. I used a semi-structured interview approach—loosely following, but not strictly adhering to, a set of questions. Interviews were taped and transcribed. Single-year focus groups were taped and recorded in short-hand by an experienced notetaker. Students were informed that the purpose of the study was to investigate the kinds of activities medical students engage during their medical education program. Our discussions were confidential; none of the medical educators knew who participated in the study, nor could comments be traced back to any individual. My impression was that students talked openly and candidly about their experiences because: (a) they knew I had nothing invested in the program or their education; (b) they saw this as an opportunity to assist future medical students; and (c) it was clear by my questioning that I knew very little about the structure of their program.

Second setting. In 1995, I completed a fieldwork placement at a local community college learning how to implement the Strategic Content Learning approach to assist students with learning disabilities. Initially, I acquired a theoretical understanding of the SCL approach through reading several of Butler's papers (Butler, 1995; Butler, 1994, 1995) and discussing the approach with her. Then, I observed 6-8 sessions with two SCL tutors. The first tutor was continuing an intervention with a mature student who was studying to be a lab technician assistant. The second tutor was starting interventions (introductory sessions) with two mature students who wanted to work on English grammar and writing, respectively. After that time I started to work with these students independently, as well as with two students who were working toward attaining high school equivalency in mathematics. The sources of data for this paper were my *reflections* on my practice as I engaged in SCL tutoring, summarized case notes, and thought about upcoming sessions with the students.

Analysis

Since I was analyzing the data and reflecting on my own practice simultaneously, my understanding and interpretation of the medical data, as well as the theoretical lens through which I was viewing the data, were co-evolving. I was learning about the PBL data through my practice as an SCL tutor, and about my practice as an SCL tutor through the PBL data. This makes it difficult to describe the analysis process in a linear fashion. Consequently, this section attempts to describe the way in which the initial themes emerged and how I was drawn to a discussion of two themes for this paper. This section provides an overview of the initial analysis process. The description of that process continues to evolve in the discussion of my results because that authentically captures the process of my analysis.

During the original medical study, some interesting issues surfaced that were not part of the research project, and therefore not pursued in depth. I revisited the transcripts because I was interested in those comments students spontaneously made about the PBL process; there seemed to be a distinct difference between "going through the motions of PBL" and really engaging in PBL. I felt that my recently acquired knowledge of self-regulation and of the strategic content learning approach in particular, would now facilitate an interpretation of those comments.

I began by reading the transcripts thoroughly and pulling out some recurring themes related to PBL. Eight themes emerged: (a) There seemed to be a couple of different ways of delivering PBL, largely determined by the tutors. (b) Consistent with the goals of PBL, some students talked about dispositions for lifelong learning. (c) They also discussed the PBL focus on the "whole person" as opposed to the traditional approach to patient care. (d) The issue of time and its influence on the effort they could put into PBL

re-emerged several times; as did (e) the issue of the relevance of the material in PBL to other studying. (f) There was discussion about formats which encouraged collaborative inquiry versus individual presentations. (g) There seemed to be some discomfort with the uncertainty of PBL. Students wanted to be given the "right" answer, and perceived that there should *be* a "right" answer. And finally (h) the role of the PBL tutor in making the PBL experience useful or not re-emerged in almost every discussion.

While attempting to organize and discuss recurring themes, I noticed an overwhelming similarity between the experiences students described in PBL and the challenges I was facing in my fieldwork as an SCL tutor. Consequently, I began to draw links between my experiences and challenges attempting to encourage students to become self-regulating and the information medical students provided about their experiences in an instructional setting designed to encourage them to become self-regulating.

I approached the task of interpreting each individual's discussion by reading through the transcripts and looking for the units of dialogue that cued me to the eight themes. This was a flexible process in that themes were added and dropped depending on the "flavour" of a particular interview. I made a conscious effort to keep units of dialogue intact and, where a piece of conversation illustrated more than one theme, I recorded that conversation in its entirety under both themes. For the purposes of this paper I decided to focus on the two themes that seemed to connect with my experiences in SCL: (a) the ways in which different types of PBL delivery influenced student engagement; and (b) the role of instructors in shaping the PBL process. These themes are interdependent and parallel the struggles I was having in figuring out: (a) how the SCL process should evolve; and (b) what my role in that process should be. As elaborated in the findings, analysis of these two PBL themes and my reflections on my SCL process led me to interpretations based on a community of learners model.

FINDINGS AND DISCUSSION

Two themes linked comments made by the medical students and my reflections as I learned how to implement the SCL approach. These themes also addressed the original questions that had intrigued me about PBL. The first is that there are different "shapes" or methods for delivering PBL. The second is that tutors play a critical role in shaping PBL as well as in the success or failure of it. The following analysis draws on the two themes emerging from students' comments about PBL and my experience learning to support students with SCL. I propose, a theoretical framework for promoting self-regulated learning and constructing content area expertise through participation in a community of learners. Informed by PBL and SCL practice, this framework provides insight as to how a community of learners unfolds through the skillful orchestration of an instructor who brings to the community: (a) content and process expertise; and (b) instructional tools to share content and process expertise strategically.

Shapes of PBL as emerging Communities of Learners

The *shapes* of PBL that emerged in my discussions with medical students were more than different methods of delivery; they were different environments altogether. The roles and responsibilities of all the participants differed greatly, as did the method of delivery. I use the term *shapes* to capture the differences in these PBL environments collectively. *Shape* refers to differences in the way in which: (a) content learning is situated in the PBL learning environment; (b) diagnoses and treatments are socially constructed; (c) expertise is distributed and shared amongst participants; and (d) participants engage in behaviours characteristic of self-regulated learning. Differences in delivery method characterize the three *shapes* of PBL described in this section, but they are not sufficient to capture the nature of differences between these PBL communities. Medical students candidly talked about their own commitment and engagement in the PBL process across different delivery methods and it is precisely the commitment and engagement associated with a delivery method that constitutes its "shape". In attempting to interpret and discuss the *shapes* of PBL my readings gravitated toward Brown and Campione's (1994) notion of a community of learners. This theoretical frame captured the collective differences I referred to as *shapes*. It also provided direction for understanding how students and instructors learn to become self-regulating learners and participants in the collaborative context of a community of learners.

In order to critically examine the various shapes of PBL and their implications for promoting self-regulated, lifelong learning in the context of collaborative content learning, it is important to introduce a theoretical framework within which this type of instructional approach can thrive—more specifically, learning as legitimate peripheral participation in a community of practice. Learning as legitimate peripheral participation suggests that learning occurs during practice and necessitates taking on the roles and responsibilities of a participant in that practice. Lave and Wenger (1991) suggest that

> learning is not merely situated in practice—as if it were some independently reifiable process that just happened to be located somewhere; learning is an integral part of generative social practice in the lived-in world (p. 35).

This description infers significant implications for the design of learning environments, and for the design of professional learning environments more specifically:

(a) Content learning is situated in relevant activities. Learning, knowing, cognition, meaning, activity, and the world are inter-related constructs—learning is not the facts students acquire but the way in which they construct and apply knowledge in the real world (Lave & Wenger, 1991). For the most part this is the challenge that medical educators have attempted to bridge with the introduction of PBL as a means of delivering and implementing medical curricula. In PBL, an attempt is made to orchestrate a learning environment that resembles a community of medical practitioners. The goal is to engage students in the practice of collaboratively problem solving in the way that practitioners attempt to reach reasonable diagnoses and treatments for their patients. The PBL community only attempts to "resemble" a community of practitioners because it operates within the constraints of limited base knowledge and practical experience by providing students with case studies instead of a genuine patient case load. Similarly, in SCL an attempt is made to support students to test and develop their learning tactics and strategies in the context of their own learning tasks (school tasks or otherwise).

(b) Knowledge is socially constructed. This definition also states that "learning, thinking, and knowing are relations among people in activity with, and arising from, the socially and culturally structured world" and that "the socially constituted world is socially mediated and open ended" (Lave & Wenger, 1991, p.51). PBL environments afford students the opportunity to experience learning and knowing as socially mediated and constructed processes. This not only means that the case studies students work on contextualize, or situate the medical content, but that the process of working through these cases together should/could engage students as participants in a community of preparing medical practitioners. This is where PBL and SCL differ. The SCL approach is embedded in a community of learners that includes the SCL instructor and the student only. This community is limited because it does not resemble the community students participate in after SCL instruction is phased out. While attempts are made to encourage students to make use of other resources as part of their strategic learning, students may not learn how to take on the role of the strategy "expert" in their own communities of learners. Working one-on-one with an instructor does not give students the opportunity to learn to support other students in becoming self-regulating, while simultaneously becoming self-regulating themselves.

(c) Expertise is distributed and shared amongst participants. Finally, communities of learners encourage the synergy of distributed expertise among members (Brown & Campione, 1994; Lave & Wenger, 1991). This means that participation in that community carries responsibility for sharing and building on distributed expertise in such a way that the sum of the expertise serves as a catalyst from which a socially constructed body of knowledge emerges. Participants are responsible for more than the acquisition of expertise in a particular area, but also for sharing and learning from the expertise in the community. These solutions are not just an accumulation of the individual contributions of each member (Brown, Collins, & Duguid, 1989. In this way the culmination of knowledge in the community results in ideas and directions that are more than the sum of the parts and beyond the scope of any individual's generation. For instance, PBL attempts to engage students in the collaborative practice of medical problem solving, where they draw on each other's knowledge and resources to generate a direction for diagnosis and treatment. This knowledge is distributed amongst the participants by the nature of their experiences, previous studies, and interests. In SCL there are only two sources of expertise, that of the student and that of the instructor. This in itself limits the power of synergy and results in the instructor having, on occasion, to be the primary source of expertise regarding learning tactics when a student reaches an impasse and doesn't have any successful tactics to draw upon. Larger communities afford more distributed expertise because, expertise (i.e. alternative learning tactics) might be provided by other students who possess a range of tactic expertise (i.e. ways of notetaking, or concept mapping).

(d) Participants engage in behaviours characteristic of self-regulated learning. The final element contributing to *shapes* of PBL involves student engagement in self-regulated learning. It is the conceptual integration of theories of self-regulation and communities of learners that highlights the differences in *shapes* of PBL across different delivery methods. Furthermore, theories of self-regulation provided the theoretical framework that drew me toward student discussions about what constituted *really* engaging in PBL versus *going through the motions*. Self regulating students set goals, develop and adapt diverse methods to strive toward those goals, are

motivationally engaged in this process and have metacognitive awareness about their learning decisions, processes and the products those processes create (Butler & Winne, 1995; Winne & Perry, 1994; Zimmerman, 1989). This model refers to conscious purposeful action such as that proposed by Bandura's social cognitive theory. It also denotes the kind of behaviour necessary for lifelong learning—practitioners who are motivated, metacognitive, and purposeful about the content they learn about and processes they engage while independently continuing learning in the field.

Analyzing and interpreting the shapes of PBL

As the medical students reflected on their PBL experiences, they described a number of different methods of PBL delivery. Associated with these methods were impressions and perceptions about their own roles and responsibilities as participants in that PBL environment. I describe the different methods as "shapes of PBL" to emphasize the interdependence of instructional method and participant engagement. Each "shape" can be categorized by a description of the instructional method, but the way in which expertise, roles, and responsibilities are distributed within a method of delivery characterizes the *shape* of PBL. In other words *shape* describes the way in which the community of learners unfolds.

Students' comments seemed to differentiate three methods for delivering PBL. Since PBL is driven by case studies, all groups started the process by analyzing the case and deciding upon learning objectives (what they needed to learn for the purposes of diagnosis and treatment), however three distinct methods emerged from that point: (a) Some students talked about dividing the objectives between individuals in the PBL group; (b) others researched all the objectives individually; and finally (c) some PBL groups categorized issues as important or peripheral, researched all the important issues individually and then divided up the peripheral issues. Regardless of the method of inquiry, students felt strongly that collaborative inquiry was a critical component in *shaping* a successful PBL environment. When the method involved individual presentations, students described the resulting *shape* PBL less favourably.

By third year, students had participated in at least three PBL groups, each of which included different configurations of peers, tutors, and case studies. These students were able to contrast the different experiences. Third year students' comments were similar to comments made by students in earlier stages of the program, but included descriptions of more than one method of PBL. For example, when asked to describe how PBL courses work, these two third year students described both the variation across years and PBL groups and introduced the first "shape" of PBL"

> They worked differently in different years. Different groups used different strategies. Some groups assigned each person a topic to present—that was a popular strategy.
>
> They did that in most groups. Another strategy was everyone looked up what they wanted and got together to discuss issues and hoped they had covered them. [One of the tutors][1] strategies, [assigning individual topics], got really tedious. Picking what you wanted obliged you to learn more widely, broadly. It was more beneficial because you missed out when other people took areas. (3F4[2]).

Shape 1. This conversation highlights the first method of PBL delivery—identifying topics for inquiry as a group, followed by dividing objectives amongst students in the group. These third year students described how topics were often divided up between students (either by choice or assignment by the tutor). Of these two alternatives, students preferred to choose their own topic rather than being assigned one. When the PBL tutor assigned the topic to be researched, it was the tutor who directed student learning, not the student. Students were "influenced" by the expectations of the PBL tutor and the structure of the course to research a predetermined number of objectives/topics, rather than the ones they needed to learn. Alternatively, by setting individual learning goals and choosing

[1]Square brackets include my own comments. They are used to fill in information that I understood from my interview/focus group but am not sure are clear in the direct quotations. While I accept that we can never re-present the "true" discussion, this is my attempt to provide a "fair" context for interpretation. Sometimes these comments refer to a noun the student was referring to "one of the tutors; other times they summarize the issue or question we were discussing "assigning individual topics." The easiest way to read them is to ignore the bracket itself and read the contents of that bracket as part of the quote (Silverman, 1993, chp. 6).

[2]Source codes were used to indicate the origin of each quote. The first number refers to the year in which each student was enrolled (1 to 3). The letter refers to the nature of the meeting with the students (F=focus group, I=individual interview) and the last number refers to which interview or focus group (1-10 for interviews, 1-4 for focus groups). In other words 3F4 means this quote comes from third year students in the fourth focus group.

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topics of inquiry, students began to direct their own learning and thereby engage in self-regulated learning.

Assigning topics for research, not only discouraged students from regulating or directing their own learning but *shaped* the learning environment by implicitly making a value judgment about the distribution of expertise in the community. In *shape 1*, the tutor becomes the source of expertise by deciding what topics should be researched by whom. Students bring a wide range of content and process expertise to the community through their experiences in the profession, their exposure to academic content, and their participation in related communities. Assigning pre-defined objectives under-utilizes the expertise students bring to the community, and encourages them to be passive rather than active agents in that community. One student articulated this effect very clearly:

> When topics were dictated to you and dry, I wasn't interested, didn't spend much time on it. When they tell you what to look up, no general reading at all (217)

Ignoring the role of distributed expertise in communities of learning and practice also impacts upon the subsequent nature of discourse in the community. Learning how to converse in a community is a critical tool for enculturation in that community (Brown, Collins, & Duguid, 1989; Lave & Wenger, 1991). Contrary to the goals of PBL, students demonstrated, through the nature of discourse, a shape of PBL characterized by enculturation in a community of learners resembling traditional schooling, rather than collaborative medical practice. These students returned to their PBL sessions with a piece of knowledge and presented it in lecture format.

> [When PBL wasn't good] In the first two [PBL courses], everyone picked a topic, read and presented to the group. [We had] mini lectures and you never knew enough about any given topic to actually work through the case (216).

Interactions composed of a series of mini-lectures are not reflective of the kind of self-regulated lifelong learning that medical educators strive to encourage in these future practitioners. Nor do they reflect the kinds of critical thinking and problem solving skills that are necessary to effectively diagnose and treat patients in a timely fashion.

Shape 2. The second *shape* of PBL engages students in directing their own learning by encouraging them to: (a) take turns facilitating PBL sessions; (b) learn about the medical and practical issues in general; and (c) discuss those issues in relation to the case. Methods of PBL that orchestrate a learning environment in which this second *shape* emerges provide the opportunity for students to work as a group to identify critical issues of concern for diagnosis and treatment of the case, and use this group brainstorming to direct their individual research and learning directions. Consistent with self-regulating behaviour, students decide upon and set their own learning goals, and subsequently direct their own learning methods toward those goals. Based on comments made by students, this method of PBL delivery resulted in "a real learning experience" because each student returned to the group discussion with the knowledge necessary for them to contribute to the diagnosis and treatment of the patient.

> The year with the good leader - We would all go through and find important points, would all go through and do everything. We tried to use many different sources and then come together and talk about case. We had a rotating facilitator. We would come up with what we thought was going on based on what we knew, so it was a real learning experience (216).

In general, students described the learning process more positively when they were given more control over the general learning objectives and directions, rather than being assigned or asked to choose one of a number of specific objectives. Furthermore, the shape that emerged encouraged them to use the distributed expertise in their communities to engage in the discourse of future medical practitioners rather than that of didactic medical educators—they had discussions directed toward diagnosis and treatment rather than individual presentations of medical facts. Expertise was valued and utilized because students used their own expertise, or lack of expertise, to guide the direction of their study episodes. Upon returning to the "community" all students were encouraged to participate by using their knowledge in collaboration with their peers to decide upon a diagnosis and treatment for the case. The collaborative activity was problem-based rather than being driven by mini-teaching sessions.

What distinguishes this *shape* of PBL from the one that follows involves the complex interrelationship between distributed expertise and the socially constructed nature of knowledge. This method of PBL delivery encouraged students to engage in self-regulated learning activity. It also

encouraged students to acquire the general knowledge necessary to engage in the type of community discourse necessary for the social construction of knowledge. However, this method does not ensure that students return to the PBL discussions with sufficiently diverse content expertise for synergy of distributed expertise to occur. When the PBL environment is structured so that students are to learn generally about a given topic, discourse about general issues is encouraged—specialization is not. Synergy of distributed expertise is dependent upon students bringing a diverse wealth of knowledge to the learning community. For example, in a community of future medical practitioners, synergy toward diagnosis and treatment may be the result of expertise about physiotherapy treatment, immunology, hematology, and the role of the social worker. Given the time constraints inherent in course curricula, it is unlikely that students assigned the task of researching generally about a case will ever pursue the additional sources of expertise in any depth. This does not mean that synergy of expertise will not happen, rather that its occurrence is dependent upon chance (that students will have some relevant content expertise).

Shape 3. The third shape of PBL highlights the complement between building a community of learners and the promotion of self-regulation. It encourages students to acquire a base medical knowledge necessary for engaging in discussion about the case and to further pursue expertise in specific areas that will assist the community in reaching the most informed diagnosis and treatment. This shape of PBL is characterized by methods of delivery that combine aspects of assigning/choosing learning objectives with a more general approach of self-directing one's research and learning directions toward appropriate and relevant issues.

> We took a case, read it, decided upon main issues. The whole group went home and read about main issues, came back and discussed them -everyone was on common ground—good! We assigned more peripheral subjects that related to the main theme, people looked them up [individually], then came back and assigned drugs, etc. We had two goes at it, first for general reading, second for smaller details. Sometimes it was all assigned at once and then we had a few weeks to do those. Everyone knew about the topics so you could have an informed discussion, whereas usually [referring to other years] just sit and listen to someone talk and you zone out. (217)

Incorporating attributes of each of the other *shapes*, students decided upon the issues that were important to know for the purpose of engaging in a discussion about the case. Issues that were peripheral, but worth looking up, were divided amongst students in the group. Perhaps this was a more practical approach given the wealth of new content to be addressed in a given case. This approach allowed students to direct their own learning toward acquiring a sufficient base of medical knowledge to engage in discourse about the core issues, and then to pursue expertise regarding peripheral issues with the purpose of contributing specialized expertise. This approach also respected the expertise members of the community brought to the process of building a community of practice. Students worked collaboratively from the first introduction of the case in an attempt to identify the knowledge that was required to engage in any relevant discourse, prior to introducing individual content expertise. This shape exemplifies a balance between self-regulating one's learning, acquiring sufficient expertise to engage in community discourse, and acquiring sufficient distributed expertise for discourse to result in a synergy of socially constructed knowledge directed toward diagnosis and treatment.

Beyond *Shapes* of PBL

Frequently, self-regulation is discussed and researched in the context of individual students. The PBL environment is unique because it attempts to facilitate self-regulated learning of challenging course content in the context of a group. Since we expect medical practitioners to diagnose and treat patients and update their knowledge and skills with their colleagues, situating their learning in a collaborative setting is critical—we not only want these students to become self-regulating learners, but also to become self-regulating practitioners who bring expertise to a community of practitioners. Situating content learning in communities of learners that resemble the applications for which that knowledge is intended is an important pedagogical step because "activity, concept and culture are interdependent and one cannot be totally understood without the other two" (Brown, Collins & Duguid, 1989, p.33). PBL allows students to explore, experience, and engage in the content of their field as a team of practitioners confronted with a "real" problem. When a community of learners/practitioners is orchestrated successfully, it affords students the opportunity to engage in the cognitive, metacognitive, and motivationally-driven activities that characterize productive self-regulated learning. These students not only acquire the tools for medical practice but also a culture and context in which to practice them.

> Authentic activity is important because it is the only way students gain access to the standpoint that enables practitioners to act

> meaningfully and purposefully. It is the activity that shapes and hones their tools (Brown, Collins & Duguid, p.36).

When a community of learners/practitioners was not orchestrated successfully, the shape that emerged was very different and students attended to their individual learning needs at the expense of the kind of collaborative dialogue resembling a community of practitioners. For instance in *shape 1*, after the group generated issues and topics for further research, each student took one or two pieces. As a result, students consistently described the struggles they had trying to integrate the material they had each researched in a discussion format. Frequently, they reported having "mini-lectures" in which no one was able to listen to anyone else because they were too worried about their own talk.

> My groups have all taken one topic, researched it and presented it to the group. I can't listen to other people's presentations because I am too stressed out about my own. It all goes by too fast (214).

Reducing the number of points students could present did not improve the situation because students said that "unless everyone knew about the topics, you couldn't have an informed discussion" (217). This type of "break down" of community was detrimental to the learning process because it directed students' attention away from the purpose of their practice (diagnosing and treating cases) and toward decontextualized tasks. Furthermore, it resulted in students acquiring expertise that was not necessarily relevant to the case, without having the opportunity to use that expertise as a practitioner. Rather than the distributed expertise synergizing to produce a collaborative diagnosis and treatment, PBL discussions presented a spectrum of puzzle pieces with abstract, undefined relations to the case and to each other.

Inherent in my definition of *shapes* of PBL, is the notion that methods of delivery are closely linked with student engagement in the learning process and that together method and engagement characterize the *shapes* of PBL. With that in mind, when each student researched all the issues, students had the flexibility to address their own learning needs. At the same time the task was overwhelming because students had to "look up a wide variety of topics and it was more time consuming" (3110). On the other hand, when the method of instruction involved researching the major issues and dividing up peripheral issues, self-regulation took on a collective *shape*. Students were able to direct their research to fill in their own gaps in knowledge regarding the major issues. This encouraged students to acquire a relevant knowledge base with which to engage in collaborative problem solving, while pursuing expertise in specific areas. In this PBL *shape*, individual responsibility for acquiring and sharing expertise was coupled with collaborative discourse across a shared knowledge base.

Given that student engagement and self-regulating behaviour is related to the method of PBL delivery and the relationships between method of delivery and student engagement characterize the *shapes* of PBL, it becomes important to examine the ways in which different *shapes* of PBL are orchestrated. The analysis of various shapes of PBL has identified two critical components of this orchestration: (a) the nature of discourse as a means of socially constructing knowledge; and (b) the emergence and contribution of distributed expertise. First, the nature of discourse is critical to the community of practice. Through enculturation in the community students learn how to engage in the discourse of that community. If we want students to engage in the discourse of a community of medical practitioners, we must structure a learning environment that encourages students to learn about and engage in that discourse—the resulting *shape* is a community of learners that resembles a community of medical practitioners. In order to function as a community of learners, students need to learn to negotiate and communicate a common discourse. For the medical students I interviewed, this meant having some common ground upon which to discuss each case. It did not mean having common expertise, but rather, having the opportunity to read broadly about the issues so that they had some shared knowledge about which to engage in discourse and thereby contribute to the synergy of distributed expertise toward diagnosis and treatment.

Second, communities of practice depend on the emergence and contribution of distributed expertise. Expertise is distributed across all participants in the community and the instructor brings a spectrum to this distribution. Lave and Wenger (1991) suggest that a de-centered view of "the master as pedagogue moves the focus of analysis away from teaching and onto the intricate structuring of a community's learning resources" (p. 94). In this way, the instructor becomes part of the learning community, not the centre of it. The tutor brings expertise which helps shape and guide the community so that all participants can participate and contribute to the learning. Lave and Wenger (1991) suggest that it is through legitimate participation in a community with "old timers" that newcomers become part of that community. *Enculturating* students and tutors into a community of learners (e.g. PBL environment) requires that students learn the individual roles and responsibilities of each member of the community. Moving instruction from a teacher centred approach to a community of learners

means that the contributions of each individual are respected and valued as sources of expertise. These sources of expertise may be content or process expertise, each of which shape the evolution of the community in significant ways. Furthermore, it requires that students be given the opportunity to seek and acquire a diverse range of relevant expertise.

Tutors as orchestrators in communities of practice

It is not unusual for students to feel uncomfortable with modes of instruction that ask them to think, to generate their own answers, and to figure out how to monitor the accuracy of those answers. These skills have seldom been emphasized in prior educational experiences; frequently curricula provide students with the material to learn, the way to learn it, and evaluations of the acquisition of that material. Learning to be self-regulating is as novel a process for the tutor as it is for the student. Ryan (1993) described the discomfort associated with instructional transition in the following way:

> The process of transition from dependence to independence as learners can be difficult for both the teacher and the students. The teacher may be unwilling and/or unable to shift the responsibilities for learning to the students; and the students, too, may have difficulty in changing dependent learning practices (Ryan, 1993, p. 55)

Orchestrating a community of learners presents a number of challenges for the instructor. Rogoff (1994) suggests that the shift from traditional instructional approaches toward a community of learners "requires a paradigm shift like that of learning how to function in another culture" (p.215). This is because most instructors and students have been brought up or enculturated into more traditional forms of instruction. When the instruction changes, so do the rules and standards that instructors and students use to monitor their engagement in learning. The transition from traditional instruction toward a community of learners approach depends upon both the teacher and students being active participants in the instruction: "The teacher guides the process and the students learn to participate in the management of their own learning" (Rogoff, 1994, p. 213). Rogoff (1994) also suggests that the roles of participants change across situations and communities because the degree and direction of support is never constant. I used this theoretical lens to interpret the comments students made about the tutor as an "orchestrator" in PBL. The struggle of PBL instructors to adapt to this method of instruction was reflected in the different methods of PBL delivery. As the method of delivery changed, so did the roles and responsibilities of student engagement. Ultimately this resulted in different *shapes* of PBL.

I faced many similar challenges learning to implement the Strategic Content Learning approach. While this method of instruction involves only two actors (the student and myself), the theoretical framework parallels that of the community of learners model—the instructor and student are active participants in the learning process with the instructor guiding the process and the student gradually taking more responsibility for their own learning. Integrating comments made by PBL students and my own experiences as an SCL tutor revealed two critical issues concerning the roles and responsibilities of the instructor as an orchestrator of an environment that supports students to become self-regulating participants in a community of learners: (a) The tutor strategically employs content and process expertise in the learning practice of the community; and (b) the tutor employs content and process expertise through the strategic use of questioning, feedback and scaffolding.

The interplay of content expertise and process expertise

Successful orchestration relies on the strategic interplay of content and process expertise on the part of the tutor. Content expertise refers to the medical knowledge the tutor brings to the community. For some tutors this knowledge is grounded in the basic sciences, for others it is clinical knowledge grounded in their own medical practice. Process expertise refers to knowledge about the way in which a community of practitioners evolves and the way in which a community of learners evolves. This knowledge stems from experiences in the field and as part of these kinds of communities. It involves recognizing the roles and responsibilities of members of a community and the methods by which we learn about them. Introducing both content and process expertise supports the initial evolution of a community of learners oriented toward self-regulated learning. Expertise is gradually appropriated by other members of the community who increasingly share the responsibility of leadership. SCL and PBL tutors shape the learning process by strategically sharing content expertise. How and when tutors share expertise determines whether that expertise contributes or detracts from the evolution of a community of learners engaged in self-regulated learning..

For the tutor, learning to share one's expertise in a way that is consistent with a community of learners model of instruction is a challenge.

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Moving away from traditional instruction, the kind we have most frequently experienced in our schooling, means struggling to find a balance between sharing content and process expertise. It also involves deciding when to contribute expertise and when hold back. The goal of SCL is to support students to become self-regulating by guiding them to consider the feedback sources that assist them to monitor their processes, and approach learning strategically. The instructor's role is to guide students through this process by using effective questioning and drawing students' attention to their process as they engage with actual course materials and assignments. Rather than teaching students contents or tactics, the SCL tutor attempts to direct students to engage in the kinds of metacognitive activities that will lead them to (and through) relevant content and tactics. As an SCL tutor, I struggled to support students by strategically using my content and process expertise to guide students to those metacognitive activities that would lead them to that content and process expertise. It was this struggle that directed my attention toward the role of a tutor in "orchestrating" instructional environments oriented toward self-regulated learning. In essence, I was struggling to figure out my role in this mini-community.

There were times when my content *expertise* interfered with the way the SCL process evolved, rather than enhancing it. The following contrast, illustrates the way in which content expertise can interfere with the evolution of a self-regulating learning process. I worked with one student in a Lab Technician program, studying phlebotomy and cardiology, and another student studying grade 11 mathematics. I have very little background in biology and even less knowledge about applying electro-cardiograph leads, however, I do have a fairly strong background in mathematics. My weak biology background facilitates the questioning process because the questions resemble the questions I ask myself as I work through new material. In this situation, my expertise about the self-regulated learning process defines my role in the learning environment. In mathematics, however, I face a consistent struggle between showing the student the steps I would use, and guiding that student to the questions he might ask to figure out how to solve the problem. Since these mathematical operations have become automated for me, it is difficult to remember the process I originally went through to make sense of them. These are the instances when I inadvertently diverge from using my *process* expertise to over-relying on my content expertise to guide the learning process. Rather than using the SCL approach, I end up teaching the student my steps, thereby directing the students' learning rather than facilitating student-directed learning. Fortunately, my knowledge about the goals of the instructional process and of how students become self-regulating allows me to reflect upon and redirect my instructional practice.

Content expertise and process expertise provide the knowledge with which the tutor guides and monitors the unfolding of a community of learners. It is the strategic interplay of these types of knowledge that guides tutors as participants in the community and results in the emergence of a variety of *shapes* of PBL. The interplay of content and process knowledge is complex, as is its impact on the way in which the community of learners evolves. In PBL (as in SCL), the tutor orchestrates a community of self-regulating learners by using his or her content and process expertise strategically. One medical student described it in the following way:

> Each instructor had a different approach. It was arbitrary based on the style of the supervisor. The approach was usually defined by the instructor. Last PBL we discussed with the instructor how we wanted to go about it—it worked. If the instructor thinks we are missing the boat, he makes sure someone covers it. The leader said very little, he shaped the discussion and guided it without teaching (218).

This comment suggests that subject matter expertise plays a critical role in preventing students from "missing the boat." While self-regulating students learn to evaluate and monitor their progress, sometimes the structure of a course, and of a school year, limit the amount of time students can afford to spend "going down the wrong track." It therefore becomes appropriate and necessary to use content expertise to guide students in the right direction. Each member of the community, including the tutor, has a responsibility to share expertise in an attempt to work toward the common goal of finding a substantiated diagnosis and treatment. At times, the tutor participates in the community of learners by interjecting relevant content knowledge or using that knowledge to guide the process. Often, the distributed expertise of other participants guides the process instead. Medical students commented in various ways in which the tutor's content expertise strengthened the problem solving process:

> It is more due to the input of the facilitator—the experience of the physician rather than peers (112)

> I didn't learn much from group members, just from myself...there was one session where I did because the doctor running it really made us think about it, what we would do with the patient...a particular doctor gave us clinical pearls that we wouldn't get anywhere else (3F4).

> The key is learning from each other, not the professor (113).

The juxtaposition of these quotes illustrates the range of outcomes (or *shapes* of PBL) associated with the introduction and timing of tutor expertise. The PBL literature also supports the notion that content expertise influences the role a tutor plays in the learning community. For example, Silver and Wilkerson (1991) found that expert tutors in PBL sessions tended to take a directive role by suggesting topics for discussion, asking more questions, and providing more answers, an approach that can undermine students' self-regulated learning. This parallels the directive role I tending to take tutoring the math student. On the other hand, Schmidt, Van Der Arend, Moust, Kokx, and Boon (1993) found that tutors' subject matter expertise results in better achievement and more student effort, but also acknowledged that process-facilitation behaviours on the part of tutors were also causally related to achievement. In other words, effective tutoring may emerge when tutors use their subject matter expertise to ask stimulating questions. In an analysis of "what drives the student in Problem-based learning", Dolmans and Schmidt (1994) addressed the importance of the tutor in shaping the PBL experience. Results from a questionnaire suggested that the tutor influences what students will study by guiding the tutorial group process and using expert knowledge. Perhaps the degree to which subject matter and process expertise constrain or drives the PBL process depends upon how they are employed. In other words, expertise provided by any member of the community, may inform the learning process, provided that individuals in that community still direct the search for, acquisition, delivery and use of that expertise.

Questioning, Feedback and Scaffolding—The Tools of Orchestration

It is the way in which tutors employ content and process expertise that determines the impact they have on the evolution of a community of learners oriented toward self-regulated learning. Three critical tools that tutors use in orchestrating a community of learners are questioning, feedback, and scaffolding which are all guided by content and process expertise. Knowing what to ask, when to ask it, and when to share expertise is the foundation of effective instruction for self-regulation.

Questioning. One of the tools, effective tutors use in the PBL and SCL environments is effective questioning. Questioning is effective when it is guided by content and process expertise and used to *shape* the way in which the community of learners evolves. Strategically monitoring the interplay between content and process expertise, allows the tutor ask questions that engage students in seeking and discussing relevant content knowledge. It also encourages students to take responsibility for *shaping* the community of learners and the way in which it evolves. In the words of one PBL student:

> This year I really had a good leader. The facilitator was laid back—he'd say "what would happen if..." and I would think "oh, I never thought of that." The facilitator plays a big role in its success. He doesn't have to play an active role but sets the tone. (216).

Comments made by this second year student reflect the actions of a PBL tutor who successfully facilitates the learning process without directing the learning. Setting the tone without playing an active role, requires the tutor to ask leading questions that result in reflection and analysis about the process, direction, and products of inquiry by participants in the community. This type of questioning is guided by content and process expertise and the product of reflective practice on the part of the tutor.

Similarly, as an SCL tutor, I have found that my questioning is guided by the interplay between my content and process expertise. My expertise in the content area (such as mathematics) guides the timing of my questioning because I recognize the points at which students should be monitoring their progress, direction or accuracy. My process expertise guides the kinds of questions I ask because I reflect on what I would ask myself to self-monitor. By asking students the right questions, I can guide them to be metacognitive about their actions—a significant component of self-regulation and critical thinking (Butler & Winne, 1995). Questions such as "what is your goal here", "what are you trying to do", "how can you/we figure out if this is working", "how do you/we know if this is correct", etceteras serve two purposes. First, they assist the student to direct (or re-direct) their learning at that instructional moment. Second, and more importantly, they model the process of self regulating through self-questioning. Gradually, students incorporate these kinds of self-monitoring questions into their own repertoire of activities, thereby becoming more metacognitive.

Feedback. Content and process expertise also make feedback opportunities apparent to tutors. Feedback based on an understanding of the mastery and application of content knowledge, the accuracy of that knowledge, and the process by which a community of self-regulating learners evolves plays a critical role in promoting self-regulated learning in a community of learners. Monitoring progress and planning one's direction is contingent upon interpreting and using the data provided through feedback. Feedback about content and process provides the data from which self-regulating students self-monitor (Butler & Winne, 1995). Feedback also provides the information from which a community of learners evaluates its practice and adapts or persists. Therefore, feedback is also a tool with which tutors orchestrate a community of self-regulating learners.

Deciding upon the appropriate feedback to provide is a challenge for tutors and the decisions tutors make about feedback have a significant impact on the learning process in PBL sessions. The following discussion between first year medical students illustrates their perceptions about feedback and the role it plays:

> Student 1: There is no evaluation of how well we are doing with the skills and objectives—no specific details about what we should be doing
>
> Student 2: This varies between groups, our leader always says the group did a good job
>
> Student 1: our leader does also, but nothing specific
>
> Student 2: The leader looks at the objectives [referring to the case objectives] (1F1)

A fundamental goal of self-regulated learning involves the internal generation of feedback. Furthermore, a community of learners should benefit from the distributed generation and provision feedback as a source of expertise. As students take on more active roles in the community of learners, one would expect them to share this expertise by providing feedback for one another. While one of the goals associated with self-regulation is that students learn to monitor the effectiveness of their own learning, thereby producing feedback for themselves (and others), this does not imply that the instructor's role is to provide no feedback or, as some students described, only ambiguous feedback. Rather, the instructor collaborates with a community of learners by drawing on expertise to craft effective questions and encourages students to do the same. The distributed expertise of participants provides feedback to the community and contributes to learning, both individually and collectively—this is the nature of metacognition transferred. As an SCL tutor, I have learned how to support students in evaluating and monitoring their performance, through the use of informed questioning. As students become more autonomous they begin to seek out and provide their own feedback through the use of a similar kind of questioning; students become active participants in their learning process and active leaders in their learning communities, thereby moving from content and process novices to experts.

Some of the medical students were uncomfortable with the type of feedback they received in PBL. They were looking for more than "the group did a good job". The following juxtaposition of quotes from first year students highlights the disparity between students in terms of the kind of feedback they should have in PBL:

> My problem was the lack of resolution of cases we studied. We got really keen, we learned a lot, but didn't know if we were right (1F1).
>
> It would be extra reward if we were right on the diagnoses (1F1)
>
> Our group leader talks a lot, lectures, stories—corrects us if we are wrong a little. I wouldn't want NO feedback, but he gives too much (1I1)

These two comments show a spectrum of responses. The first student expects that there is a "right" answer and that the tutor should be able to provide that. The comment made by the second student illustrates the danger of providing too much feedback. These comments suggest that student discomfort with PBL feedback needs to be addressed beyond preparing and training tutors. Shope (1989) suggests that some student discomfort is also the result of their own inadequate understanding of the PBL process as well as lack of appropriate feedback. If students don't understand the process and the purpose of PBL, they will have difficulty accepting feedback that is not concrete. Similarly, if tutors do not understand the theory behind PBL, they will have difficulty providing feedback that guides students toward seeking, generating, and sharing their own feedback. Curriculum innovations such as PBL require support for

both students (Woodhouse et al., 1995) and faculty involved in the transition.

Students engaged in SCL also experience discomfort with the kind of feedback they receive. Their frustration with not being given the answer is often expressed through comments ("just tell me if it is right?") and behaviours (cancelling appointments following sessions in which you push them to generate their own feedback). In one of my recent experiences I found the most effective way to address these concerns was to discuss the process of SCL with the student (how it evolves and why it evolves in that way).

Scaffolding. Previous research suggests that students tend to be dissatisfied about the lack of structure in PBL (Blumemberg & Eckenfels. 1988) and that this is particularly pervasive in the earlier stages of their program (de Vries, Schmidt, & de Graaff, 1989). Furthermore, students rated their enjoyment of PBL higher, when the tutor was more directive (Davis, Nairn, Paine, Anderson, & Oh, 1992). In a review of the literature on outcomes and implementation issues for PBL, Albanese and Mitchell (1993) suggested an approach to reduce the discomfort students feel with the uncertainty of PBL, particularly in their early exposure. They suggested that students require a gradual progression toward total independence of learning. This highlights the dynamic nature of tutoring which aims at promoting self-regulated learning.

> As students' competence and knowledge increases, the tutor's leadership style should change. For novices, the style should be more directive or "telling", meaning the tutor provides more guidance, direction, and emotional support (high levels of task and relationship behaviors). As students mature, the tutor should be more "participatory" or "delegative": providing little direction or support and allowing students to decide what and how they will learn (Albanese & Mitchell, 1993, p. 74).

Unlike the process that directed my attention to the other two *tools of orchestration*, scaffolding emerged from my own practice rather than the comments made by PBL students. It was the absence of discussion about *learning to learn about PBL* in the medical data, that alerted me to scaffolding as a tool of orchestration. Given my experiences and struggles learning to scaffold SCL instruction. I was surprised that students did not talk about the PBL process as evolving over time and with experience, as they learned to participate in the community of learners.

My experiences suggest that providing scaffolded support for students is not straightforward, and does not go unnoticed by students. I discovered that providing scaffolded support, requires learning how to decide on the degree of structure or direction to provide, and when to begin phasing out that support. SCL attempts to encourage students to adopt, adapt and evaluate their own strategies; as such, my first struggle as an SCL tutor involved deciding whether to tell students to write their strategies down. I discovered, through conversations with other SCL tutors and experiences with students, that asking students "how will you remember that strategy the next time you get stuck" was more effective because it gave students ownership of their memory tool. I expect PBL tutors face a similar struggle in guiding the structure of a PBL session, and this may explain why different *shapes* of PBL emerge.

Facilitating self-regulated learning is not the same as letting students stumble upon the content, strategies, and solutions. It involves carefully orchestrating a learning environment so as to guide students toward successfully directing their own learning. It is unlikely that a tutor can gain the theoretical knowledge to guide this action through a basic introduction to PBL only. My experience as an SCL tutor has shown me that it is much easier to fall back into the pattern of giving students steps and procedures than it is to help them discover, evaluate and adapt those steps themselves. Successfully promoting self-regulation requires that the facilitator attend to and critique his/her own practice based on an understanding on pedagogical theory associated with self-regulation and legitimate peripheral participation.

CONCLUSIONS AND FUTURE DIRECTIONS

The themes I have discussed imply that both PBL and SCL are much more than instructional manipulations; they are learning environments within which the tutor and students play critical roles. Analyzing both the *shapes* of PBL as emerging communities of learners and the role of tutors in orchestrating those communities, illustrates the importance of preparing tutors and students to engage with, and in, a community designed to promote self-regulation. Many factors influence the evolution of a community of learners including the nature of discourse and the interplay of content and process expertise between participants. This paper has provided insight as to how a community of learners unfolds through the skillful orchestration of an instructor who brings to the community: (a) content and process expertise; and (b) instructional tools to share content and process expertise strategically. I have not yet proposed, how tutors and students

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might best be prepared to make a transition from traditional instruction to a community of self-regulating learners model. Perhaps that answer lies in the notion of legitimate peripheral participation as a model for *enculturating* participants in a community of self-regulating learners model.

The process of PBL cannot be separated from its players (both students and tutors). Both PBL and SCL are dynamic processes which evolves over time. In order for a tutor to successfully facilitate this process, the tutor must have a theoretical and practical understanding of the promotion of self-regulation from which to successfully adapt and evolve with the ever-unfolding process in a community of learners. Albanese and Mitchell (1993) suggest that all PBL tutors should be recruited based on their responsiveness to the program (attitude) and should then undergo careful and in-depth *training*. At present, this is a strength of SCL tutor recruitment.

Lave and Wenger (1991) suggest that legitimate peripheral participation is a way of understanding learning as something that occurs regardless of intent or instructional form. By existing and engaging in the many environments and communities within which we live and work, we *are* learning continually (Lave & Wenger, 1991). Legitimate peripheral participation in a community of learners describes the process of learning that occurs as one gradually becomes enculturated in that community moving from the role of newcomer to old-timer. Rogoff (1994) suggests that legitimate peripheral participation also provides a model for introducing "a new generation of participants" to the process of learning to lead in a community of learners. Just as the role of students changes as they make the transition from being newcomers to old-times in a community of learners, instructors need to learn to participate, share expertise and shape the learning process through self-directed movement from observing to participating in problem-based learning.

The PBL tutor plays a significant role in creating a PBL environment that encourages self-regulation and problem solving and should therefore have the opportunity to make the transition from newcomer to old-timer. The role they play depends on learning the theory and practice of self-regulated learning and a community of learners model. This knowledge is acquired through participation in a community of learners that promotes self-regulated learning. It involves active legitimate participation that incorporates activities such as reflecting on their practice, discussing progress with peers, having opportunities to watch and critique the practice of others etc. In essence, this means making the transition from novice to expert, newcomer to old-timer, or peripheral participant to practicing participant. These are the opportunities that allowed me to become enculturated in the SCL approach: observing the collaborative activities of tutors and students, discussing the process, asking questions, and gradually fading into the process in a self-pace manner, guided by feedback from an expert. I brought a lot of theoretical expertise to this learning environment, but my skilled application of that knowledge did not evolve until I became enculturated in the SCL environment.

Learning to promote self-regulated learning also requires active reflection on one's process—it is the practice of self-regulating instructors. For example, as an SCL tutor I was required to write case notes on each session. This involved listening to tapes of the sessions and reflecting upon my practice and its relationship with student progress. SCL is making strides regarding the training process for tutors and facilitators. Perhaps, recent studies of developing SCL tutoring expertise could inform PBL tutors about the process of scaffolding in this type of instruction. Supporting the development of PBL tutors is an important aspect of the instructional process. In order for that to happen, tutors must be supported to reflect on their own practice and consider improvements. Kamann and Butler (1996) provide an analysis of the instructional features of SCL. It evaluates and interprets the interactions between a tutor and his three students. In striving to promote self-regulated learning, studies like these may serve to inform the practice of PBL tutors and other instructors who are learning to engage in scaffolding, or at the very least provide direction for reflecting on their own practice.

Engaging in self-regulating instruction requires a theoretical vision toward which you strive. It is that knowledge upon which you monitor your practice. As an SCL tutor, it was my understanding of the theory behind self-regulation, and of the SCL approach in particular, that maintained my enthusiasm and fueled my perseverance for improvement. It was a struggle to change my approach. Previously, I had a lot of experience tutoring students by teaching them learning strategies (directing what they learned and how they learned it). I had to consciously rethink the tutoring practices with which I had become accustomed. It was the theoretical knowledge of self-regulation and the process of SCL that assisted me to be self-regulating in adopting, evaluating, and adapting the SCL approach I was using. Similarly, PBL instructors may benefit from an understanding of the theoretical underpinnings of self-regulation and problem-based learning. Furthermore, this type of knowledge could empower them to become self-regulating, reflective practitioners.

Understanding the theory behind the instructional and learning processes involved in orchestrating a community of self-regulating learners is a critical step in becoming a successful orchestrator. However, it is not until instructors become comfortable with the process and metacognitive in their practice, that they radiate a commitment to the process that impacts that process in significant ways. How can we expect students to do more than "go through the motions of PBL" if their instructor's actions don't reflect an understanding and commitment to the PBL process? McCrorie, Clark, Colvin, & Drincevic (1994) suggest "it is still possible to facilitate students' learning without being an expert but many staff not used to problem-based learning are uncomfortable with ignorance" (p. 606). Attitude has an incredible impact on the learning environment. If tutors do not understand or believe in the evolution of a community of self-regulating learners (in PBL or SCL), it does not take long for students to become enculturated in that attitude. In larger communities of learners, the impact of attitude is more pronounced because all participants become enculturated in the attitude and actions of the tutor. For example, medical students also mentioned the attitude of their peers as playing a role in the PBL environment. As one student suggested "is all depends on the dynamics" (215).

> It depends on the group and the enthusiasm. Some people just cheat in PBL. They get stuff from a group who covered the topic last week. My enthusiasm really decreased because no real contribution had to be made (3110).

These comments also reflect on the attitudes and knowledge of PBL tutors. Dolmans and Schmidt (1994) suggested that PBL tutors stimulate learning activities, stimulate students to make use of different sources of information, and have an important influence on the selection of learning issues. This would suggest that the actions and behaviours of students arise from the "tone" the tutor sets.

Becoming a self-regulating, lifelong practitioner or problem-solver does not happen outside practice in a relevant context for students or tutors. In SCL, students learn and develop effective learning strategies in the context of "real" tasks—assignments in courses they are taking outside the SCL support environment, or tasks they encounter in their positions of employment. In PBL, students learn relevant medical content and the community process/practice of deciding upon diagnosis and treatment, in the context of "real" cases conveyed on paper. In both approaches the content and process learning are embedded in relevant and "typical" tasks with the goal of students being able to continue that learning after instructor support is withdrawn.

Finally, interpreting and analyzing the data in this paper highlights the notion that promoting self-regulated, lifelong learning cannot be understood or developed within self-regulated learning theory alone. The concept of lifelong learning implies that knowledge and strategies for learning be transferred into environments within which we practice over a lifetime. These environments are often socially constituted. It is difficult to understand or analyze learning in a community with a self-regulated learning lens because it tends to overlook the notion that learning is a socially constructed phenomenon. When we attempt to promote self-regulated, lifelong learning in the context of a community of learners, we go beyond the parameters of self-regulated learning theory. Becoming lifelong learners not only means engaging cognitively, metacognitively and motivationally, but learning to contribute that knowledge effectively in the communities within which we continue to learn across a lifetime. If we want students to learn to participate in these communities in their professional lives, we must give them the opportunity to learn how to do that by situating their learning in those relevant contexts.

Through an examination of the theory and practice of SCL and PBL, I have generated a proposal for embedding the theory and practice of self-regulation in a community of learners model. This analysis of PBL practice provides guidance regarding the skillful and strategic promotion of self-regulated learning in a community. Integrating, my own reflections on becoming an SCL tutor with these findings, brings to the foreground avenues through which tutors can learn to become participants in the learning process, as well as reflective practitioners who guide, rather than lead, the instructional process—orchestrating self-regulation in a community of learners

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