

Skills to Enhance Problem-based Learning

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Abstract: Problem-based Learning (PBL) has become a popular method of instruction among educators in the health professions. Central to the effectiveness of PBL is the ability of students to work together to solve problems. When these abilities are lacking, PBL outcomes can be compromised. Since these skills have not been emphasized in public school or higher education, students are often forced to muddle through group processes in the effort to learn. The purpose of this paper is to discuss the interpersonal skills necessary to enhance PBL, and suggest how these skills can be improved and incorporated into the curriculum.

Problem-based learning (PBL) has gained acceptance and has been found effective within a variety of disciplines in higher education.^{1,2} PBL satisfies three important criteria that promote optimal learning.³ First, it provides an environment where the student is immersed in a practical, on-going activity in which he/she receives feedback from other students and the instructor. Second, the student receives guidance and support from his/her friends and peers. Learning is not uni-directional (teacher to student), but multi-directional, including other students, tutors, and professors.⁴ As Savery and Duffy state, learning occurs through the multiple interactions within the learning environment.⁵ Third, the learning is functional — based on solving a real problem. According to Camp, PBL is based on a foundation of collaboration and integration within a small group context.⁶ Simply stated, PBL depends upon the ability of students to work together to identify and analyze problems, and/or generate solutions.

PBL's dependence upon group effectiveness may lay at the heart of the difficulty for researchers to definitively say that PBL improves learning.^{7,8} Kalaian and Mullen reported that although tutor effectiveness was the crucial item in learning at the start of the curriculum, by the end, learning was more a function of the effectiveness of the small group process.⁹ The assumption that students can work together effectively is a misguided one. Few employed health professionals, much less students, have the skills needed to work in groups competently or effectively.^{10,11} This should come as no surprise since traditional lecture or textbook generated learning is at

the core of education from elementary school through many graduate level programs. Subsequently, students are forced to learn by trial and error how they personally work best in a group setting. Their communication and group interaction habits are developed over two decades of formal education. These habits, however, differ from student to student. Some may try to take control of the group, others will become passive, still others will become overly verbose, while others will shy away from commenting.¹² Observers of student group interaction often find that students don't work productively, waste time, repeat old information, or become confrontational.⁷ Regardless of the problem posed to a group of students, learning is proportional to the ability of that group to work effectively together.¹²⁻¹⁴ Faculty, too, may lack the ability to utilize problem-based learning effectively because of a lack of training in small-group management.¹⁵ In some instances they may find themselves in small groups that actually harm individuals and the learning climate.¹⁵

Medical and health professionals who have used PBL in the classroom have reported symptoms of weak group process and interaction skills among the students.^{7,9,15} These problems compromise the learning process. Hitchcock and Anderson identified five different small group dysfunction¹⁵:

- Apathy, or lack of meaningful interaction.
- Limited or focused discussion that ignores other aspects of an issue.
- Dysfunctional group member who does not

participate or perform work equally with others in the group.

- Scapegoated student, who becomes ignored by other group members.
- Domineering student who disrupts, or prevents others to learn through the process.

For faculty, poor interpersonal skills (as determined through informal interviews) can lead to:

- A class becoming hostile towards the instructor due to frustration over learning.
- An over-reliance on tutors and/or professor in solving problems and completing tasks.

Peter Senge stated that “a group of talented individual learners will not necessarily produce a learning team, any more than a group of talented athletes will produce a great sports team.”¹⁶ [As a point of clarification and for the purposes of this article, group and team will be used synonymously] To be a learning team, the learners need to have the interpersonal skills that will help them become an effective team. For example, in a course designed to teach students how to work together as a group to solve problems, lack of interpersonal skills and over-reliance on previously formed bad habits of group process created a decline in learning.¹⁷ In this course, students were randomly divided into two groups of six students each. However, randomness created one group comprised of all the “leaders” in the class, and one group with “no leaders.” All students had been instructed in the skills of team dynamics, and were required to utilize these skills to solve a problem posed to them by the instructor. Based on instructor observations, and qualitative data obtained from students in the course, the “no leader” group utilized the skills, followed the process, and worked effectively and efficiently during the class. Their level of interaction and the depth of analysis was good. The “leader” group started out fine, but over the course of time began to break apart as individuals began to try to gain dominance of the group and to formulate a process to their individual preferences. Eventually, the group was pulled in six different directions, communication broke down, and motivation declined. Individually, the students were good, but together they were not successful. Frustrating the situation even more for the “leaders” was the fact that the other group was functioning effectively, having fun, and learning. It became abundantly apparent to the “leaders” that they needed to follow a process, and practice the skills

taught to them in order to learn and function effectively. This experience impressed upon the students that interpersonal skills relating to group process were essential for effective problem solving and learning, and that sheer force of will does not breed success. Katzenbach and Smith have expounded on the need for teams to have problem solving and interpersonal skills.¹³ Without these skills being adequately developed, student learning can be frustrated.

What Interpersonal Skills are Necessary?

The skills necessary for successful teaming include: consensual decision making skills, dialogue and discussion skills, team maintenance skills, conflict management skills, and team leadership skills. Students who have these skills have a better opportunity to learn more than students who do not have these skills.^{12,17-19}

Consensual Decision Making Skills

The first skill team members need before they join a team is consensus decision making.¹⁹ Consensus is based on the term “to consent” as in “to grant permission.” When a team arrives at consensus, each team member permits the decision to occur and agrees to support the decision. Consensus means that every member of the team participates in the decision, and everyone agrees with the decision. The decision, however, may not be the decision everyone prefers, but it is one that everyone can live with. In PBL, reaching consensus requires that every student participates, has equal opportunity to be heard, and for their ideas to become part of the team’s database.^{20,21} Consensual decision making, by definition, involves the contributions of all members, not only a select few. In this environment, the likelihood of an outcome acceptable to all is high.²⁰

Consensus occurs at various levels. Sheive and Metivier have outlined five levels of consensus.²¹ The first level is where all team members agree that no more information is needed. The second level is where everyone understands what each team member means. It involves clarifying the information. The third level of consensus occurs when all members agree on the relationship between a set of items (differentiating between main and supporting ideas). The fourth level of consensus occurs when all agree on the hierarchy within a set of ideas. Lastly, the fifth level of consensus is achieved when all agree on the activities needed to

solve a problem. Adopting consensus as an operating style requires patience, the ability to listen and learn from others, and a willingness to adjust one's own needs with those of the team's. While consensus is time consuming, it inevitably leads to well thought out and implementable solutions.²⁰ Consensus is predicated on the need for individual's to understand each other. Therefore to reach consensus students need to have the ability to effectively engage in dialogue and discussion.

Dialogue and Discussion Skills

Dialogue

Dialogue is a process by which students seek to understand one another. Dialogue is not just a technique, but a principle that is founded on the belief that problem identification and resolution are intimately linked with a core of common meaning.¹⁶ Before a solution can be determined, common definitions of the problem must be identified.⁴

Dialogue is a process that builds shared meanings and definitions of the problem between students within a group. When the meanings are shared and understood the ability of the students to resolve the problem is enhanced.

For dialogue to be effective it must be nurtured not forced. It requires true facilitation, not manipulation, where value judgements are not allowed. At most, students in a dialogue ask questions to clarify meaning for the purpose of accurately understanding another's viewpoint and passion about an issue or problem.²⁰ The issue is *not* whether you agree or disagree with another, the issue is whether you understand the other person's view. Consequently, effective listening and critical thinking skills are crucial.²²

Dialogue is not used for the purpose of making a decision. According to Senge et al., it will backfire if channeled toward closure.¹⁴ This can be a problem with student learning and is often exemplified when students go directly to solutions rather than developing a shared meaning of the problem. Through dialogue students learn how to think together. Students learn when individual contributions lead to greater understanding of the problem and how to resolve it.

Two effective procedures that enhance dialogue are brainstorming, and clarification.^{17,18,21}

Brainstreaming, as opposed to brainstorming, is a procedure that sequentially solicits ideas pertaining to a problem from group members. Whereas brainstorming involves a random solicitation of information that tends to favor the more verbose and quick thinking individuals, brainstreaming allows all group members equal opportunity to participate in idea generation. The ability for each student to participate equally provides a potential solution to problems with domineering, shy, or less cerebrally agile students. By providing equal opportunity, all students develop a sense of ownership and reduce the tendency to think unidirectionally. Following brainstreaming, clarification is utilized to provide depth of meaning of the brainstreamed items, and to promote understanding between students about each item. Essential to dialogue is asking questions that clarify, not challenge or place a value judgement on the item. Value-laden questions breed interpersonal conflict which compromises the team's effectiveness.

For example, a student who feels threatened by another student's questioning may be less likely to provide information in the future. The net result is a group with fewer actively participating members, and less "brain power" to engage the problem. Therefore, clarification is a skill that utilizes effective questioning to promote understanding — not agreement. Questions are posed in a manner such as "Help me understand what you mean by this statement?" "Please explain to me how your item relates to the problem we are addressing?" Clarification also requires that the student, whose brainstreamed item it is, clearly articulate what they mean. This promotes critical thinking, for to be clear a student must present information that is not ambiguous. All students in a group must be allowed to ask for clarification of an item. When all students understand, essentially they have consented to the meaning of that item.

Discussion

In contrast, discussion is used for the purpose of making a decision or reaching closure on an issue or problem. For discussion to be effective it should follow dialogue. When there is no common understanding of the problems and concerns, or shared vision of what needs to be done, effective decision making is compromised.²³ Discussion is not a debate, and it is not for the purpose of winning. Discussion is a skill that makes thought processes visible, allows assumptions to surface and be challenged, and exposes the sources of disagreement. Effective discussion

focuses on issues, not personalities.²² Discussion, mindfully done, allows ideas to be challenged in a meaningful way, and focuses on making a decision so a problem can be addressed and remediated. The role of the facilitator is essential in effective discussion, for discussion can become unfocused and purposeless if not done properly. The facilitator must focus predominantly on the process, not the content of discussion. The facilitator must monitor discussion so that it allows students to reach a decision, challenge assumptions and involve all group members. Facilitators should provide opportunity for all to participate in the discussion. Discussion is useful in clustering items together into categories, prioritizing items as to their relevance to the problem, or selecting a solution to the problem. Facilitators must be careful not to interject their ideas, but rather, focus on promoting student interaction and discussion toward a decision. Tutors, for example, must be careful not to practice facilitation by manipulation. That is, move the team to their view or solution. If this occurs, students may learn to be dependent upon the tutor, rather than becoming independent learners and decision makers. Although, tutors may help teams where they lack information, during discussion, they should take caution in moving the team to their viewpoint.

Maintenance Skills

All teams have two fundamental tasks: to accomplish a task, and to develop and maintain the team. Tipping, Freeman and Rachlis reported that faculty and students had a low awareness of effective group dynamics and the absence of mechanism for reflection that could help groups analyze and learn from their behaviors.⁷ For teams to improve, and therefore learn, all members must contribute to the on-going evaluation of the team's process and development. This requires group members to provide feedback and evaluation on: 1) each member's commitment to the project, task, and team; 2) the level of affective development including feelings of trust, belonging, and work relationships; 3) the team's efficacy — ability to get the job done; and, 4) their ability to resolve conflict. Therefore, team members must have and follow methods and procedures that allow feedback.²¹ Feedback from others is essential for both personal and team growth, and students should learn to self manage their own groups by conducting on-going process evaluations.¹⁹ When students do not receive on-going feedback about their own performance, problems fester, resentments rise, and frustrations increase.

Feedback should not only occur from the instructor, via a grade, but should also be on-going from both the instructor and other group members so that students have opportunity to improve throughout the PBL process. Another technique that serves to promote team maintenance is debriefing. Debriefing is a technique of discussing how the team and/or the work of the team is progressing. It serves to engage the group in self-assessment, and enables the group to determine how it needs to change and to be self correcting. For example, during debriefing students may address what went well, what has been accomplished, what were some difficult moments, what they need to work on, and what has been learned. Debriefing should be done at the end of every other class period, as a minimum, to be effective.^{17,18,21}

Conflict Resolution Skills

Conflict is healthy, common, and necessary for team growth.¹⁵ However, conflict can become destructive to student learning when it is personal or becomes an obstacle to task completion. Conflict can occur when students lack the skills necessary for team function. For example, a lack of dialogue skills will result in misunderstandings, a lack of shared meaning, and confusion. This can result in conflict and create resentment.¹³

Another source of conflict is the difference in thinking styles between students. Teams are usually composed of 5 to 10 students, each with a different background, a unique view of the world, and a variety of thinking styles. This diversity provides rich resources for problem solving.²⁰ Thinking styles determine how a student gathers information and how the student utilizes information to solve problems. Not understanding or appreciating the value of other students' thinking styles creates conflict. For example, a more intuitive student is more likely to consider several options simultaneously when analyzing information, or jump from one step of analysis to another. In contrast, a systematic thinker is more likely to make a plan for problem solving, and complete one analysis before jumping to the next step. If these students don't understand the value of each others' style and their respective manner for analyzing data, the systematic thinker may view the intuitive thinker as flighty and impulsive, while the intuitive thinker may view the systematic thinker as slow and ignorant. Many potential conflicts are minimized when students are aware of the various cognitive styles represented by

individuals within the group.²⁰

According to leaders in team process conflict can be managed and minimized by:^{10,13,14,19}

- Focusing on the process and not the people as the source of conflict.
- Providing a safe, non-threatening environment that allows conflict to surface and be resolved.
- Developing common team purposes and goals.
- Building shared meanings and perspectives.
- Instituting a common approach to solving problems and accomplishing team tasks.
- Emphasizing collaboration.
- Understanding differences in how individuals gather and analyze data (i.e. thinking styles).

Hitchcock and Anderson also recommend that ground rules be established to govern student interaction, and to promote the above objectives.¹⁵ Ground rules serve to prevent crises from occurring by establishing clear expectations, and serve to establish norms of behavior which act as references for process diagnosis when problems do occur.²⁴ Ground rules should be elicited from the group members,²⁵ with certain ground rules deemed mandatory.¹⁵ For example, students should be punctual and attend class, no value judgements during brainstorming/storming and clarification, come to each group session prepared. Peterson utilized a structured team problem solving approach that provided a systematic method for problem solving and group interaction.^{17,18} The structured system prevented behaviors and communication patterns that create conflict. Student qualitative responses, and outside observations from the Center for Teaching Effectiveness indicated that conflict was significantly reduced, and students stayed on task during the team interaction. By defining roles, space, and behaviors through a structured process, conflict was minimized because students learned how to act and function together to solve a problem.

Team Leadership Skills

In early teaming, every individual should be given the opportunity to be assertive and to learn the value of his/her thoughts and actions.¹⁹ This necessitates that traditional views of a leader's role be modified.²⁶ Teams need and seek participation and input from all members. Traditionally, the leader of a group is seen as the authority, the one who makes the final decision, generates member interaction, sets the agenda, and provides direction.⁷ As a consequence, team members

may become reliant upon the group leader, and may not function well without his/her presence. A student team which operates this way usually can not be productive when a "student leader" (or tutor) is absent. This approach is very much like traditional education modalities which have been reported to contribute to a "learned helplessness" among students.^{27,28} Therefore, it becomes necessary for all team members to be able to lead the team. This can occur when responsibility for the operation of the team is shared. The technique is called role-sharing. Shared leadership leads to shared accountability and competencies. The leader of a team should focus on the process rather than the content of the problem solving process. The leader performs more of a facilitatory role, working to encourage and manage communication, participation, and consensus.²⁶ The leader functions to manage and implement dialogue and discussion appropriately, as well as resolve conflict judiciously as it arises. Most importantly, the leader keeps the team functioning within a problem solving process. When students overtly share the leadership or facilitator role, they are more attentive to team maintenance issues when they reassume a team member status because they can empathize with the team leader's responsibilities.²⁰ In addition, effective leadership skills allow students to become more self managed, which may allow for fewer tutors, thereby reducing the cost of a PBL curriculum — a common obstacle to PBL implementation.⁴

The Importance of Structure

Teams need a common approach to problem solving, and members need a safe, secure environment in which to function, share ideas without being judged, interact, and to keep them on task.^{12,16} Team process breaks down when there is a lack of direction, purpose, and open communication between team members. Although students have developed individual strategies for problem solving, these strategies often do not mesh with the strategies of others, or work well in a team setting. According to Shieve and Metivier, to promote effective team interaction the team must have structure to:²¹

- Provide an overall process for problem solving.
- Provide procedures to govern the problem solving process.
- Govern and regulate team member behaviors, roles, and space.

When people feel that their ideas do not matter, or feel vulnerable to ridicule, learning is hampered, and a

feeling of helplessness can develop.²⁸ Student frustration also results when team members pull the group in different directions, or follow a process of problem solving that has not been agreed upon by the entire team. Conflict occurs when student interaction is not regulated such that unequal participation, workload, and learning occurs.¹⁵ Students may regress into conflict when there is an absence of rules and thereby compromise learning.

Student groups that learn and follow a structured problem solving process, utilizing a common set of procedures, governed by techniques which regulate team behavior, have shown through self-reported and outside observer data improvements in critical thinking, interpersonal skills, problem solving, and learning.^{17,18} Czikszenmihalyi has long advocated the need for rules and structure for obtaining an optimal psychological experience.²⁹ Structure in terms of behaviors, roles, and space may help students function more competently and obtain a positive educational experience in PBL.

When Should Interpersonal Skills Be Learned?

Ideally, it would be advantageous if all students had these skills prior to the implementation of PBL. The reality is that not all students have adequately developed these skills. There are three possible mechanisms for teaching students these skills. The first is to create a skills course as a prerequisite to PBL based courses or curriculums. The advantage to this approach is that subsequent instructors do not have to concern themselves as intensely with the process of learning, thereby freeing them to deal more directly with the content to be learned. A second strategy is to train students in interpersonal skills while they work on a problem in a specific course already existing within a curriculum. This option has the advantage of not having to create a new course, but it will compromise the learning of content because the instructor will have to divide his/her attention between the learning of teaming skills and the course content. This strategy, however has been limited to smaller class sizes of 30 or less.¹⁸ Finally, tutors and faculty members could be trained to be team trainers, and teach students teaming skills while they work on problems. This spreads out the training and frees the instructor from having to spend time on interpersonal skill development.

It is also important for faculty to be competent in interpersonal skills before they can be expected to train

students. For PBL to be improved, the development of interpersonal skills is a necessity. Continual reliance on the belief that students will somehow be able to work out a problem will continue to compromise PBL and student learning outcomes. PBL's effectiveness is impacted by how well students work together. Therefore, enhancing Problem-based Learning will require the development of the interpersonal skills upon which PBL is built. Since PBL has not been the educational method of choice in the majority of pre-medical education systems, suffice it to say that many students will lack these skills upon entering the medical school curriculum. By training students (as well as faculty) in these skills prior to, or within existing medical courses which utilize PBL, learning can be enhanced.

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