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Emotional Intelligence and Social Skills: Necessary Components of Hands-on Learning in Science Classes

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Abstract

The multiple intelligences are familiar concepts to K-12 teachers and to many university professors, especially those in teacher education. The majority of educators have also heard of Daniel Goleman and the concept termed "emotional intelligence." Emotional intelligence is rarely discussed as an important variable in the classroom, however, even though it has a profound influence on student learning. It should, therefore, inform decisions regarding the type and variety of instructional activities. Goleman's (1995) research supports the claim that emotional intelligence, even more than IQ, is the most reliable predictor of success in school and in life. In this article, emotional intelligence is presented as the foundation for social skills—skills that students must possess to successfully work together collaboratively and in cooperative groups. Research conducted in U.S. classrooms indicates that the benefits of cooperative group learning depend on the quality of the interactions that occur. When the interactions are respectful and inclusive, more frequent use of small groups is associated with increases in academic and prosocial outcomes. When group interactions are disrespectful and inequitable, frequent use of groups is associated with reduced academic and prosocial outcomes. Linn, Lewis, Tsuchida, and Songer (2000) suggested that science education, as well as academic instruction of all kinds, should be studied in the larger context of students' social and ethical development (i.e., responsibility, helpfulness, and the willingness and capacity to express disagreement respectfully); however, few reform efforts in the U.S. focus simultaneously on academic content, social development, and character development (Schaps, Watson, & Lewis, 1997).

Students Working Together at All Levels

Educators in all grade levels, kindergarten through college, are realizing the value of students working together. Cooperative learning techniques are used throughout the curriculum, including in science classes. Comprehensive data of a meta-analysis of over 1,200 studies compared the performance of students educated using cooperative learning strategies with that of students taught by traditional methods. The results indicated that cooperative learning promoted greater individual knowledge, greater retention of knowledge, and more enjoyment by students as compared to competitive and individualistic learning (Johnson, Johnson, & Holubec, 1993). Students taught by cooperative learning had better

attitudes toward subjects, developed better social skills, became more articulate, and ended up respecting differing viewpoints more than students taught by traditional modes. Studies with college students that compared cooperative, competitive, and individualistic learning indicated that cooperative learning promoted higher individual achievement than other approaches in the areas of knowledge acquisition, retention, accuracy, creativity in problem-solving, and higher-level reasoning (Johnson, Johnson, & Smith, 1998). These results were true for verbal tasks (e.g., reading, writing, presentations), mathematical tasks, and procedural tasks. Cooperative learning also promoted higher quality of relationships and psychological health.

Traditionally, cooperative learning methods were used primarily in elementary school classrooms. At the present time, cooperative and group learning strategies are slowly being integrated into secondary and postsecondary classrooms. In many colleges, more attention has been paid to developing "Lone Rangers" than to creating learning communities within which the achievement of all students is enhanced; however, many university professors are now seeking more effective ways to teach than by using solely lecture (King, 1993). The national call for reform in science education stimulated by *A Nation at Risk* (National Commission on Excellence in Education, 1983) has captured the attention of many university faculty who recognize the need to change how science is taught, especially in undergraduate classes (Ebert-May, Brewer, & Allred, 1997). University professors are finding that it is possible to implement strategies for active, inquiry-based learning and cooperative group interaction in large lecture classes. They are learning that cooperative learning is the most effective strategy to shift responsibility for learning from the instructor to the student. Many university instructors are changing the way their courses are taught; they are combining cooperative learning with an inquiry-based approach and experiencing the result of more effective learning by more students. Even science professors of large university classes, many of whom have never facilitated activity-based instruction, are now experimenting with cooperative learning activities.

The Problem

As instructors in all grade levels integrate cooperative learning strategies into their classrooms, a problem is emerging: many students do not understand how to work cooperatively with others. They lack the emotional intelligence, and they need social skills training. This problem and the need for training are evident at all levels, primary grades through graduate school. A research study at Northern Arizona University investigated the relative effectiveness of inquiry-based instruction and found that the majority of students entering the classes had minimal, if any, experience in working in successful cooperative groups (Ebert-May et al., 1997). Highly structured classroom management was necessary to facilitate individual and group interactions during class.

Ordinarily, teachers do not place priority on developing their students' emotional intelligence or social skills. They expect their students to acquire these qualities by the time they begin school. Too often, children are not taught these skills in their families, or they are influenced by a competitive environment to solely seek self-gratification. Furthermore, children are expected to expand their emotional intelligences and improve their social skills as they progress in school, but with no special training in these areas.

Our society's culture and reward systems have been oriented toward competitive and individualistic work rather than cooperative work (Johnson et al., 1998). Students in all grade levels, including college, frequently have difficulty communicating, taking turns, exchanging ideas, sharing, making requests, discussing ideas, and treating each other with respect. Teachers in kindergarten through college have found the lack of social skills to be a problem. Until students are taught these social skills, any efforts at cooperative or group learning are destined to fail. Additionally, almost all classrooms that are funded by public education include students with disabilities; these students frequently lack the emotional intelligence necessary for social skill development.

In the remainder of this paper, the authors present background on emotional intelligence and social skills instruction as prerequisites to working cooperatively. Cooperative learning is presented as a way to involve students in working together in activity-based instruction for the purpose of learning course content. As students participate in the activities, their social skills improve and they become better equipped to work collaboratively and cooperatively. They develop a greater level of emotional intelligence, which increases their persistence, motivation, and the ability to handle diverse relationships.

In the paragraphs that follow, we will explore the concept of emotional intelligence as the foundation for social skills and how we can help students develop emotional intelligence in science classes. Emotional intelligence and social skills are prerequisites to successful collaboration and participation in cooperative learning activities, and they are strengthened by participation in these activities.

Emotional Intelligence

Emotional intelligence can be compared to Howard Gardner's (1993) definition of intrapersonal and interpersonal intelligences. Emotional intelligence is defined as the ability to develop self-awareness; to delay gratification; and to remain persistent, motivated, and empathetic. Emotional intelligence includes self-discipline and the ability to control impulses. The characteristics of emotional intelligence include those qualities that are predictors for successful functioning in society. These characteristics are described as being self-assured and interested; knowing what kind of behavior is expected and how to control the impulse to misbehave; and being able to wait and delay gratification, to follow directions, to turn to teachers for help, and to express needs while getting along with peers.

Salovey, Mayer, Goldman, Turvey, and Palfai (1995) proposed a model of emotional intelligence that includes abilities in five domains:

1. *Understanding One's Emotions*: Individuals who are introspective, insightful, and truly understand their feelings are better equipped to develop goals, make plans, and follow through and achieve their goals. They are able to understand their strengths and are willing to work on their weaknesses.
2. *Managing One's Emotions*: Understanding one's feelings leads to better management of emotions and, consequently, to happier situations. Individuals who are able to manage their emotions are able to control their behavior.
3. *Motivating Oneself*: Individuals who are able to manage their feelings in a positive direction are able to control their impulses. They are in charge of their behavior and feel empowered to change their destiny.

4. *Recognizing Emotions in Others:* Empathy is a quality that is crucial in maintaining a civilized social order. It negates the "every person for him- or herself" mentality, and causes people to abide by certain moral principles. Empathetic individuals are sensitive to the feelings of others and are able to put themselves in "another's shoes."
5. *Handling Relationships:* The art of influencing people requires skills in managing the emotions of others. Individuals are able to collaborate and to cooperate with others and respect their differences.

Social Skills Instruction

Youngsters who lack social and emotional competence frequently experience behavior problems and failure in academic pursuits. The lack of self-restraint and compassion for others may cause them to withdraw from social interactions or turn to violent acts. Helping children develop socially and emotionally is equally if not more important as helping them to progress academically; however, teachers are sometimes hesitant to systematically teach democratic values. They may feel intimidated by parents who believe that the teaching of values is solely a home responsibility and that a school's obligation is to provide academic instruction. A poll surveying parents of students in public schools indicated that the public does indeed favor the teaching of values in public schools. The respondents of the poll were in strong agreement on teaching skills such as honesty, democracy, responsibility, acceptance of people of diverse races and ethnic backgrounds, caring for one another, moral courage, and love of country (Rose & Gallup, 1999). It has recently become more "politically correct" to substitute the term *social skills* instruction for value education or moral education. The word "value" has religious connotation and is attached to the value clarification movement of the 1960s which was highly criticized because of the belief that any value is as good as any other (Kohn, 1997). Recent social skills programs stress democratic ideologies by helping students to understand the effects of their actions on others and to promote individual emotional maturity. Thus, social skills instruction involves teaching intrapersonal and interpersonal skills. These skills may overlap with many religious ideologies, which are basic for social order and harmony. Students must be taught to be introspective and insightful, to set realistic goals for themselves, and to persevere in achieving their goals. They also need to acquire those social skills necessary to get along and work with others. Richardson (1996a, 1996b) developed a social skills program entitled *Connecting with Others: Lessons for Teaching Social and Emotional Competence*. The lessons are based on three main theories: (1) Cognitive Behavior Modification, (2) Transactional Analysis, and (3) Responsible Assertion. Combined, these three theories serve as a base to teach students responsibility, self-discipline, empathy, self-awareness, and positive interpersonal skills. These qualities are essential for meaningful cooperative interchanges and teaming.

Essential Elements of Cooperative Learning

According to Johnson et al. (1993), "Cooperative teaming is the instructional use of small groups so that students work together to maximize their own and each other's teaming" (p. 6). Cooperative teaming activities help students improve academically; they also help the students develop social skills and expand their emotional intelligence. We use cooperative teaming in the classroom as a way to

engage students in active teaming activities designed to assist in long-term teaming and to help them improve their emotional intelligence. Through cooperative group teaming, students can learn to empathize, to become sensitive and caring, and to be able to take the perspective of others. They can learn to collaborate with each other and to peacefully resolve conflicts that may arise within the group.

Simply assigning students to groups and telling them to work together does not result in cooperative efforts (Johnson et al., 1998). Cooperative learning is more than throwing students together and expecting learning to occur (Herreid, 1998). Johnson and Johnson (1999) explained five elements that are essential to successfully implementing cooperative learning: (1) positive interdependence, (2) individual and group accountability, (3) promotive interaction, (4) interpersonal skills, and (5) group processing.

For positive interdependence to occur, success of the group goal requires that group members work together to complete the task. Each student must perceive that he or she is linked with others and cannot succeed unless the others succeed. For individual and group accountability to be effective, each person is held accountable for his or her contribution, and the individual performance of each student must be assessed. Additionally, the group must be held accountable for achieving its goals.

For successful, promotive interaction, students help each other and care about each other's success. Students encourage, assist, support, and praise each other. To develop effective interpersonal skills, students need to be taught social skills and how to use them appropriately. The success of a cooperative effort requires leadership, decisionmaking, trust-building, communication, and conflict-management skills. For successful group processing, students should assess how well their group is functioning and identify ways to improve the processes they are following.

Outcomes of Cooperative Learning

Cooperative learning promotes outcomes such as academic success, high-quality relationships, psychological health, and positive attitudes toward education. Each of these outcomes reinforces the others and the tendency to cooperate with others.

- *Academic success:* Cooperative learning promotes higher individual achievement than do competitive approaches or individualistic ones. Measures include knowledge acquisition, retention, accuracy, creativity in problem-solving, higher-level reasoning, verbal tasks, mathematical tasks, procedural tasks, metacognitive thought, willingness to take on difficult tasks, persistence, intrinsic motivation, transfer of learning, and time-on-task.
- *Quality of relationships:* Cooperative effort promotes greater liking among students than does competing with others or working on one's own. Measures include interpersonal attraction, cohesiveness, and trust. Students who learn cooperatively perceive greater social support from peers and instructors than do students who work competitively.
- *Psychological health:* Cooperativeness is highly correlated with a wide variety of indices of psychological health; individualistic attitudes and competitiveness are related to a mixture of indices of health and psychological pathology.
- *Attitude toward education:* Cooperative learning promotes more positive attitudes toward learning, the subject area, and the school than does competitive or

individualistic learning. There are numerous theories that predict that students' attitudes, values, and behavioral patterns are most effectively developed and changed in cooperative groups.

- *Reciprocal relationships among outcomes:* There is a reciprocal relationship among these outcomes. The more effort students expend in working together, the more they learn and the greater their social competence, self-esteem, and general psychological health. The healthier individuals are psychologically, the more effectively they tend to work together. The greater numbers of committed relationships individuals are involved in, the healthier they will be psychologically; healthier individuals, in turn, are more able to form caring and committed relationships.

Rationale for Cooperative Learning in Science Classes

Cooperative learning activities in science increases communication and interdependence between group members. In a hands-on activity, students can be assigned various tasks to learn independence as well as interdependence skills. Students learn to be responsible for themselves and for each other. Cooperative learning activities empower students and engage them in their own academic learning.

Cooperative learning works extraordinarily well in science courses for the following reasons (Smith, 1993, p. 11):

- Whoever organizes, summarizes, provides elaboration, justification, and explanation learns. The person who does the intellectual work, especially the conceptual work, learns the most.
- More learning occurs in an environment of peer support and encouragement because students work harder and longer.
- Students learn more when they are doing things they enjoy.
- Learning that is informal, social, and focused on meaningful problems helps create "insider knowledge." Gaining insider knowledge is a major part of becoming a member of a community of practice.

Conclusion

Science instruction involves teaching the whole student both cognitively and affectively. When science is taught inclusively, it addresses not only various content areas, but it also addresses understanding of self and others. We approach all learning with our minds and our emotions. Full recognition of our emotions, their role, and their relationship to other mental functions is an important aspect of the more inclusive science of the mind that researchers now believe is evolving (LeDoux, 1996). The last decade has witnessed dramatic new insights in the field of neuroscience. The research has presented new information about the role of neurotransmitters and other communication mechanisms in the brain and body which explain the impact of emotions (Brandt & Perkins, 2000). The most important learning is to understand oneself and others and to develop the ability to manage oneself and to relate to others.

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